Appendix B Acronyms and Abbreviations

Units of Measure and some Physical Constants

A ..... ampere − unit of electric current [named after André M. Ampère (1775−1836), French physicist]. 1 A represents a flow of one coulomb of electricity per second (or: 1A = 1C/s)

Ah ..... ampere hour

Å ..... angstrom − unit of length (used in particular for the short wavelength spectrum); 1Å= 10^{-10} m [named after Anders Jonas Ängström (1814−1874), Swedish physicist and astronomer]

amu ..... atomic mass unit (1.6605402 10^{-27} kg)

are ..... unit of area (1 are = 100 m^2)

arcmin ..... arcminute [1' = (1/60)° or 1 arcmin = 2.908882 x 10^{-4} radian]

arcsec ..... arcsecond [1" = (1/60)' or 1 arcsec = 4.848137 x 10^{-6} radian = 0.000278°]

au ..... astronomical unit − unit of length, namely the mean Earth/sun distance [=1.495978706 10^{13} cm, which is the semimajor axis of the Earth's orbit around the sun (or about 150 million km)]

bar ..... pressure, (1 bar = 10^5 Nm^{-2})

Bq ..... Becquerel [named after Alexandre Edmond Becquerel, a French physicist (1820−1891)]. The Bq is a SI unit used to measure a radioactivity. One Becquerel is that quantity of a radioactive material that will have 1 transformations in one second.

c ..... velocity of light in vacuum (299,792,458 m/s)

cd ..... candela (unit of luminous intensity). The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540 × 1012 Hz and that has a radiant intensity in that direction of 1/683 watt per steradian.

cm ..... centimeter (unit of length) 1 cm = 10^{-2} m

C ..... coulomb − unit of electrical charge; 1 C = 1 As [named after Charles−Augustin Coulomb (1736−1806), French physicist. The coulomb is the quantity of electricity transported in 1 second by a current of 1 ampere.

°C ..... degree Celsius [named after Anders Celsius (1701−1744), Swedish astronomer]

dB ..... decibel − a unit for expressing the signal strength [named after Alexander Graham Bell (1847−1922), Scottish−born American inventor]

dm ..... decimeter (length) 1 dm = 10^{-1} m

Dobson Unit .... 1 Dobson Unit equals the number of ozone molecules required to create a layer of pure ozone 0.01 mm thick at a temperature of 0°C and a pressure of one atmosphere.

E ..... Eötvös (1 E = 10^{-9} s^{-2}). The linear gradient of gravity is defined in units of Eötvös, named in honor of the Hungarian physicist Roland Eötvös (1848−1919). The Eötvös unit is used in geophysics to measure the rate of change, or gradient in the acceleration of gravity with horizontal distance.

Erlang ..... a dimensionless unit of average traffic density (occupancy) of a facility (telecommunications system, data collection system, etc.) during a period of time, usually a busy hour. Example: 60 calls in 1 hour, each lasting for 5 minutes = 300 minutes / 60 min per hour = 5 Erlang. Network designers use the Erlang to understand traffic patterns.

eV ..... electron volt (1.60217733 10^{-19} J). A unit of energy, equal to the energy an electron (or proton) would gain when accelerated by 1 volt.

F ..... farad − a unit of capacitance [named after Michael Faraday (1791−1867), English physicist and chemist]. The farad is the capacitance of a capacitor between the plates of which there appears a difference po-

tential of 1 volt when it is charged by a quantity of electricity equal to 1 coulomb.

f ..... focal length

f/d ..... focal−length−to−diameter ratio

GHz ..... Gigahertz (10^9 Hz)

GWe ..... Gigawatt (10^9 W) electrical energy

gal ..... unit of acceleration (used in particular in gravity measurements): 1 gal = 10^{-2} m s^{-2} = 1 cm s^{-2}; 1 mgal = 10^{-5} m s^{-2} [named after Galilei Galileo (1564−1642), Italian mathematician, astronomer and physicist]. The gal unit is used in making measurements of local variations in the acceleration of gravity g. Variations in the acceleration of Earth's gravity (e.g. gravity anomalies) are typically measured in milligal (mgal). One gal is approximately 0.0010197 g, or 1 gal is about 10^{-3} g. Hence, 1 mgal is about 10^{-6} g.

gauss (G) ..... unit of magnetic induction [named after Carl Friedrich Gauss (1777−1855), German mathematician]

Gy ..... Gray [named after Louis Harold Gray (1905−1965) British physicist, president of BIR (British Institute of Radiology) and elected F.R.S. (Fellow of the Royal Society) in 1961]. The gray is a SI unit used to measure a quantity called absorbed dose. This relates to the amount of energy actually absorbed in some material, and is used for any type of radiation and any material. One gray is equal to one joule of energy deposited in one kg of a material (or: 1 gray = 1 J/kg). Note: In the SI system, the rad is replaced by the gray; 1 krad =10 gray.

H ..... henry − unit of magnetic inductance; 1 H = 1Wb/A or 1Vs/A [named after Joseph Henry, a nineteenth−century US physicist]

Hz ..... hertz − a measure of frequency; 1Hz = 1/s [named after Heinrich Rudolf Hertz (1857−1894), German physicist]. In 1887, Hertz proved that energy is transmitted through a vacuum by electromagnetic waves.

h ..... hecto (10^2)

h (or hr) ..... hour

h ..... Planck's constant = 6.6260755 x 10^{-34} Js (joule second)

ha ..... hectare (1 ha = 10^4 m^2)

hPa ..... hectopascal (international standard of pressure, 1 hPa = 100 Pa)

Isp ..... specific impulse with a unit Ns/kg. The numerical value of the specific impulse also corresponds to the effective exhaust velocity (**m/s**) of the gas exiting the thruster in a vacuum. See also Glossary.

J ..... joule − unit of work or energy; 1 J = 1 Nm = 1 Ws [named after James Prescott Joule (1818−1889), British physicist]

Jy ..... "Jansky," the unit of radio−wave emission strength or flux density (brightness of a radio source), in honor of Karl G. Jansky (1905−1950) an American engineer whose discovery of radio waves (1931) from an extraterrestrial source inaugurated the development of radio astronomy. Jansky published his findings in 1932 while working at Bell Telephone Laboratories in Murray Hill, NJ, USA.
The "Jy" is a unit of radiative flux density (or radio−wave emission strength) which is commonly used in radio and infrared astronomy. **1 Jy = 10^{-26} W/(m^2 Hz)**. The units of Jy $(Hz)^{-1/2}$ then refer to the noise power.

K ..... degree Kelvin [named after Sir William Thomson (Lord Kelvin, 1824−1907), Scottish engineer, physicist and mathematician]. The degree Kelvin is the unit of temperature determined by the Carnot cycle with the triple−point temperature of water defined as 273.15 K (corresponds exactly to 0 °C).

k ..... kilo (10^3)

kbit/s ..... kilobit per second (10^3 bit/s)

keV ..... kiloelectron volt (10^3 eV)

kg ..... kilogram (10^3 g). The kg is a unit of mass. The kilogram is currently defined in terms of the mass of a platinum−iridium artifact stored in France. Scientists want to replace this physical artifact with a more reproducible definition for the kilogram that is based on fundamental constants of nature. — A new SI definition of the kg is due in November 2018. [7074)]

kg/m^3 ..... density

kHz ..... kilohertz (10^3 Hz)

km ..... kilometer (10^3 m)

krad ..... kilorad (see rad below)

kW ..... kilowatt (10^3 watt)

kWe ..... kilowatt electric (used to distinguish electrical power from thermal power)

L ..... liter (volume) 1l = 1 dm^3 [the symbol for liter is capitalized (when alone by itself) to avoid confusion with the number 1]

lm ..... lumen (cd sr) luminous flux. The lumen is the luminous flux emitted in a solid angle of 1 steradian by a uniform point source having an intensity of 1 candela.

lx ..... lux (lm/m^2) illumination

M ..... Mega (10^6)

mas ..... milliarcsecond (1 mas = 4:848 x 10^{-9} rad)

Mbit/s ..... Megabit per second (10^6 bit per second)

MeV ..... Megaelectron volt (10^6 eV)

MHz ..... Megahertz (10^6 hertz)

Mpc ..... Megaparsec (unit of length used in astronomy)

Msample/s ..... Mega sample/s (also written as Msps)

m ..... meter

m ..... milli (10^{-3})

m^2 ..... area (square meter)

m^3 ..... volume (cubic meter)

marcsec ..... milliarcsecond = 2.78° x 10^{-7}

mb (mbar) ..... millibar

min ..... minute

mCrab ..... " 1 mCrab" is a unit to describe the X−ray intensity defined as 1/1000 of the intensity of the Crab nebula. X−ray astronomers use this unit when comparing observations from different X−ray detectors on different instruments.

mg ..... milligram (10^{-3} g)

mgal ..... milligal ≙ 10^{-6} g (where "g" is the gravity constant)

mJ ..... millijoule (10^{-3} J)

ml ..... milliliter (10^{-3} l)

mm ..... millimeter (unit of length) 1 mm = 10^{-3} m

mN ..... millinewton

mrad ..... milliradian [7075)]

ms ..... millisecond

m/s ..... meter per second (velocity)

µ ..... micro (10^{-6})

µarcsec ..... microarcsecond = 2.8° x 10^{-10}

µgal ..... microgal ≙ 10^{-9} g (where "g" is the gravity constant of 9.81 m/s^2)

µm ..... micrometer (10^{-6} m)

µrad ..... microradian

µs ..... microsecond (10^{-6} second)

7074) "New measurement will help redefine international unit of mass," Space Daily, July 3, 2017, URL: http://www.spacedaily.com/reports/New_measurement_will_help_redefine_international_unit_of_mass_999.html

7075) An example is given to better visualize the plane angle of a milliradian. The apparent sun disk angle as seen from Earth is 32' 26" (max, or about **30.7 mrad**), and 31' 31" (min) −− on average about 32 arcmin.

N ..... newton − unit of force; 1N = 1 kgm/s^2 [named after Sir Isaac Newton (1643−1727), English natural philosopher and mathematician]
Nm ..... newton meter (work or energy)
Nms ..... newton meter second (angular momentum)
n ..... nano ($10^{-9)}$
nm ..... nanometer (10^{-9} m)
nm ..... nautical miles [1 nm = 1852 m (international)]
nT ..... nanotesla (10^{-9} tesla) SI unit of magnetic flux density
Ω ..... ohm − unit of electrical resistance; 1 Ω = 1 V/A [named after Georg Simon Ohm (1789−1854), German physicist
Pa ..... pascal − unit of pressure; 1 Pa = 1 N/m^2 [named after Blaise Pascal (1623−1662), French mathematician and physicist]. Normal atmospheric pressure = 101.320 Pa (1,013.2 millibar). The SI unit (Pa) for pressure was introduced in 1971.
p ..... pico (10^{-12})
pC ..... picocoulomb (10^{-12} coulomb)
ps ..... picosecond (one trillionth of one second, light travels 0.3 mm in 1 ps)
pT ..... picotesla (10^{-12} tesla)
parsec ..... pc = astronomical unit of length. It represents the distance at which the radius of the Earth's orbit subtends an angle of one second of arc; thus a star at a distance of one parsec would have a parallax of one second, and the distance of an object in parsecs is the reciprocal of its parallax in seconds of arc. One parsec equals 3.26 light−years, which is equivalent to 3.08374 x 10^{13} km ; 1 kpc (kiloparsec =1000 pc); 1 Mpc (Mega parsec = 10^6 pc)
ppb ..... parts per billion (10^{-9})
ppbv ..... parts per billion, by volume
ppm ..... parts per million (10^{-6})
ppmv ..... parts per million, volume
pps ..... pulses per second
ppt ..... parts per trillion (10^{-12})
pptv ..... parts per trillion (10^{-12}), by volume
psu ..... practical salinity unit, [(1 psu=0.1%) and ranges from 32 to 37 psu]
R_E ..... Earth radius = 6378.140 km (mean equatorial radius)
R_{sun} ..... Radius of sun ~700,000 km
rad ..... radian − a unit of plane angular measurement equal to the angle at the center of a circle subtended by an arc equal in length to the radius
rad/s ..... radian per second (angular velocity)
rad ..... In the context of radiation shielding, the term "rad" (or Rad) is also used for energy accumulated in matter (dosimetry for the energy absorbed per unit mass of material, usually by ionization processes). A rad is the amount of particle radiation that deposits 10^{-2} J/kg of target material. Besides the "rad" is the "**Gray**." 1 rad = 1/100 Gray. Note: A Gray is the radiation absorbed dose unit of SI (Systeme Internationale). 1 Gray = 1 J/kg (=100 rad). Or 10 Gray = 1000 rad = 1krad. [7076)] See also Glossary.
Note: The SI system replaced the "rad" with the unit Gray (Gy). However, the use of the terms rad, krad, Mrad remains in the industry vocabulary.
rms ..... root mean square
rpm ..... revolutions per minute
rps ..... revolutions per second
S ..... siemens − unit of electrical conductance; 1 S = 1 A/V [named after Werner von Siemens (1816−1892), German electrical engineer]

7076) Typical CMOS devices can tolerate 1−10 krad/year. Dose rates for a silicon target are usually stated in g/cm^2 or in thickness of aluminum shielding for a given orbit. For a sun−synchronous orbit, about 0.8 g/cm^2 (or 4 mm silicon thickness) is needed for a 1−year lifetime, and about 3 g/cm^2 (13 mm silicon) for a 10 year lifetime.

s ..... second. The international definition of the second (in the International System of Units, or SI) is based on the cesium atom, cesium remains the "ruler" for official timekeeping.
sr ..... steradian – a unit of measure of solid angles expressed as the solid angle subtended at the center of a sphere by the portion of the surface whose area is equal to the square of the radius of the sphere
Sv ..... Sievert [named after the Swedish physicist Rolf Sievert (1898–1966)]. Radiation dose measurement. The sievert is a unit used to derive a quantity called equivalent dose. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. Not all radiation has the same biological effect, even for the same amount of absorbed dose. On Earth, humans receive an annual average dose of about 2 mSv from background radiation. Astronauts, floating in LEO outside ISS, are exposed to about 54 mSv per year.
T ..... Tera (10^{12})
TB ..... TeraByte (10^{12} Byte)
TECU ..... Total Electron Content Unit. 1 TECU = 10^{16} electrons/m^2
TeV ..... 10^{12} electron volt, corresponding to a trillion times the energy of visible light photons.
tesla (T) ..... SI unit of magnetic flux density. 1 T = 1 Wb/m^2 which corresponds to 10^4 gauss [named after Nikola Tesla (1856–1943), Croatian–born American inventor]
THz ..... Terahertz (10^{12} hertz)
V ..... volt – unit of electrical potential [named after Alessandro Volta (1745– 1827), Italian physicist]
W ..... watt – unit of power; 1 W = 1 J/s [named after James Watt (1736–1819), a Scottish mechanical engineer and inventor]
Wb ..... weber – unit of magnetic flux [named after Ernst Weber (1901–), Austrian–born US engineer
Wh ..... watt hour (work or energy)
Ws ..... watt second (work or energy)

General conventions of unit representations:

The symbol "m" is used with various meanings depending on its position and occurrence in a unit. In single–digit instances, the symbol m stands simply for meter. This is also the case in double symbol instances, when m is in last position, like in Nm (newtonmeter), nm (nanometer), or mm (millimeter). When m is used in double–digit symbols in first place, like mm (millimeter), ml (milliliter), ms (millisecond), mN (millinewton), etc., then the first small "m" is always used in a diminutive sense referring to "milli" (10^{-3}).

The term small "k" stands for kilo (10^3) as in km (kilometer), kg (kilogram), kW (kilowatt), or kbit (kilobit). The capital letter "K," on the other hand, has the meaning of Kelvin, referring to a degree temperature on the absolute temperature scale. Also, a capital letter in front of a unit is used in the context of M (mega = 10^6) or G (giga = $10^{9)}$ like GPa (Giga Pascal) or GHz (Giga Hz).

All units in context with physical values should generally be stated in the singular form and not in plural form. For instance: the length of 155 cm (and not: 155 cms); the data rate of 9.6 kbit/s; the data storage capacity of 55 Gbit; the thrust of 5.5 N, (and not 5.5 Ns, the latter term means in effect Newton seconds); etc.

The basic SI units come in all sizes. Since the SI system is built upon the base 10, the different sizes are base 10 multiples of the basic units as illustrated in Table 981. – The designations M (Mega), G (Giga), T (Tera), or μ (micro), n(nano), p (pico), etc., in combinations with other units, follow the same logic as outlined above and in Table 981.

Quantity	Unit name	Unit symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Table 980: Symbols for the seven basic units in the SI system

Prefix	Symbol	Multiplication factor	Examples
Exa	E	10^{18} = 1,000,000,000,000,000,000	
Peta	P	10^{15} = 1,000,000,000,000,000	
Tera	T	10^{12} = 1,000,000,000,000 (trillion)	TByte
Giga	G	10^{9} = 1,000,000,000 (billion)	GHz, GByte,
Mega	M	10^{6} = 1,000,000	MHz, Mbit/s,
kilo	k	10^{3} = 1,000	km (kilometer), kg (kilogram),
hecto	h	10^{2} = 100	hl (hectoliter), ha (hectare)
deca	da	10^{1} = 10	
		10^{0} = 1	
deci	d	10^{-1} = 0.1	dg (decigram), dl (deciliter)
centi	c	10^{-2} = 0.01	cm (centimeter), cl (centiliter)
milli	m	10^{-3} = 0.001	mm (millimeter), ml (milliliter)
micro	µ	10^{-6} = 0.000001	µm (micrometer), µg (microgram)
nano	n	10^{-9} = 0.000000001	nm (nanometer), ns (nanosecond)
pico	p	10^{-12} = 0.000000000001	ps (picosecond), pf (picofarad)
femto	f	10^{-15} = 0.000000000000001	fs (femtosecond)
atto	a	10^{-18} = 0.000000000000000001	as (attosecond)
zepto	z	10^{-21} = 0.000000000000000000001	zs (zeptosecond)

Table 981: Commonly used prefixes of SI multiples and sub−multiples

Quantity	Unit name	Unit symbol (derivation)
Force	newton	N ($kgms^{-2}$)
Energy	joule	J (Nm) or (Ws) or (kgm^2s^2)
Energy	kilowatt hour	kWh (3.6 10^6 J)
Energy	electron volt	eV (1.6 10^{-19} J)
Power	watt	W (Js^{-1}) or ($kgm^2\ s^{-3}$)
Frequency	hertz	Hz (s^{-1})
Electrical potential	volt	V (JC^{-1}) or (WA^{-1})
Electrical charge	coulomb	C (As)
Electrical resistance	ohm	Ω ($V\ A^{-1}$)
Electrical conductance	siemens	S ($A\ V^{-1}$)
Electrical capacitance	farad	F ($C\ V^{-1}$) or ($A\ s\ V^{-1}$)
Magnetic inductance	henry	H ($Wb\ A^{-1}$) or ($V\ s\ A^{-1}$)
Magnetic flux	weber	Wb (Vs)
Magnetic flux density	tesla	T ($Wb\ m^{-2}$)
Area	square meter	m^2
Volume	cubic meter	m^3
Volume	liter	L ($10^{-3}\ m^3$)
Velocity (speed)	meter per second	ms^{-1}
Temperature	degree Celsius	^oC
Pressure	pascal	Pa (Nm^{-2}) or ($kg\ m^{-1}\ s^{-2}$)
Pressure	standard atmosphere	atm (1.01325 10^5 Pa)
Torque (force x distance)		Nm (newton meter)
Electric field strength		$V\ m^{-1}$ (volt per meter)

Quantity	Unit name	Unit symbol (derivation)
Magnetic field strength		A m^{-1} (ampere per meter)
Plane angle (arc length)	degree arcmin (minute) arcsec (second)	$1^o = (\pi/180)$ rad $1' = (1/60)^o$ $1'' = (1/60)'$

Table 982: Derived units commonly used in science and engineering [7077)]

Numbers

3DMA ..... Three−Dimensional Microgravity Accelerometer (Shuttle payload)
6DOF ..... 6 Degree of Freedom
5G−ACIA ..... 5G−Alliance for Connected Industries and Automation. 5G−ACIA is the central global forum for shaping 5G in the industrial domain. On one platform, various industries from all over the world jointly create a new ICT and IOT (Information and Communication Technology and Internet of Things) ecosystem and set the frameworks for a highly attractive emerging market.

A

AAAS ..... American Association for the Advancement of Science (Washington DC)
ÅAC ..... Ångström Aerospace Corporation, Uppsala, Sweden (since 2005), ÅAC is a spin−off company of Uppsala University research department Ångström Space Technology Centre (ÅSTC). In November 2008, the company changed name to **ÅAC Microtec AB**.
In December 2017, ÅAC Microtec acquired the CubeSat leader Clyde Space Ltd of Glasgow, Scotland, creating a global leader in the high−growth market for small satellites and CubeSats. [7078)]
AAE ..... Austrian Aerospace GmbH, Vienna, Austria (a subsidiary of Saab Ericsson Space, Sweden)
AAI ..... Airport Authority of India (since 1994). AAI provides Communication Navigation Surveillance / Air Traffic Management (CNS/ATM) services over Indian airspace and adjoining oceanic areas.
AAOE ..... Airborne Antarctic Ozone Experiment (1987)
AAPPS ..... Association of Asia Pacific Physical Societies (Bulletin, online journal)
AARGOS ..... A340 Atmospheric Research Global Observation System (MOZAIC)
AARI ..... Arctic and Antarctic Research Institute (St. Petersburg, Russia)
AARS ..... Asian Association on Remote Sensing
AAS ..... Alcatel Alenia Space (French / Italian company as of July 1, 2005). Alcatel Alenia Space has 11 industrial sites in 4 European countries (France, Italy, Spain and Belgium)
AAS−E ..... Alcatel Alenia Space Espana
AAS−F ..... Alcatel Alenia Space France, −−− Note: As of April 10, 2007, the EC approved the transfer to Thales of Alcatel−Lucent's shareholdings in the two space sector joint venture companies Alcatel Alenia Space and Telespazio. Hence, Alcatel Alenia Space was renamed to "**Thales Alenia Space**"
AAS−I ..... Alcatel Alenia Space Italia
AAS ..... American Astronomical Society
AASE ..... Airborne Arctic Stratospheric Expedition (see campaign survey)
AAT ..... Automatic Aerial Triangulation (image location technique). The method permits automatic tie point extraction using image−matching

7077) R. A. Nelson, "Guide for Metric Practice," Physics Today, Supplement to August 1997 issue, pp. 13−14
7078) "ÅAC Microtec acquires Clyde Space," ÅAC Microtec, 21 Dec. 2017, URL: http://investor.aacmicrotec.com/pressmeddelanden/?file=aac−microtec−acquires−clyde−space−62900/AAC_Microtec_Pressrelease_2017−12−21_English.pdf

techniques to automate the point transfer and the point mensuration procedures. At the start of the 21st century the AAT solution has reached the accuracy level of a conventional aerial triangulation.

ABI ..... Advanced Baseline Imager (GOES−R instrument in study/planning phase by NOAA and NASA)

ABLE ..... Atmospheric Boundary Layer Experiment (campaign)

ABYSS ..... Altimetric Bathymetry from Surface Slopes (a proposed altimetry mission of JHU/APL)

AC ..... Alternating Current

ACAE ..... Asociación Centroamericana de Aeronáutica y del Espacio (Central American Association of Aeronautics and Space). ACAE HQs are in Costa Rica (since 2010). ACAE is organized as a non−governmental organization, but it is associated with the Costa Rican government's National Council for Space Research and Development (CONIDA).

ACC ..... Anthropogenic Climate Change (CLIVAR subprogram)

ACCESS ..... Assembly Concept for Construction of Erectable Space Structure (Shuttle)

ACE ..... Advanced Composition Explorer (NASA, APL, etc., see M.1)

ACE−1, −2 .... Aerosol Characterization Experiment (campaigns)

ACE ..... Agencia Chilena del Espacio (Chilean Space Agency), Santiago, Chile (created in 2001, modified on Dec. 29, 2008)

ACE ..... Atmosphere Climate Experiment (an ESA mission, C.1)

ACES ..... Acoustic Containerless Experiment System (Shuttle payload)

ACM ..... Adaptive Coding and Modulation. ACM allows optimizing bandwidth utilization by dynamically changing transmission parameters.

ACORN ..... Airborne Composition Observations in the Region of the North−Atlantic−Corridor (R.41.2)

ACRS ..... Asian Conference on Remote Sensing

ACRES ..... Australian Centre for Remote Sensing (Belconnen, Australia)

ACSER ..... Australian Center for Space Engineering Research, University of New South Wales, Australia

ACSYS ..... Arctic Climate System Study (WCRP program)

ACT ..... Applied Coherent Technology, Herndon VA (commercial provider of remote sensing products, operator of satellites, etc.)

ACTS ..... Advanced Communications Technology Satellite in GEO (NASA, Launch: Sept. 1993 by Shuttle Discovery, STS−51 (Sept.12−22, 1993).

A/D ..... Analog/Digital converter (also written as ADC)

ADA ..... Antarctic Data Acquisition [a partnership project of EUMETSAT, NOAA, NSF and NASA at the MGS (McMurdo Ground Station) in Antarctica]. MetOp−A of EUMETSAT is the firstpolar−orbiting meteorological satellite using the ADA services since June 2011 to reduce data latency.

ADAM ..... Advanced Data Acquisition and Messaging System [a DCS (Data Collection System) flown on FedSat−1 (Australia) and STSat−1 (Korea)

ADC ..... Analog Digital Converter

ADCP ..... Acoustic Doppler Current Profilers [(U. of Florida, Tokai University, Hiroshima University, Kyushu University, Japan, and CSIRO), subsurface upward−looking moorings]

ADEN ..... ALOS Data European Node [an ESA initiative involving a number of distributed acquisition facilities capable of receiving ALOS data (SAR and optical) for European users: a) Toulouse (France) with upgraded X−band stations, b) DLR Neustrelitz (Germany) and Libreville (Gabon), c) TSS Tromsoe (Norway) and SSC Sturup (Sweden) ASI Mataira (Italy) and Maspalomas (Spain)]

ADEOS ..... Advanced Earth Observation Satellite (NASDA, F.1, F.2)

ADM ..... Atmospheric Dynamics Mission (ESA Earth Explorer Core Mission)

ADN ..... Ammonium Dinitramide (used as a 'green propellant'). ADN is a storable liquid monopropellant, easy to handle and transport due to its low toxicity and low sensitivity, and has received the so called UN/DOT 1.4S transport classification, thus allowing it to be transported on commercial passenger aircraft.
The HPGP (High Performance Green Propellant) of ECAPS (Solna, Sweden) utilizes the ADN monopropellant is environmentally benign and significantly easier for both transport and handling than the traditionally used hydrazine monopropellant.

ADPCM ..... Adaptive Differential Pulse Code Modulation (a lossy data compression technique)

ADR ..... Active space Debris Removal. ADR is a type of rendezvous missions in which the target is uncooperative. — ADR is necessary to stabilize the growth of space debris, but even more important is that any newly launched objects comply with post−mission disposal guidelines – especially orbital decay in less than 25 years. If this were not the case, most of the required ADR effort would go to compensate for the non−compliance of new objects.

ADS ..... Aerobrake Deorbiting System (a technique to deorbit satellites)

ADS−B ..... Automatic Dependent Surveillance−Broadcast [an FAA system installed in aircraft (first prototypes as of 2000). When coupled with GPS, an aircraft's ADS−B unit can continuously broadcast its identification, position, altitude, direction, speed, rate of climb or descend, etc.] − ADS−B is a next−generation key technology to determine and share precise aircraft location information, and streams additional flight information to the cockpits of properly equipped aircraft.
In its final form, ADS−B is designed to ease ATC (Air Traffic Control) as the number of approaches grows, enhancing safety and increasing airport capacity. In the air, the information provided by ADS−B enhances the pilots' traffic awareness, allowing more optimal flight levels leading to fuel savings.
The **ITU** (International Telecommunication Union) establishes worldwide standards that foster seamless interconnection of a vast range of communications systems, has now adopted the main technical principals of enhanced aircraft automatic dependent surveillance via satellite, to track in−flight aircraft worldwide. Different aircraft automatic dependent surveillance systems have been standardized within the ICAO (International Civil Aviation Organization), such as terrestrial automatic dependent surveillance−broadcast (ADS−B) and automatic dependent surveillance−contract (ADS−C).
The technical principals adopted by ITU support implementation of reception of ADS−B via satellite that would enhance surveillance of aircraft, particularly in areas where terrestrial receivers cannot practically be deployed, such as in oceanic, trans−polar and remote regions − and would be a major step in the implementation of the ICAO global aeronautical distress and safety system. [7079)]

ADSF ..... Automated Directional Solidification Furnace (Shuttle payload)

ADSL ..... Asynchronous Digital Subscriber Line (communications)

ADV CGBA .... Advanced Commercial Generic Bioprocessing Apparatus (Shuttle)

ADV XDT ..... Advanced X−Ray Detector (Shuttle payload)

AEAP ..... Atmospheric Effects Aircraft Program (NASA)

AEB ..... Agencia Espacial Brasileira − Brazilian Space Agency, Brasilia, Brazil (since 1994)

AEHF ..... Advanced EHF (Extremely−High Frequency) for RF communications, also a communication satellite program of the USAF in GEO.

7079) "Reception of automatic dependent surveillance broadcast via satellite and compatibility studies with incumbent systems in the frequency band 1 087.7−1 092.3 MHz," Report ITU−R M.2413−0, (11/2017), URL: https://www.itu.int/dms_pub/itu−r/opb/rep/R−REP−M.2413−2017−PDF−E.pdf

The first spacecraft, AEHF−1, was launched on Aug. 14, 2010. AEHF−2 was launched on May 4, 2012, the AEHF−3 spacecraft was launched on September 18, 2013. The AEHF system is the successor to the five−satellite Milstar constellation to provide significantly improved global, highly secure, protected, survivable communications. [7080]

On July 28, 2015, IOC (Initial Operational Capability) was declared for the Advanced Extremely High Frequency system. The AEHF system is a joint service satellite communications system that provides survivable, global, secure, protected, and jam−resistant communications for high−priority military ground, sea and air assets. AEHF provides 10 times the throughput and a substantial increase in coverage compared to the 1990s−era Milstar satellites currently in orbit. [7081]

On August 8, 2019, the USAF launched the AEHS−5 spacecraft from the Cape Canaveral Air Force Station, FL on a ULA Altas−V−551 vehicle. SMC procured AEHF−5 from Lockheed Martin Space Systems Company as a part of a firm fixed price contract block buy, which included AEHF−6, for a total cost of $2.15B for both satellites. AEHF−6 is tentatively expected to be delivered in January 2020 and launched in March 2020. [7082]

AEM ..... Agencia Espacial Mexicana (Mexican Space Agency, establish in 2010)

AEM−1 ..... Applications Explorers Mission−1 of NASA

AEM−2 ..... Applications Explorers Mission−2 of NASA

AERCam/Sprint . Autonomous Extravehicular Activity Robotic Camera Sprint [Shuttle free−flying camera, first flown on STS−87 (Nov. 19 − Dec. 5, 1997)]

AEROCE ..... Atmospheric/Ocean Chemistry Experiment (campaign)

Aerospace Corp. . 'The Aerospace Corporation' (since 1960), a US private nonprofit research and development center with HQs in El Segundo, CA. Aerospace operates a Federally Funded Research and Development Center (FFRDC) for the Department of Defense (DoD). The primary customer is the Space and Missile Systems Center (SMC) of the US Air Force Materiel Command. The Aerospace Corporation provides engineering services and space technology expertise to DoD space programs and other US government agencies. Other company locations are in the Washington DC area, Colorado Springs, CO, Albuquerque, NM, Sunnyvale CA, VAFB, CA, and at KSC (Kennedy Space Center), FLA.

Aerospatiale .... A French aerospace conglomerate with 38,000 employees, HQ in Paris. Builder of the main stages of Ariane 4 and 5. Manufacturer of satellites and sensors. Three major divisions: Aircraft, Helicopters, and Space & Defense. Spacecraft platforms: Spacebus series.

AES ..... Advanced Encryption Standard

AES ..... Atmospheric Environment Service (of Environment Canada)

AESA ..... Active Electronically Scanned Array (a new radar antenna technology for rapid target detection and mapping)

AESA ..... Atmospheric Effects of Stratospheric Aircraft (NASA)

AF ..... US Air Force

AFB ..... Air Force Base (US Air Force)

AFC ..... Affiliated Data Center (these are institutional facilities that are affiliated with EOSDIS, in particular NOAA facilities are AFCs)

AFE ..... American Flight Echocardiograph (Shuttle payload)

7080) "ULA Launches Advanced Extremely High Frequency−2 Satellite to Orbit for the U.S. Air Force," Sapce Travel, May 07, 2012, URL: http://www.space−travel.com/reports/ULA_launches_Advanced_Extremely_High_Frequency_2_Satellite_to_Orbit_for_the_U_S__Air_Force_999.html

7081) "Major Collaboration Among Organizations Delivers Survivable AEHF System ... Achieves Initial Operational Capability," Satnews Daily, July 30, 2015, URL: http://www.satnews.com/story.php?number=695223515

7082) "A TWEET Statement from USAF Space and Missile Systems Center ... AEHF−5 Successfully Launches," Satnews Daily, 9 August 2019, URL: http://www.satnews.com/story.php?number=1082160980

AFIT ..... Air Force Institute of Technology (a college at the Wright−Patterson Air Force Base, Ohio)

AFGL ..... Air Force Geophysics Laboratory (Hanscom AFB, Bedford, MA, USA) Note: in 1998 AGFL was renamed to "Hanscom Research Site"

AFDX ..... Avionics Full DupleX Switched Ethernet (based on IEEE 802.3 Ethernet technology). AFDX is a data network for safety−critical applications that utilizes dedicated bandwidth while providing deterministic Quality of Service (QoS).

AFP−675 ..... Air Force Program 675 (Shuttle payload)

AFNOR ..... Association francaise de normalization (French standards institute)

AFOSR ..... Air Force Office of Scientific Research (an AFRL directorate and manager of basic research)

AFRL ..... Air Force Research Laboratory (USA). The nine AFRL sites are located at: Wright Laboratory, Wright−Patterson AFB, Ohio (AFRL HQs, directorates of: Air Vehicles, Propulsion, Directed Energy, and Materials & Manufacturing); Hanscom AFB, MA (Sensors directorate); Phillips Research Site, Kirtland AFB, Albuquerque, NM (Space Vehicles directorate); Rome Laboratory, Griffiss AFB, Rome, NY; Edwards AFB, Edwards, CA; Brooks AFB, TX; Eglin AFB, FL; Tyndall AFB, FL; Bolling AFB (AFOSR directorate), Washington DC.

AFS ..... Atomic Frequency Standard [AFS is used in "atomic clocks" flown on radionavigation systems (GPS, GLONASS, Galileo, etc.) as well as in other spaceborne missions]. There are Rubidium (Rb) AFS, Cesium (Cs) AFS, Passive Hydrogen Maser (PHM) AFS, etc.

AFSCN ..... Air Force Satellite Control Network (USA)

AFSK ..... Amplitude Frequency Shift Keying (modulation technique)

AFOSR ..... Air Force Office of Scientific Research (part of AFRL, DoD, USA, AFOSR manages the Air Force's investment in basic research)

AFSPC ..... Air Force Space Command (Peterson AFB, CO, USA)

AFSSS ..... Air Force Space Surveillance System (a U.S. DoD ground based facility, informally known as the **Space Fence**, since 1961). Space Fence is a series of multi−static VHF receiving and transmitting sites strung out across the continental United States at latitude 33° north ranging from California to Georgia. — Space Fence is part of the greater global Space Surveillance Network, and comprises about 40% of the overall observations of space debris and hardware in orbit carried out by the U.S. Air Force. Space Fence is also a unique asset in the battle to track space junk and dangerous debris, as it gives users an "uncued" tracking ability. This means that it's constantly "on" and tracking objects that pass overhead without being specifically assigned to do so.
Note: On October 1, 2013, the AFSSS was closed due to resource constraints caused by sequestration, marking the end of its 52 years of service to the Space Situational Awareness mission. [7083)]

AFWA ..... Air Force Weather Agency (USAF) at Offutt Air Force Base (OAFB), Bellevue, Nebraska, USA (south of Omaha). AFWA analyses large amounts of weather data and forecasts global cloud cover.

AGARD ..... Advisory Group for Aerospace Research and Development. AGARD is a NATO agency (with HQ in Neuilly−sur Seine, France), formed in 1954, with the objective to enhance the exchange of aerospace technology within NATO.

AGASP ..... Arctic Gas and Aerosols Sampling Project (airborne campaign)

AGC ..... Antenna Gain Control

AGGA ..... Advanced GPS/GLONASS ASIC (ESA/ESTEC development). As of the end of 2000 the AGGA−2 chip set is available to European industry, it is manufactured by Atmel of Nantes, France (Atmel product code

7083) "End of an era at US Space Command," Space Daily, Oct. 15, 2013, URL: http://www.spacedaily.com/reports/End_of_an_era_for_AFSSS_999.html

T7905E). It is used in GRAS, in the LAGRANGE GNSS receiver of Laben SpA, Italy, and in the RIMS stations of the EGNOS program. AGGA−2 supports such EO applications as RO (Radio Occultation) and POD (Precise Orbit Determination).
With the new GNSS signal availability in the middle of next decade (∼2015), the AGGA−4 component will enable the digital processing of all the public signals in modernized GPS, Galileo and possibly Beidou/Compass and Glonass too.

AGILE ..... Astro−rivelatore Gamma ad Immagini LEggero (Gamma−ray Astronomical Low−Mass Detector), an approved ASI mission with a planned launch in 2006

AGL ..... Above Ground Level (usually the altitude of aircraft)

AGN ..... Active Galactic Nuclei

AGU ..... American Geophysical Union (a society with over 60,000 members in over 115 countries. The objective is to advance progress in the Earth, atmospheric, oceanic, hydrologic, and space and planetary sciences.) Founded in 1919, AGU is a not−for−profit scientific society dedicated to advancing Earth and space science for the benefit of humanity.

AGW ..... Acoustic Gravity Wave. AGWs are sound waves that propagate in the water layer with amplitudes governed by the restoring force of gravity. Since the slight compressibility of the water has a negligible effect on surface gravity waves, on one hand, and the gravitational force has no practical effect on sound waves in the ocean, on the other hand, the compressibility and gravity effects in water have long been treated separately. [7084) 7085)]

AHRPT ..... Advanced High Resolution Picture Transmission (a transmission standard of WMO for polar orbiting meteorological satellites)

AIAA ..... American Institute of Astronautics and Aeronautics (Reston, VA)

AIDAA ..... Associazione Italiana Di Aeronautica e Astronautica (Rome, Italy)

AIDJEX ..... Arctic Ice Dynamics Joint Experiment (campaign)

AIGO ..... Australian International Gravitational Observatory — located at Gingin (115° 42' 50.30" east, 31° 21' 28.13" south). The site of Gingin is located just north of Perth in Western Australia. [7086)]

AIM ..... AEG Infrarot Module GmbH, Heilbronn, Germany (since 1976, developer and manufacturer of infrared devices such as QWIPs since 1996). AIM is a subsidiary of BGT, a company of Diehl's Defence/Avionics Division, and of EHG, a company of DaimlerChrysler AG.

AIMO ..... Asymmetric Inverted Mode Operation [AIMO is a standard CCD but with extra implants under one set of electrodes. With the right clocking it can give between 20−100 times less dark current (equivalent to an extra 15 to 30°C of cooling)]

Airbus Group ... As of January 1, 2014, former EADS rebranded itself as the **Airbus Group**, with three divisions that include: [7087)]
− Airbus, focussing on commercial aircraft activities;
− Airbus DS (Airbus Defence & Space), integrating the Group's defence and space activities from Cassidian, Astrium, and Airbus Military;
− Airbus Helicopters,comprising all commercial and military helicopter activities.
The former Astrium subsidiary was merged into the Airbus DS in late

7084) UsamaKadri,"Tsunami mitigation by resonant triad interaction with acoustic–gravity waves," Heliyon, Jan. 17, 2017, URL: http://www.heliyon.com/article/e00234/pdf

7085) Usama Kadri, Davide Crivelli, Wade Parsons, Bruce Colbourne, Amanda Ryan, "Rewinding the waves: tracking underwater signals to their source," Scientific Reports 7: 13949, 24 Oct. 2017, DOI:10.1038/s41598−017−14177−3, URL: https://www.nature.com/articles/s41598−017−14177−3.pdf

7086) David Blair, "An end in sight in the long search for gravity waves," Space Daily, Feb. 24, 2014, URL: http://www.spacedaily.com/reports/An_end_in_sight_in_the_long_search_for_gravity_waves__999.html

7087) "Airbus Group Takes Off Into 2014 With Joint Brand," Airbus Group, January 2, 2014, URL: http://www.airbus−group.com/airbusgroup/int/en/news/press.20140102_airbusgroup_new_brand.html

2013. The new Airbus DS started operating at executive level as of January 1, 2014. The GEO–Information Division of Astrium Services became the program line "Geo–Intelligence", of Airbus DS.
After the consultation process with the works councils, expected to be concluded by mid–2014, the three entities – Airbus Military, Astrium and Cassidian – will be fully integrated and operational at all levels as Airbus DS. [7088)]

Airbus Industrie . A consortium of European aerospace companies, founded in 1970. (partners are: Aerospatiale of France, DASA Airbus of Germany, British Aerospace, and Spain's CASA). Italy's Alenia, Fokker of the Netherlands, and Belairbus in Belgium are associate members who participate in selected programs. Some 32,000 people work directly for Airbus Industrie within the partner companies. Airbus Industrie is headquartered near Toulouse, France. Builder of civil aircraft (Airbus).
– In February 2019, Airbus' Friedrichshafen site has opened Europe's most state–of–the–art satellite integration and space technology centre, known as the Integrated Technology Centre (ITC). The ITC, which triples the area of clean room space to 4,200 m^2, is dedicated to building satellites, probes, space instruments and experimental technologies. The centre took only two years to build at a total cost of approximately €45 million. [7089)]

AIRS ..... Autonomous Information Reception Station (see Meteor–3M series)

AIRSS ..... Alternative Infrared Satellite System (DoD program intended to provide strategic and tactical missile warning for the U.S. in the middle of the next decade)

AIP ..... American Institute of Physics

AIP ..... Astrophysikalisches Institut Potsdam (Germany)

AIS ..... Automatic Identification System [IMO (International Maritime Organization) mandatory system in shipping since July 2002 – an automatic electronic reporting device i.e., a transponder fitted to a ship and operating in the VHF maritime band]

AIS–SART ..... AIS–based Search and Rescue Transmitter. AIS–SART is a self–contained radio device used to locate a survival craft or distressed vessel by sending updated position reports using a standard AIS class–A position report.

AIT ..... Assembly, Integration and Test (of a spacecraft, etc.)

AIV ..... Assembly, Integration and Verification (tasks, usually in connection with a S/C)

aka ..... also known as, used to introduce pseudonyms, aliases, nicknames, working names, legalized names, pen names, maiden names, etc.

AKR ..... Auroral Kilometric Radiation (ionospheric phenomenon)

ALACE ..... Autonomous Lagrangian Circulation Explorer (free–floating ocean buoys designed to seek a pre–programmed depth; they drift with the ocean currents of that depth, and pop up periodically to report their position to a satellite), see also PALACE

ALD ..... Atomic Layer Deposition (an emerging technology)

ALE/GAGE .... Atmospheric Lifetime Experiment/Global Atmospheric Gas Experiment (campaign)

Alenia Spazio ... Alenia Aerospazio S.p.A. is a company of the Finemeccanica IRI group, an Italian consortium in aerospace, defense, energy, transportation and automation markets. Partner in many space programs (2500 employees), builder of COSMO–SkyMed. Subsidiaries: Laben S.p.A. (Laboratori Elettronici Nucleari) in Vimodrone (Milano, Italy) since 1958; SSI (Space Software Italia S.p.A. in Taranto, Italy; QSW (Quad-

7088) "Enhancing Competitiveness – EADS Outlines Plan for Defence and Space Restructuring," EADS, Dec. 9, 2013, URL: http://www.eads.com/eads/int/en/news/press.20131209_eads_enhancing_competitiveness.html

7089) "Satellite building on an entirely new scale," Airbus Press Release, 22 February 2019, URL: https://www.airbus.com/newsroom/press–releases/en/2019/02/satellite–building–on–an–entirely–new–scale.html

rics Supercomputer World Ltd.) in Rome, Italy; HCSA (Hellenic Company for Space Applications S.A.) in Paradisos Amarousiou, Italy; EuroSkyWay in Rome, Italy

ALEXIS ..... Array of Low Energy X−Ray Imaging Sensors (LANL, M.3)

ALISSA ..... l'Atmosphere par LIdar Sur SAliout (the French sensor was at first proposed by CNES for a Salyut flight)

AlGaN ..... Aluminum gallium nitride is a semiconductor material which is also used to manufacture light−emitting diodes operating in the blue to ultraviolet region (down to 250 nm)

ALM ..... Additive Laser Manufacturing. ALM, or 3D Printing, is a rapid prototyping−manufacturing method used to reduce process time, product mass and use of raw materials.

ALMA ..... Atacama Large Millimeter/submillimeter Array (of ESO) in Chile located at an altitude of 5000 m. Actually, the ALMA buildup and operation represents an international partnership of Europe, North America East Asia and the Republic of Chile as host country. − When completed in 2013, ALMA will consist of **66 telescopes (forming a sparse array of antennas**) of 12 m and 7 m in diameter − that when electronically combined simulate a telescope diameter of up to 15 km. On Nov. 17, 2009, ALMA made its first measurements using just two of the 66 antennas that will comprise the array. As of January 4, 2010, three antennas are working in unison. In October 2011, ALMA has officially opened for astronomers. About a third of ALMA's 66 radio antennas are installed. [7090] − ALMA is the largest and most ambitious ground−based observatory ever created with full service provision expected in 2013. [7091] [7092]

ALMA was inaugurated in an official ceremony on March 13, 2013. This event marks the completion of all the major systems of the giant telescope and the formal transition from a construction project to a fully fledged observatory. The telescope has already provided unprecedented views of the cosmos with only a portion of its full array. [7093]

The 66th ALMA antenna was transported to the AOC (Array Operations Site) on 13 June 2014. This is an important milestone for the ALMA project. [7094]

In July 2015, ALMA successfully opened its eyes on another frequency range after obtaining the first fringes with a Band 5 receiver, specifically designed to detect water in the local Universe. Band 5 will also open up the possibility of studying complex molecules in star−forming regions and protoplanetary discs, and detecting molecules and atoms in galaxies in the early Universe, looking back about 13 billion years. [7095]

7090) "ALMA Opens Its Eyes," Space Daily, Oct. 4, 2011, URL: http://www.spacedaily.com/reports/ALMA_Opens_Its_Eyes_999.html

7091) http://www.almaobservatory.org/

7092) Gianpietro Marchiori, Francesco Rampini, "The European ALMA Project: Design, Manufacturing, Commissioning and Test Activities," Proceedings of the 32nd ESA Antenna Workshop on Antennas for Space Applications, Noordwijk, The Nethetrlands, Oct. 5−8, 2010, URL: http://utopia.duth.gr/~iaitidis/ESA%20conference%202010/Papers/session%2019/EIE%20_THE%20EUROPEAN%20ALMA%20PROJECT.pdf

7093) "ALMA Inauguration Heralds New Era of Discovery," ESO, Release eso1312, March 13, 2013, URL: http://www.eso.org/public/news/eso1312/

7094) "Final ALMA Antenna Arrives on Chajnantor Plateau,"Space Daily, June 19, 2014, URL: http://www.spacedaily-com/reports/Final_ALMA_Antenna_Arrives_on_Chajnantor_Plateau_999.html

7095) "ALMA Greatly Improves Capacity to Search for Water in Universe," ESO, July 17, 2015, URL: http://www.eso.org/public/announcements/ann15059/

Figure 1621: Photo of the partially constructed ALMA observatory in 2011 (image credit: NRAO, NSF)

ALMAZ ..... ALMAZ = 'rough diamond' (Earth observation series, Russia), F.4
ALOHA ..... One of several communication access methods
ALOHA ..... Airborne Lidar and Observations of the Hawaiian Airglow (campaign)
ALOS ..... Advanced Land Observing Satellite (F.3)
ALPEX ..... Alpine Experiment (campaign)
ALR ..... Agentur für Luft– und Raumfahrt, Wien, Austria (Aeronautics and Space Agency of Austria) since 2005, formerly ASA (since 1972)
ALWIN ..... Airport Low–level Wind Information (JMA, JAXA). ALWIN, jointly developed by JMA and JAXA, started operations on April 19, 2017 at Tokyo International Airport (Haneda) and Narita International Airport. ALWIN provides wind direction, wind speed, wind shear*, turbulence, etc. around airports. ALWIN uses JMA's airport based Doppler radar and Doppler lidar (1) to detect wind shears and low–level turbulence induced by local terrain and buildings. [7096)]
AM ..... Amplitude Modulation (modulation technique of the main carrier)
AM ..... Ante Meridiem (US time notation designating morning hours, to distinguish from PM)
AM0 ..... Air–mass–zero (calibration measure of solar cells, measurement at top of atmosphere). See also Glossary for Air–mass–zero.
AMBIACE ..... Amazon Biogeochemistry and Atmospheric Chemistry Experiment (campaign)
AMEX ..... Australian Monsoon Experiment (campaign)
AMISR ..... Advanced Modular Incoherent Scatter Radar. AMISR is coordinated by SRI International, Menlo Park, CA. The AMISR facility system establishes a new state–of–the–art for ISR (Incoherent Scatter Radar) design by implementing fully electronic beam steering with a phased array of 4096 UHF transceivers.
AMM ..... Advanced Microsatellite Mission (an ESA spacecraft platform developed by Astrium Ltd.)

7096) "Airport Low–level Wind Information (ALWIN) starts operation at Haneda and Narita airports," JAXA Press Release, April 19, 2017, URL: http://global.jaxa.jp/press/2017/04/20170419_alwin.html#at

AMM . . . . . Antarctic Mapping Mission (Radarsat)
AMMOS . . . . . Advanced Multi−Mission Operations Systems (a NASA/JPL program in 2012 to revitalize its ground system and services) [7097)]
AMOLED . . . . . Active Matrix Organic Light−Emitting Diode (a 3−D OLED display technology). An AMOLED display consists of OLED pixels that have been deposited or integrated onto a thin film transistor (TFT) array to form a matrix of pixels that illuminate light upon electrical activation. AMOLEDs consume significantly less power than OLEDs.
AMOS . . . . . a) Advanced Maui Optical and Space Surveillance (a set of observatory sensors at Maui, Hawaii); b) AMOS (Advanced Maui Optical and Space Surveillance Technology Conference), a yearly conference in Maui, Hawaii.
AMOS . . . . . Advanced Mechanical and Optical Systems (since 1983, developer of very−high−accuracy optomechanical systems; manufacturer of small optical pieces by diamond turning, Liege, Belgium)
AMOS . . . . . Afro−Mediterranean Orbital System. A family of commercial Israeli geosynchronous telecommunications vehicles developed, launched and controlled by IAI. AMOS−1 was launched on May 16, 1996 (launch mass of 961 kg, built by Alcatel Espace of France and Daimler−Benz Aerospace of Germany). AMOS−2 (1370 kg mass) was launched on Dec. 27, 2003 from Baikonur, Kazakhstan. AMOS−3 (1300 kg mass) was launched from Baikonur on April 28, 2008. The AMOS series S/C are the property of Spacecom.
AMOS . . . . . Air Force Maui Optical Station (Shuttle experiment). AMOS is located at the summit of Haleakala, on the island of Maui, Hawaii. The Air Force experiment is using the Shuttle orbiter as a calibration target for a ground−based experiment (research for electro−optical sensors)
AMPERE . . . . . Active Magnetosphere and Planetary Electrodynamics Response Experiment. AMPERE is installed on the IridiumNEXT constellation. AMPERE collects magnetic perturbation data from engineering grade magnetometers aboard 66 spacecraft in the Iridium commercial communication constellation (11 satellites in 6 different orbital planes), each with an orbital period of 104 min and altitude of 780 km.
AMPTE . . . . . Active Magnetosphere Particle Tracer Explorers (cooperative mission of US/ NASA, Germany and UK, M.4)
AMR . . . . . Anisotropic Magneto−Resistance. AMR is the property of a material in which a dependence of electrical resistance on the angle between the direction of electrical current and orientation of magnetic field is observed.
AMS . . . . . Alpha Magnetic Spectrometer (Shuttle payload) AMS was first flown on STS−91 (June 2 − 12, 1998). It is an anti−matter demonstration, an experiment with international cooperation from: USA, China, Finland, Germany Italy, and Switzerland
AMS . . . . . American Meteorological Society
AMSAR . . . . . Airborne Multifunction Solid−State Active Array Radar (European Fighter Radar Program) under development for operation in 2015
AMSAT . . . . . The Radio Amateur Satellite Corporation (worldwide groups of Amateur Radio Operators (volunteers, normally organized by country), building, launching and communicating with each other through non−commercial amateur satellites, since 1969, also the name of satellites)
AMSTAP . . . . . Aerospace Microsystems Technology Applications Partnership (a UK initiative started in 2000)
AMTEC . . . . . Alkali Metal Thermal−to−Electric Converter (Shuttle payload)
AMV . . . . . Atmospheric Motion Vector (a meteorological data product)

7097) Erik W. Monson, Kevin A. Smith, "Streamlining GDS Deployment with the AMMOS Automated Deployment System," SpaceOps 2014, 13th International Conference on Space Operations, Pasadena, CA, USA, May 5−9, 2014, paper: AIAA 2014−1683, URL: http://arc.aiaa.org/doi/pdf/10.2514/6.2014−1683

ANARS ..... Autonomous Navigation and Attitude Reference System (Shuttle payload)
ANASA ..... National Aerospace Agency, Azerbaijan, Baku, Azerbaijan (since 1992)
ANGKASA ..... National Space Agency of Malaysia, Kuala Lumpur (since 2002)
ANL ..... Argonne National Laboratory (Argonne, IL, USA, a DOE facility, operated by the University of Chicago)
ANSI ..... American National Standards Institute
ANSTO ..... Australian Nuclear Science and Technology Organization
Antarctic Dome C The Antarctic Dome C site is located in the High Polar Plateau Region at 75°06'S, 123°21'E with a mean elevation of 3,233 m above sea level. *The site has the following characteristics that make it very suitable for radiometric calibration and validation of satellite sensors:* the surface is flat and covered with uniformly distributed, permanent snow; temperatures are extremely cold and stable, except for seasonal variability; skies are clear most of the time, with more than 75% of days being cloud free; atmosphere above the site has low water vapor and aerosol loading, thus atmospheric effects are small.
The **Concordia Station** is a station located at a location called Dome C on the Antarctic Plateau, Antarctica, owned and funded by the Italian and French National Antarctic Programs (PNRA and IPEV). The Concordia Station (opened in 2005) is the third permanent, all–year research station on the Antarctic Plateau besides Vostok Station (Russian) and the Amundsen–Scott South Pole Station (U.S.) at the Geographic South Pole. It is jointly operated by scientists from France and Italy and regularly hosts ESA scientists.
Antrix Corp. Ltd . Bangalore, India (the commercial marketing arm of ISRO, Antrix is the distributor of IRS data, etc.)
ANTS ..... Autonomous Nano–Technology Swarm (a proposed mission architecture for scalable, robust, highly distributed systems at NASA)
ANU ..... Australian National University (Canberra, Australia)
AO ..... Announcement of Opportunity (usually for a sensor on a particular mission)
AOCS ..... Attitude and Orbit Control System
AOET ..... Atomic Oxygen Exposure Tray (Shuttle D2 mission)
AOGS ..... Asia Oceania Geosciences Society (Singapore)
AoI ..... Area of Interest
AOS ..... Acousto–Optical Spectrometer
AOT ..... Aerosol Optical Thickness
AOTF ..... Acousto–Optic Tunable Filter (an imaging dispersion technique)
APACE ..... Automated Primary, Alternate, Contingency, and Emergency communications. The solution enables soldiers to survive and excel in contested electronic warfare environments. The reliability of communications is significantly improved by simultaneously sending data over multiple paths and adjusting the traffic flow in real–time between GEO and LEO satellite constellations.
APARE ..... Asia/North Pacific Regional Study (campaign)
APCF ..... Advanced Protein Crystallization Facility (Shuttle, see also PCF)
APCG ..... Advanced Protein Crystal Growth (Shuttle, see also PCG)
APC–MCSTA .. Asia–Pacific Conference on Multilateral Cooperation in Space Technology and Applications [sponsored by CNSA (China National Space Administration) and organized by Chinese Society for Astronautics]
APD ..... Avalanche Photodiode (detector type)
APDA ..... Arctic Precipitation Data Archive
APE ..... Airborne Polar Experiment (campaign)
APE ..... Auroral Photography Experiment (Shuttle payload)
APEX ..... Active Plasma Experiment (Intercosmos, M.5)

APEX ..... Atacama Pathfinder EXperiment, a telescope of 12 m aperture (of ESO – the European Southern Observatory in the Atacama desert of Chile). APEX operates at millimeter and submillimeter wavelengths. APEX is a collaboration between the MPIfR (Max Planck Institute for Radio Astronomy), the OSO (Onsala Space Observatory) and ESO. In 2013, the ArTeMiS (Bolometer arrays for wide–field submillimeter ground–based telescopes) camera was integrated into APEX.

APFO ..... Aerial Photography Field Office (Salt Lake City, UT, USA)

API ..... Application Programming Interface

APL ..... Applied Physics Laboratory, since 1942, a facility of Johns Hopkins University (JHU), in Laurel, MD, USA

APM ..... Ascent Particle Monitor (Shuttle experiment)

APRS ..... Automatic Packet Reporting/Position System (a graphical method, used by the Amateur Radio community,of broadcasting positioning information in "real time" from packet radio–equipped stations)

APRSAF ..... Asia Pacific Regional Space Agency Forum (since 1993 – to enhance the development of each country's space program and to exchange views toward the future cooperation in space activities in the Asia–Pacific region). APRSAF is an annual meeting initiated jointly by MEXT/JAXA of Japan, and a co–host country. Examples: [7098] [7099]
APRSAF–11 took place Nov. 3–5, 2004, Canberra, Australia
APRSAF–12 took place Oct. 11–13, 2005, Kitakyushu, Japan
APRSAF–13 took place in Dec. 2006 in Jakarta, Indonesia
APRSAF–14 took place in Nov. 2007 in Bangalore, India
APRSAF–15 took place in Dec. 2008 in Hanoi, Vietnam
APRSAF–16 , took place in January 2010, Bangkok, Thailand
APRSAF–17, took place Nov. 23–26, 2010, Melbourne, Australia
APRSAF–18, took place December 6–9, 2011, Singapore
APRSAF–19, took place Dec. 11–14, 2012, Kuala, Lumpur, Malaysia
APRSAF–20, took place Dec. 3–6, 2013, Hanoi, Vietnam
APRSAF–21, took place Dec. 2–5, 2014, Tokyo, Japan

APS ..... Active Pixel Sensor

APSC ..... Asia Pacific Space Center, located on Australia's Christmas Island. The Indian Ocean island is located about 1560 km northwest of Australia, close to the equator. Rosaviakosmos of Russia is expected to launch satellites from the island starting in 2004 (new Aurora launch vehicle, an upgrade version of the Soyuz launch vehicle).

APSCC ..... Asia–Pacific Satellite Communication Council (since 1994) with a Secretariat in Korea.

APT ..... Automatic Picture Transmission (one type of NOAA downlink transmission; APT transmits data from two channels of the AVHRR at a reduced resolution of 4 km in the VHF frequency band (at 137.50 and 137.62 MHz)).

APV ..... Autonomously Piloted Vehicle (Condor)

A&R ..... Automation and Robotics (technology)

AR ..... Anthrorack (Shuttle D2 mission)

ARAT ..... Avion de Recherche Atmosphérique et de Télédétection (Atmospheric Research and Remote Sensing Aircraft), ARAT is jointly operated by INSU–CNRS, CNES, DMN (French National Weather Center), and IGN (Institut Géographique National). The aircraft is IGN property. ARAT is a Fokker 27 MK pressurized twin turboprop aircraft (service altitude = 5800 m, cruising speed = 350 km/h, flight endurance = 5 hr; on–board computer systems: HP1000 A900, recordings on high–capacity digital video cassette, two Exabyte 2.5 GByte recorders) .

7098) http://www.aprsaf.org/about/leaflet/APRSAF_leaflet_en_a4.pdf

7099) Takaaki Iwasa, "APRSAF – Japanese International Cooperation," 5th session of COPUOS (Committee on the Peaceful Uses of Outer Space),UNOOSA, Vienna, Austria, June 6–15, 2012, URL: http://www.oosa.unvienna.org/pdf/pres/copuos2012/tech–01.pdf

ARC . . . . . Ames Research Center (NASA facility at Moffett Field, CA, and at the Dryden Flight Research Facility in Edwards, CA, USA)

ARC . . . . . Aggregation of Red Blood Cells (Shuttle experiment)

ArcGIS . . . . . Aeronautical Reconnaissance Coverage Geographic Information System. ArcGIS is geographic information system (GIS) software for visualizing, managing, creating, and analyzing geographic data. The ArcGIS Desktop program has 3 different lincense options: ArcView, ArcEditor and ArcInfo.

Archimedes I, II . Coordinated European airborne campaigns in the North Sea region (start in 1983, Archimedes IIa took place in April 1988)

ARCO Solar Inc. Since 1979, a subsidiary of Atlantic Richfield Company, located in Camarillo, CA. In February 1990, Siemens A.G. of Munich, Germany, acquired ARCO Solar, the world's largest photovoltaic company. It is now Siemens Solar Industries.

ARCS . . . . . Austrian Research Center Seibersdorf (since 1956, with sites at Seibersdorf, Leoben, Ranshofen, Vienna, Graz, Dornbirn, Wiener–Neustadt, and Budapest)

ARCSS . . . . . Arctic Center of System Science (at NSIDC of U. of Colorado, Boulder, CO, USA)

ARESE . . . . . ARM Enhanced Shortwave Experiment (campaign)

ARGO . . . . . Accurate Ranging system for Geodetic Observations (SLR program of Korea)

ARGO . . . . . "Array for Geostrophic Oceanography," a global array of buoys [an international ocean program, part of GCOS/GOOS and CLIVAR – eventually it will consist of an array of 3000 free–drifting (Lagrangian) profiling floats, at various depths, that measure the temperature and salinity of the upper 2000 m of the ocean; start of deployment in 2000]. ARGO represents a global network of sea–going floats for a better understanding of the world's oceans. Note: the acronym ARGO was abandoned several years ago, so the project is now "**Argo**" rather than ARGO.

ARGOS . . . . . Argos (CNES System) is a data collection and location system with a space segment and a ground segment. ARGOS is operational on NOAA polar–orbiting S/C. I.15.4, E.2

ARGOS . . . . . Advanced Research and Global Observation Satellite (DoD, O.3)

ARIANESPACE A commercial launch service provider of Europe with HQ in France (since 1980, first commercial operator of launchers in the world). Twelve European countries participate in the Ariane program.
Note: Airbus Safran Launchers, the joint venture created at the initiative of the Airbus and Safran groups in order to reorganize the European launchers sector, is now to be known as **ArianeGroup** — the change in corporate name will be effective as of July 1, 2017. [7100)]
ArianeGroup is a joint venture by European aerospace company Airbus and the French group Safran, it currently (2018) employs 9,000 people in France and Germany.

ARIES . . . . . Australian Resource Information and Environment Satellite

ARISS . . . . . Amateur Radio on the ISS. The first ARISS equipment was carried to the ISS on STS–106 (Space Shuttle Atlantis) in Sept. 2000 and installed by the Expedition 1 crew. The first amateur contacts were made by Commander William Shepherd in mid–November 2000.
ARISS is an international working group consisting of delegations from nine countries including Canada, Japan, Russia, the USA and several European countries. The organization is run by volunteers from national amateur radio organizations and the AMSAT (Radio Amateur Satellite Corporation) organizations from each country.

7100) "Airbus Safran Launchers to Become ArianeGroup as of July 1st," SatNews Daily, May 17, 2017, URL: http://www.satnews.com/story.php?number=1008902589

ARISTOTELES . **A**pplications and **R**esearch **I**nvolving **S**pace **T**echniques **O**bserving **T**he **E**arth's Field from **L**ow **E**arth Orbiting **S**atellite (planned but cancelled ESA Mission)

ARM ..... Advanced RISC Machine. ARM is a RISC (Reduced Instruction Set Computer), an instruction set architecture developed by ARM Holdings Plc (Cambridge UK). As a special branch of RISC, ARM architecture processors have been widely used in embedded systems including smartphones. ARM processors are typically deployed as SoC (Systems−On−Chip) to reduce space, power consumption and cost.

ARM ..... Atmospheric Radiation Measurement (campaign program of DOE)

ARMCAS ..... Arctic Radiation Measurements in Column Atmosphere−Surface System (campaign)

ARNS ..... Aeronautical Radionavigation Service (GPS, GALILEO)

ARTEMIS ..... Advanced Relay and Technology Mission Satellite (ESA)

ARTES ..... Advanced Research in Telecommunications Systems [ESA program (since 1993) consisting of several elements to support the nascent European telecom industry : ARTES 1: Strategy, ARTES 2: On−Board Processing, ARTES 3: Multimedia, ARTES 4: Partnership, and ARTES 5: Technology, etc.] [7101)]

ARPA ..... Advanced Research Project Administration (US, agency of DoD, since 1958, was renamed to DARPA)

ARQ ..... Automatic−Repeat Request

ARRL ..... American Radio Relay League (US national association for amateur radio)

ASA ..... American Standards Association (e.g. the original film speeds came out of work by Kodak on the practical measurement of film speeds in the 1940s). The international ASA/BS/DIN standard is from 1960−71.

ASA ..... Australian Space Agency (Canberra, Australia). The Agency commenced operations on 1 July 2018 and has access to $41 million over four years. [7102)] — In December 2018, the Australian government announced that Adelaide, the capital of South Australia, will become the home of the Australian Space Agency. [7103)]

ASA ..... Austrian Space Agency (Vienna, Austria, since 1972). Note: as of 2005, ASA was renamed and reorganized into FFG/ALR (see below).

ASAL ..... Agence Spatiale Algérienne (Algerian Space Agency), Algiers, Algeria (since 2002)

ASAP ..... Adaptive Sensor Array Processing (MIT/LL)

ASAP ..... Advanced Sensors Application Program (US Navy)

ASAP ..... Airborne Science and Application Program (USGS, NASA)

ASAP ..... Ariane Structure for Auxiliary Payloads (ASAP provides launch opportunities for microsatellites on a commercial basis, the ASAP−5 ring structure can accommodate up to 8 microsatellites with a volume restriction of 60 cm x 60 cm x 80 cm)

ASAP−S ..... Arianespace Structure for Auxiliary Payloads−Soyuz. The first launch of the ASAP−S was conducted on the 2nd Soyuz launch from Kourou with the Pleiades−1A mission (Dec. 17, 2011) as primary payload and the 4 ELISA satellites and the SSOT minisatellite of Chile as secondary payloads.

ASC ..... Advanced Stellar Compass (a star tracker of DTU − Technical University of Denmark)

ASCOT ..... Atmospheric Studies in Complex Terrain (campaign)

7101) "ESA's 25 years of telecom: interview with Nick Appleyard," ESA, 4 December 2018, URL: http://m.esa.int/Our_Activities/Telecommunications_Integrated_Applications/ESA_s_25_years_of_telecom_interview_with_Nick_Appleyard

7102) "Australian Space Agency," 6 July 2018, URL: https://www.industry.gov.au/strategies−for−the−future/australian−space−agency

7103) "Adelaide to Become the Home of the Australian Space Agency," Satnews Daily, 12 December 2018, URL: http://www.satnews.com/story.php?number=501137464

ASCS ..... Agricultural Stabilization and Conservation Service (USA)
ASDAR ..... Aircraft to Satellite Data Relay (wind observations are reported from commercial aircraft at cruising altitude via meteorological satellite communication links at 7 minute intervals)
ASEAN ..... Association of Southeast Asian Nations. ASEAN is made up of 10 countries : Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam – lying 28' N to –10.5' S and from 92' E to 140' E, making up approximately 600 million people. The ASEAN region is prone to large scale natural disasters such as Earthquakes, Tsunami, Typhoons Volcanic Eruptions, Flooding etc. that can lead to massive loss of life. The ASEAN region is very much dependent on EO data contributions from the global EO community.
ASE ..... Automatic Air–Sampling Equipment, see R.41.4
ASEM ..... Assembly of Station by EVA Methods (Shuttle demonstration)
ASES ..... American Solar Energy Society
ASF ..... Alaska SAR Facility in Fairbanks, Alaska (DAAC of NASA EOS Program. ASF is located at the Geophysical Institute of the University of Alaska at Fairbanks. Position: 65°N, 148°W. ASF is in effect a US–PAF for ERS–1/2 data as well as for JERS–1 and RADARSAT data.)
ASHOE ..... Airborne Southern Hemisphere Ozone Experiment (campaign)
ASI ..... Agenzia Spaziale Italiana (formerly PSN). ASI is the Italian Space Agency, Rome (since 1988)
ASI/CGS ..... ASI/Centro di Geodesia "Guiseppe Colombo" in Matera, Italy, for Space Geodesy, Remote Sensing and Space Robotics. CGS hosts the I–PAF (Italian Processing and Archiving Facility), a multimission facility for archiving, processing and distributing remote sensing data.
ASI ..... Alcatel Space Industries, France, since 1998 (ASI represents the merger of four space hardware development divisions from Alcatel, Dassault, Thomson and Aerospatiale)
As of July 1, 2005, Alcatel of Paris and Finmeccanica (parent company of Telespazio and Alenia Space) of Milano announced the creation of two new joint ventures (companies) effective as of July 1, 2005: **Alcatel Alenia Space** and **Telespazio Holding**. – Alcatel Alenia Space now combines the activities of Alcatel Space and Alenia Spazio with HQ in Cannes, France. It focuses on the design, development, and manufacturing of space systems, satellites, payloads, orbital infrastructures and space transportation, instruments and associated ground systems for civilian and military applications. – Telespazio Holding with HQ in Rome, Italy, combines Telespazio with Alcatel Space Services and Operations activities.
ASIC ..... Application Specific Integrated Circuit
ASIM ..... Application Specific Microinstrument
ASIM ..... Appliqué Sensor Interface Module – a hardware and software element of the emerging SPA (Spacecraft Plug–and–Play Avionics) standard. An ASIM functions as a bridge between a typical SPA interface and a user module and delivers automatic support for useful services including power management, synchronization, electronic data sheet etc.
ASIT ..... Applied Signal & Image Technology, (compression technology) Glen Burnie, MD
ASM ..... All–Sky Monitor
ASP ..... Attitude Sensor Package (Shuttle payload of ESA)
ASPIC ..... Application Specific Photonic Integrated Circuit
ASPRS ..... American Society for Photogrammetry and Remote Sensing (Bethesda, MD, since 1934)
ASRI ..... Asher Space Research Institute (of the Technion Israel Institute of Technology, Haifa, since 1986)

ASRI ..... Australian Space Research Institute, Elizabeth, SA [ASRI, a non−profit organisation, came about in the early 1990s as the result of a merger between the AUSROC Launch Vehicle Development Group at Monash University in Melbourne and the Australian Space Engineering Research Association (ASERA)]

ASTEX ..... Atlantic Stratocumulus Transition Experiment (airborne campaign at the Azores in 1992)

ASTP ..... Apollo−Soyuz Test Project (1975)

ASTRE ..... Accéléromètre Spatial Triaxial Electrostatique [an ESA accelerometer built by ONERA and part of ESA's MMA (Microgravity Measurement Assembly) flown on Shuttle flights STS−83 and STS−94]

Astrium ..... Astrium is the name of a new European space company of EADS and of BAE Systems (UK), formally created in May 2000. Astrium is a merger of Aerospatiale Matra of Paris, France, DASA of Munich Germany, and Marconi Electronic Systems of Stanmore, UK. German Astrium facilities are located at Friedrichshafen, Ottobrunn, Bremen, Lampoldhausen, Rostock and Trauen. The German Astrium company is called Astrium GmbH. The French/British MMS (Matra Marconi Space) facilities are located at Portsmouth and Stevenhage, UK, and at Toulouse and Vélizy, France. The French company is referred to as Astrium SAS, while the UK company is called Astrium Ltd.

Astrium GEO−Information Services Spot Image and Infoterra joined forces within **Astrium Geo−Information Services** to offer a consolidated product and services portfolio under the Astrium brand. The merger took place in May 2010. On January 1, 2011, a single operational management structure was implemented. [7104] − Commercial provider of geospatial data from such missions as: SPOT−4, −5, −6, TerraSAR−X, TanDEM−X, FormoSat−2, Pleiades, etc.

ASTRO ..... Autonomous Space Transfer and Robotic Orbiter (DARPA concept study as of 2002). The objective is to service military and commercial satellites within a specified range of orbital inclinations and altitudes. Another key component of the study is "NEXTSat" which is representative of a next−generation class of satellites designed to be serviced by the ASTRO. A demonstration launch of ASTRO is planned for 2004.

ASTRO−SPAS .. Astronomy Platform − Shuttle Pallet Satellite

ASU ..... Arizona State University (Tempe, AZ)

AT&T ..... American Telephone&Telegraph company [AT&T was the largest phone company in the world (US monopoly) prior to its divestiture in 1984 (consequence of US government deregulation policy)]. The Bell Laboratories (Bell Labs) were part of AT&T. A portion of the former AT&T was regrouped in 1996 with the founding of Lucent Technologies Inc.

ACTD ..... Antenna Coupled Terahertz Device (the emerging THz technology permits far−infrared detection of radiation at room temperature)

ATEx ..... Advanced Tether Experiment (NRL)

ATEX ..... Atlantic Tropospheric Experiment (campaign)

ATHENA ..... Advanced Telescope for High Energy Astrophysics. ATHENA is a planned X−ray telescope mission of ESA within the Cosmic Vision Program (launch expected in 2028).

ATI ..... Along−Track Interferometry

ATK ..... Alliant Techsystems Inc. with HQs in Minneapolis, MN, USA. The ATK Aerospace Group is the world's top producer of solid rocket propulsion systems and a leading supplier of military and commercial aircraft structures. It also specializes in small and microsatellites; satel-

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7104) "Astrium fully integrates Spot Image and Infoterra into new GEO−Information business division," Dec. 1, 2010, URL: http://www.astrium.eads.net/en/press_centre/astrium−fully−integrates−spot−image−and−infoterra−into−new−geo−information.html

lite components and subsystems; lightweight space deployables and solar arrays.

ATLAS ..... Atmospheric Laboratory for Application and Science (NASA program, payload series on Shuttle), L.2

ATLAS ..... Autonomous Temperature Line Acquisition System (NOAA/PMEL mooring system measuring surface wind, air temperature, SST, ten subsurface temperatures and two subsurface pressures; all data are monitored by ARGOS)

ATLID ..... Atmospheric Lidar (Sensor), an ESA backscatter lidar

ATM ..... Air Trafic Management

ATM ..... Asynchronous Transfer Mode (ITU−T network standard for cell relay)

ATN ..... Advanced TIROS−N Series (NOAA, launched from 1983 on)

ATN ..... Aeronautical Telecommunication Network

ATS ..... Air Traffic Service (a communications service)

ATS ..... Application Technology Satellite (NASA GEO satellite series prior to GOES)

ATSB ..... Astronautic Technology (M) Sdn. Bhd., Kuala Lumpur, Malaysia [Note: in this official name the (M) stands for Malaysia, while Sdn. Bhd. is the equivalent of Co. Ltd.]. ATSB is a space research and development organization (operation of TiungSat−1, RazakSat).

ATTAS ..... Advanced Technology Testing Aircraft System (VFW−614 of DLR)

ATTREX ..... Airborne Tropical TRopopause EXperiment. ATTREX is a NASA science camapain on Global Hawk over the Pacific Ocean from three locations in 2013 and 2014.

ATV ..... Roton Atmospheric Test Vehicle (of Rotary Rocket Company, Redwood City, CA). Roton ATV is a fully reusable, single−stage−to−orbit, commercial launch vehicle. Roton is powered by a rotary engine burning liquid oxygen and jet fuel. ATV made its first successful flight on July 23, 1999.

ATV ..... Automated Transfer Vehicle (ESA cargo resupply vehicle for ISS − payloads of up to 7,500 kg can be delivered). The inaugural launch of ATV (Jules Verne) took place on March 9, 2008 on an Ariane 5 launch vehicle from Kourou.

AU ..... Astronomical Unit, Sun−Earth distance = 1.496×10^8 km (average)

AURA ..... Association of Universities for Research in Astronomy [Washington DC, since 1957, AURA/STSI (Space Telescope Science Institute) is the operator of the Hubble Space Telescope for NASA]

AUSPACE ..... Auspace Ltd. of Mawson Lakes, South Australia (provider of electronic equipment, FedSat, etc.). Auspace is a wholly owned subsidiary of EADS Astrium.

AVHRR ..... Advanced Very−High Resolution Radiometer (NOAA Sensor, AVHRR/3 on NOAA−K,L,M,N is to be renamed in VIRSR for NOAA−O,P,Q)

Avionics ..... A contraction of the terms ”aviation” and ”electronics”. An avionics system is being used on aircraft and spacecraft − comprising communications, navigation and attitude control (the latter in the case of spacecraft).

AVISO ..... Archivage Validation and Interprétation des données des Satellites Océanographiques [Archiving, Validation and Interpretation of Satellites oceanographic data (CNES data center for GEOSAT, Topex/Poseidon, ERS−1/2, ENVISAT, Jason−1, etc.)]

AWACS ..... Airborne Warning and Control System. A far−field radar surveillance system developed by Westinghouse Corp. The radar’s antenna is a passive phased array used for the monitor control in elevation. AWACS operates in S−band and is able to detect low−flying targets up to distances of 370 km − from cruising altitudes of 10 km. AWACS is a product of the Cold War (mounted on top of a Boeing 707); the first AWACS system was flown in March 1977.

AWCS ..... Automated Wafer Cartridge System (Shuttle payload)
AWG ..... American Wire Gauge (the higher the number the thinner the wire)
AWG ..... Arrayed Waveguide Grating (a plane optical filter, a wavelength multiplexer/demultiplexer used in DWDM systems, it belongs into the family of high performance optical routing devices)
AWI ..... Alfred Wegener Institut for Polar and Marine Research, Bremerhaven (since 1980) and Potsdam since 1992 (Germany)
AWIPS ..... Advanced Weather Interactive Processing System (of NWS, NOAA)
AWJ ..... Abrasive Water Jet (a surface preparation technique used for telescope mirrors, etc.)
AWS ..... Automated Weather Station
AX.25 ..... Amateur X.25 radio communication protocol (a modified version of the commercial communication X.25 protocol standard), developed in the early 1980s.
AXAF ..... Advanced X−ray Astrophysics Facility, a NASA satellite mission in a high elliptical Earth orbit, deployed by Shuttle STS−93; in the spring of 1999 AXAF has been renamed to "Chandra X−ray Observatory" in honor of the late India−American Nobel Laureate Subrahmanyan Chandrasekhar
AZBS ..... Avionik Zentrum Braunschweig (Germany)

B

BA ..... Baroreflex (Shuttle payload on D2 mission)
BAC ..... Block Adaptive Quantization (a SAR raw data compression method)
BACARDI ..... Backbone Catalog of Relational Debris Information. A space object (debris) catalog located at DLR/GSOC.
BACC ..... Beijing Aerospace Control Center (Beijing, China)
BADC ..... British Atmospheric Data Center (at RAL, Chilton, UK)
BAE Systems ... British Aerospace, Farnborough, Bristol, UK; BAE was formed in 1977 as a nationalized corporation by the merger of British Aircraft Corporation, Hawker Siddeley Aviation, Hawker Siddeley Dynamics and Scottish Aviation. In 1981 BAE formed as a public limited company (Plc). In 1999 merger of BAE and GEC's Marconi Electronic Systems. The new company is called **BAE Systems**. BAE Systems (over 100,000 employes globally) business units as of 2002: Airbus UK, Aircraft Services Group, Avionics, Australia, North America, etc. As a 25% shareholder in Astrium, BAE Systems is also heavily involved in Earth observation on the European scene − in such programs as ERS, SPOT, HELIOS, MetOp, Envisat, etc.
BAEX ..... Baltic Aerosol Experiment (campaign)
BGAN ..... Broadband Global Area Network. BGAN is a combined voice and broadband data mobile communications service. Service introduction in 2005 with Inmarsat−4F series to deliver Internet and intranet content and solutions, video on demand, LAN services, e−mail, phone, etc.)
BAHC ..... Biospheric Aspects of the Hydrological Cycle (IGBP core project since 1994)
BALTEX ..... Baltic Sea Experiment (campaign)
BAMS ..... Bulletin of the American Meteorological Society (a periodical)
BAQ ..... Block Adaptive Quantization, a compression technique most suitable (and a de−facto standard) for raw SAR data compression. Also: FD−BAQ or FDBAQ (Flexible Dynamic Block Adaptive Quantization).
BAS ..... British Antarctic Survey (Cambridge, UK)
BATC ..... Ball Aerospace and Technologies Corporation (Aerospace Systems Division in Boulder, CO, and Telecommunication Products Division in Broomfield, CO) formerly: Ball Brothers Research Corporation, since

1956, [manufacturer of satellites such as: Seasat, SIR−C, COBE (Cosmic Background Explorer), CGRO (Compton Gamma Ray Observatory), ERBS, CRRES, GFO−1; and builder of instruments: CZCS, GHRS (Goddard High Resolution Spectrograph), STIS (Space Telescope Imaging Spectrograph), and NICMOS (Near−Infrared Camera and Multi−Object Spectrometer), all on HST, etc.]

BASE . . . . . Beaufort and Arctic Storm Experiment (campaign)

BATERISTA . . . . Biosphere−Atmosphere Transfer and Ecological Research, In situ Studies in Amazonia (campaign)

BATGE . . . . . Biosphere−Atmosphere Trace Gas Exchange in the Tropics (IGBP/IGAC campaign)

BATS . . . . . Bermuda Atlantic Time−Series Study (campaign)

BB . . . . . Biolabor (Shuttle D2 mission)

BBM . . . . . Breadboard Model

BBSO . . . . . Big Bear Solar Observatory. A 1.6 m telescope on Big Bear mountain in California. BBSO is operated by NJIT (New Jersey Institute of Technology), Newark, New Jersey. BBSO s the most powerful ground−based telescope dedicated to studying the sun.

BBXRT . . . . . Broad Band X−Ray Telescope (part of ASTRO−1 observatory, Shuttle)

BCP . . . . . Ball (or BATC) Commercial Platform (BCP 2000 series bus, BCP 4000 series, BCP 5000, etc.)

BCR . . . . . Battery Charge Regulator

BCRS . . . . . Netherlands Remote Sensing Board (Delft, The Netherlands)

BCSC . . . . . Boeing Commercial Space Co. (a subsidiary of the Boeing Co, chartered to commercialize space technologies)

BCT . . . . . Blue Canyon Technologies, Boulder, CO, USA (since 2008). BCT developed XACT (fleXible ADCS Cubesat Technology) unit, a standalone 0.5U 3−axis stabilized ADCS unit, featuring a star tracker, coarse sun sensor, IMU (Inertial Measurement Unit), reaction wheels, and torque rods.
Raytheon Technologies' acquisition of satellite manufacturer Blue Canyon Technologies has been completed, the company announced Dec. 22, 2020. Boulder−based BCT from now on will be part of Raytheon Intelligence & Space, a business unit of Raytheon Technologies based in Arlington, Virginia. [7105)]
The deal was first disclosed Nov. 10 and was projected to close in early 2021. It was approved sooner than expected. − Blue Canyon has a commercial satellite business but has been growing its defense sales. The company currently has more than 90 satellites in production for the Defense Advanced Research Projects Agency, the U.S. Air Force and NASA.

BDPU . . . . . Bubble, Drop and Particle Unit (Shuttle experiment)

BDS . . . . . Bioreactor Demonstration System (Shuttle payload)

BEAM . . . . . Bigelow Expandable Activity Module (a commercial inflatable module to the ISS; BEAM is scheduled to arrive at the ISS in 2015) [7106)]

BEC . . . . . Boise−Einstein Condensation

BELSPO . . . . . Belgian Federal Science Policy Office, Brussels, Belgium

BEO . . . . . Beyond Earth Orbit

BEP . . . . . Beamed Energy Propulsion

BER . . . . . Bit Error Rate (in data transmission systems)

BEST . . . . . Bilan Energétique du Système Tropical (Tropical System Energy Budget), a proposed CNES mission

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7105) Sandra Erwin, "Raytheon completes acquisition of Blue Canyon Technologies," SpaceNews, 22 December 2020, URL: https://spacenews.com/raytheon−completes−acquisition−of−blue−canyon−technologies/

7106) NASA to BEAM Up Inflatable Space Station Module," Universe Today, Jan. 16, 2013, URL: http://www.universetoday.com/99486/nasa−to−beam−up−inflatable−space−station−module/

BFN ..... Beam Forming Network
BGI ..... Bureau Gravimétrique International (Paris, France)
BGR ..... Bundesanstalt für Geowissenschaften und Rohstoffe (Hannover, Germany)
BGVQ ..... Block Gain Vector Quantization (a new compression technique of SAR data proposed by KARI) [7107)]
BIB ..... Blocked Impurity Band (detector type)
BIBEX ..... Biomass Burning Experiment (program of IGBP/IGAC)
BIC ..... Business Incubation Centre (of ESA/ESTEC in Noordwijk, the Netherlands). As of June 2015, ESA's BICs hit a milestone this month: they have now fostered 300 start−up companies – and more are joining all the time. [7108)]
BIC/TCP ..... Binary Increase Congestion/Transmission Control Protocol (as of 2004, a newly dveloped high−volume Internet Protocol at North Carolina State University)
BiCMOS ..... Bipolar Complementary Metal−Oxide Semiconductor. BiCMOS is an evolved semiconductor technology that integrates two formerly separate semiconductor technologies − those of the analog bipolar junction transistor and the digital CMOS transistor − in a single integrated circuit device.
BIL ..... Band Interleaved by Line (image organization)
BILTEN ..... TUBITAK−METU BILTEN −− BILTEN is the acronym for "Information Technologies and Electronics Research Institute" − BILTEN is affiliated with TUBITAK (also spelling of TÜBITAK) −− TUBITAK is the acronym for "The Scientific and Technical Council of Turkey" a non−profit governmental organization of Turkey, located on the campus of the Middle East Technical University (METU), Ankara, Turkey
BIO3D ..... Biochemistry of 3−D Tissue Engineering (Shuttle Payload)
BIP ..... Band Interleaved by Pixel (image organization)
BIPM ..... Bureau International des Poids et Mesures (Paris, France) − International Bureau of Weights and Measures.
BIPVs ..... Building−Integrated Photovoltaics (in 2009, this refers to flexible rooftop solar panels)
BIRA ..... Belgisch Instituut voor Ruimte Aeronomie (Brussels, Belgian Institute of Space Aeronomy)
BISSAT ..... Bistatic SAR Satellite (a proposed minisatellite mission of ASI)
BJT ..... Bipolar Junction Transistor (a three−terminal electronic device constructed of doped semiconductor material and may be used in amplifying or switching applications)
BLAST ..... Battlefield Laser Acquisition Sensor Test (Shuttle experiment)
BLM ..... Bureau of Land Management (USA)
Blog ..... A blog (a contraction of the term "weblog") is a type of website, usually maintained by an individual with regular entries of commentary, descriptions of events, or other material such as graphics or video. ....
BLOS Comms ... Beyond Line−Of−Sight Communications. As of 2017, the MUOS−5 (Mobile User Objective System−5) satellite of the US Navy is delivering secure, beyond−line−of−sight communications to troops with legacy UHF (Ultra High Frequency) radios.
BMBF ..... Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie (German Ministry of Education, Science, Research and Technology, the successor to BMFT, since 1994)
BMDO ..... Ballistic Missile Defense Organization, since 1993 [US, Division within DoD, formerly known as SDIO (Strategic Defense Initiative Organiza-

7107) Hyeon−Cheol Lee, Eun Su Kang, Sang Soon Yong, "Block Gain Vector Quantization for Satellite SAR Raw Data Compression," Proceedings of the 64th International Astronautical Congress (IAC 2013), Beijing, China, Sept. 23−27, 2013, paper: IAC−13−B1.4.1

7108) "From ESA: More than 300 new companies," June 18, 2015, URL: http://www.esa.int/Our_Activities/Space_Engineering_Technology/TTP2/From_ESA_more_than_300_new_companies

tion)]. In 2002, BMDO was renamed to MDA (Missile Defense Agency)

BMFT ..... Bundesministerium für Forschung und Technologie (German Ministry of Research and Technology, prior to 1994)

BMO ..... British Meteorological Office (same as UKMO, HQs in Bracknell, Remote Sensing Instrumentation branch in Farnborough)

BMRC ..... Bureau of Meteorology Research Centre (Melbourne, Australia)

BMV ..... Bundesministerium für Verkehr (German Ministry of Transportation)

BMVg ..... Bundesministerium für Verteidigung (German Ministry of Defense)

BNL ..... Brookhaven National Laboratory (Upton, NY, USA)

BNSC ..... British National Space Centre (London, UK) since 1985. BNSC is in effect a partnership between 10 government departments and research councils – it is Britain's Space Agency.

BNTS–1 ..... Beidou Navigation Test Satellite–1 (first augmentation system GEO satellite of China, launch Oct. 2000)

BOC ..... Binary Offset Carrier (modulation technique of Galileo, GPS)
CBOC (Composite BOC)
MBOC (Multiplexed BOC)
TMBOC (Time–Multiplexed BOC)

Boeing Co. ..... Seattle, WA, USA. A conglomerate (over 200,000 employees) of Boeing + Rockwell International (purchase of Rockwell's aerospace and defense business in Dec. 1996) + McDonnell Douglas Corp. (merger with Boeing in Aug. 1997). Boeing is also a large manufacturer of telecommunication satellites. In October 2000, The Boeing Company acquired three units within Hughes Electronics Corporation: Hughes Space and Communications Company, Hughes Electron Dynamics, and Spectrolab, Inc., in addition to Hughes Electronics' interest in HRL (Hughes Research Laboratory). The four are now part of Boeing's newest subsidiary, Boeing Satellite Systems, Inc.

BOREAS ..... Boreal Ecosystem–Atmosphere Study (campaign)

BOS ..... Basic Observation Scenario

BOST ..... Belgian Office of Science and Technology

BP ..... Bundle Protocol. The BP implements the DTN (Delay Tolerant Networking) architecture. The key capabilities of the bundle protocols include custody–based reliability, ability to cope with intermittent connectivity, ability to take advantage of scheduled and opportunistic connectivity, and late binding of names to addresses.

BPDF ..... Bidirectional Polarization Distribution Function

BPOT ..... Bioluminescence Potential

BPSK ..... Bi–Phase Shift Keying (modulation technique)

BRDF ..... Bidirectional Reflectance and Distribution Function

BRF ..... Bidirectional Reflectance Factor

BRE ..... Broad Reach Engineering (Tempe, AZ, USA, since 1997); provider of space components. In January 2013, BRE was acquired by Moog Inc. of East Aurora, NY. [7109)]

BREMSAT ..... University of Bremen Satellite (Shuttle payload)

BRIC ..... Biological Research in Canister (Shuttle experiment)

BRICS Countries BRICS is the acronym for an association of five major emerging national economies: Brazil, Russia, India, China and South Africa. The BRICS members are all leading developing or newly industrialized countries, but they are distinguished by their large, sometimes fast–growing economies and significant influence on regional affairs; all five are G–20 members. Since 2009, the BRICS nations have met annually

7109) "Moog Acquires Broad Reach Engineering Company," Moog, January 2, 2013, URL: http://www.moog.com/news/corporate–press–releases/2013/moog–acquires–broad–reach–engineering–company/

at formal summits. China will host the 9th BRICS summit in Xiamen on September 3–5, 2017. [7110)]

BrO . . . . . Bromine monoxide

BSH . . . . . Bundesamt für Seeschiffahrt und Hydrographie (Hamburg, Germany)

BSI . . . . . British Standards Institution

BSIS . . . . . Boeing Space and Intelligence Systems (Seal Beach, CA)

BSPO . . . . . Belgian Science Policy Office

BSRN . . . . . Baseline Surface Radiation Network (WCRP/GEWEX)

BSS . . . . . Boeing Satellite Systems, Inc. El Segundo, CA (since Oct. 2000)

BST . . . . . Barium, Strontium and Titanium (BST is a ceramic material consisting of barium, strontium and titanium salts. Because ferroelectrics retain their electric polarization after application and removal of an electric field, their polarization depends on temperature. The IR detector technology of BST is based on an uncooled ferroelectric BST array.

BSTC . . . . . Biotechnology Specimen Temperature Controller (Shuttle)

BUFR . . . . . BUFR is an acronym for "Binary Universal Form for the Representation of meteorological data". BUFR is a WMO (World Meteorological Organization) standard binary code for the exchange and storage of data.

BWB . . . . . Bundesamt für Wehrtechnik und Beschaffung (German Office of Defense Technology and Procurement), Koblenz

C

C3S . . . . . Copernicus Climate Change Service. C3S supports society by providing authoritative information about the past, present and future climate in Europe and the rest of the World. C3S is one of six thematic information services provided by the Copernicus Earth Observation Programme of the EU (European Union). Copernicus is an operational programme building on existing research infrastructures and knowledge available in Europe and elsewhere. C3S relies on climate research carried out within the World Climate Research Programme (WCRP) and responds to user requirements defined by the Global Climate Observing System (GCOS). C3S provides an important resource to the Global Framework for Climate Services (GFCS). [7111)]

C5ISR . . . . . Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance (of the US Army)

C/A . . . . . Coarse Acquisition (a GPS and GLONASS code)

CAA . . . . . Comtech AeroAstro Inc., Ashburn, VA, USA

CAAC . . . . . Civil Aviation Association of China

CAAO . . . . . Center for Astronomical Adaptive Optics (at the University of Arizona in Tucson, AZ)

CAFE . . . . . Central Australian Fronts Experiment (campaign)

CALIPSO . . . . . Cloud–Aerosol Lidar and Infrared Pathfinder Satellite Observations (a NASA/CNES mission, new name as of the end of 2001), alias PICASSO–CENA, alias ESSP–3

CAM . . . . . Centre d'Aviation Météorologique (France)

CAMAREX . . . . Carbon in the Amazon River Experiment (campaign)

CAMEX . . . . . Convection and Atmospheric Moisture Experiment (airborne campaign conducted at NASA Wallops Flight Facility, Wallops Island,VA)

CAN . . . . . Controller Area Network (used in embedded systems)

CANDOS . . . . . Communications and Network Demonstrations on Shuttle (Hitchhiker payload on STS–107)

CANEUS . . . . . Canada–Europe–United States Organization for Aerospace Applications

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7110) "Xiamen, host city of next annual BRICS summit," Oct. 18, 2010, URL: http://news.xinhuanet.com/english/china/2016–10/18/c_135762265.htm

7111) Copernicus Climate Change Programme, URL: https://climate.copernicus.eu/

CANEX . . . . . Canadian Experiments (Shuttle payload)
CANSOC . . . . . Canadian Satellite Operations Center (in St−Hubert, Canada)
CAMS . . . . . Copernicus Atmosphere Monitoring Service (monitors ozone in the atmosphere, as well as ultraviolet radiation that gets through the ozone layer to reach Earth's surface). The Service records past trends, gives a snapshot of the current situation and forecasts ozone concentrations over the next days to support research, policy monitoring and information of the public.
CAO . . . . . Central Aerological Observatory (Moscow)
CAPE . . . . . Convection and Precipitation Electrification Experiment (campaign)
CAPL . . . . . Capillary Pumped Loop (Shuttle experiment of Hitchhiker payload, see also 'CPL')
CARIBIC . . . . . Civil Aircraft for Remote−Sensing and In−Situ−Measurements in Troposphere and Lower Stratosphere Based on the Instrumentation Container Concept (R.41.3)
CART . . . . . Cloud and Radiation Testbed [field measurement component of the DOE ARM program; the three CART sites are: SGP (Southern Great Plains) near Billings in northern Oklahoma, TWP (Tropical Western Pacific on Manus Island, Papua, New Guinea), and NSA (North Slope of Alaska)]
CAPTEX . . . . . Cross−Appalachian Tracer Experiment (campaign)
CAS . . . . . Chinese Academy of Sciences (Beijing, China, since 1949)
CAS/CSSAR . . . . CAS/Center for Space Science and Applied Research, Beijing, China, since 1987
CASIC . . . . . China Aerospace Science and Industry Corporation (a large state−owned hi−tech enterprise under direct administration of the central government)
CAS/IRSA . . . . . CAS/Institute for Remote Sensing Applications, Beijing, China
CAS/SITP . . . . . CAS/Shanghai Institute of Technical Physics, Shanghai, China
CASA . . . . . Construcciones Aeronauticas S.A. (Madrid, Spain). In July 1999 CASA merged with DASA (DaimlerChrysler Aerospace AG)
CASC (CASTC) . China Aerospace Science & Technology Corporation (Beijing, since 1993, also referred to as CAC). CASC, as a large state−owned enterprise, exerts primary control over the national space program on a day−to−day basis (handling of internal matters). CASC specializes in developing, building and suppling launch vehicles, satellites, various types of strategic and tactical missiles as well as satellite ground application systems and providing commercial launch services.
Over 130 Chinese organizations are subordinate to CASC, including five large academies [CALT (Chinese Academy of Launch−Vehicle Technology), CAST (Chinese Academy of Space Technology), SAST (Shanghai Academy of Space−Flight Technology), CASET (Chinese Academy of Space Electronic Technology), and the Academy of Space Chemical Propulsion Technology]. The Dongfanghong Satellite Company of Beijing is also part of CASC.
CASI . . . . . Canadian Aeronautics and Space Institute
CASIC . . . . . China Aerospace Science and Industry Corporation, Beijing, China.
CASIS . . . . . Center for the Advancement of Science in Space (administrative office in Melbourne, FL, USA). CASIS is a non−profit organization selected by NASA in July 2011 to maximize use of theISS U.S. National Laboratory through 2020. CASIS is to manage the non−NASA research on the ISS. CASIS has opened part of the ISS exterior to research experiments via NanoRacks, a company providing plug−and−play platforms

aboard the Station to third−party research organizations. [7112) 7113)]

CASP . . . . . Canadian Atlantic Storms Program (campaign)

CAST . . . . . Center for Aerospace Technology (Weber State University, Ogden, Utah)

CAST . . . . . Chinese Academy of Space Technology (Beijing, China, since 1968). CAST has responsibility for the design and manufacture of most Chinese satellites − and operates a number of institutions (12) and factories to meet satellite development and testing requirements. CAST employs more than 6000 technicians (2000 with higher degrees). − Meteorological satellite instruments are being build by SITP (Shanghai Institute of Technical Physics).

CATSAT . . . . . Cooperative Astrophysical and Technology Satellite (part of STEDI program, see P.26.3)

CAWSES . . . . . Climate and Weather of the Sun−Earth System (an international program which started in 2004)

CBE . . . . . Chemical Beam Epitaxy (a growth technique)

CBE . . . . . Current Best Estimate (for instance for a spacecraft mass in planning)

CBERS . . . . . China/Brazil − Earth Resources Satellite, F.9. The satellite is also referred to as Ziyuan−1, meaning 'resource' in Chinese.

CBLAST . . . . . Coupled Boundary Layers Air−Sea Transfer [a NOAA, ONR, etc. research project of mapping mesoscale and sub−mesoscale ocean wind fields and to characterize MABL (Marine Atmospheric Boundary Layer)]

CBR . . . . . Constant Bit Rate

CCAFS . . . . . Cape Canaveral Air Force Station (Cape Canaveral, FL, USA)

CCD . . . . . Charge−Coupled Device (solid−state detector type)

CCDev . . . . . Commercial Crew Development (program of NASA to stimulate development of privately operated crew vehicles to LEO)

CCE . . . . . Charge Composition Explorer (S/C of AMPTE mission, M.4.3)

CCETT . . . . . Centre Commun d' Etudes de Télécommunications et de Télédiffusion (Rennes, France)

CCIR . . . . . Comité Consultatif International des Radiocommunications (International Consultative Committee for Radio Communications , an organ of ITU). As of 1990 CCIR was renamed to ITU−R.

CCIT . . . . . Coherent Communications, Imaging and Targeting (a DARPA sponsored program for secure communications)

CCITT . . . . . Comité Consultatif International Téléphonique et Télégraphique (one of three bodies for the definition of OSI. CCITT is a permanent organ of ITU). As of 1990 CCITT was renamed to ITU−T (ITU−Telecommunications)

CCLRC . . . . . Council for the Central Laboratory of the Research Councils [UK's strategic agency for large−scale research facilities, since 1995, RAL (Rutherford Appleton Laboratory) is part of CCLRC]

CCM−A . . . . . Cell Culture Module−A (Shuttle experiment)

CCN . . . . . Cloud Condensation Nuclei

CCPD . . . . . Charge−Coupled Photo Detector

CCRS . . . . . Canada Center for Remote Sensing (Ottawa, Ontario; established in 1972, part of 'Department of Energy, Mines and Resources,' Canada)

CCSDS . . . . . Consultative Committee for Space Data Systems (CCSDS was formed in 1982 by the major space agencies of the world to provide a forum for discussion of common problems in the development and operation of space data systems)

CD . . . . . Compact Disk (introduction in 1982)

7112) "CASIS and NanoRacks Close Deal to Use Commercial Research Platform in the Extremes of Space," 2012, URL: http://nanoracks.com/wp−content/uploads/Release−01−Casis−NanoRacks−Commercial−Platform.pdf

7113) http://www.iss−casis.org/

CDA . . . . . Command and Data Acquisition (NOAA Antenna, downlink concept)
CDAAC . . . . . COSMIC Data Analysis and Archive Center, located at Boulder, CO
CDDIS . . . . . Crustal Dynamics Data Information System (database at GSFC)
CDGPS . . . . . Carrier−phase Differential GPS (a relative position measurement technique)
CDM . . . . . Conjunction Data Message. The CDM is designed for applications involving conjunction information interchange between originators of CAs (Conjunction Assessments) and recipients. Conjunction information includes data types such as miss distance, probability of collision, TCA (Time of Closest Approach), and closest approach relative position and velocity. — ISO 19389:2014 specifies a standard message format for use in exchanging spacecraft conjunction information between originators of CAs and satellite owner/operators and other authorized parties.
CDMA . . . . . Code Division Multiple Access (a communication access scheme)
CDMU . . . . . Command and Data Management Unit
CDOM . . . . . Chromophoric Dissolved Organic Matter (in ocean color measurements)
CDP . . . . . Crustal Dynamics Program (NASA)
CdZnTe . . . . . Cadmium Zinc Telluride (a detector material – also referred to as CZT)
CDR . . . . . Critical Design Review
CD−ROM . . . . . Compact Disk – Read Only Memory (storage capacity up to 650 MByte)
CD−R/W . . . . . Compact Disk – Read/Write
CDRS . . . . . Chinese Data Relay Satellites: On April 25, 2008, China launched its own first data relay satellite into GEO. On July 13,2011, and on July 25, 2012, the second and third CDRS were launched and deployed into geostationary orbit. The satellites are also referred to as “Tianlian“ (Sky Link).
CDTI . . . . . Center for Technological and Industrial Development (Centro para el Desarrollo Tecnológico e Industrial), Madrid, Spain [since 1977, a government space policy coordination center – and a PPP (Public, Private Partnership) organization reporting to the Spanish Ministry of Science and Innovation]
CDWL . . . . . Coherent−detection Doppler Wind Lidar
CEA . . . . . Commissariat à l’Energie Atomique
CEAREX . . . . . Coordinated Eastern Arctic Experiment (campaign)
CEBAS . . . . . Closed Equilibrated Biological Aquatic System (Shuttle payload)
CE90 . . . . . Circular Error of 90% – a measure of positional accuracy of observed imagery. The location error is defined in relation to a confidence level (i.e., range of error) of 90% (CE90)— meaning that the object’s location is represented on the image, within the stated accuracy, 90% of the time. The CE90 accuracy scale can be related to RMSE (Root Mean Square Error) as well as the U.S. NMAS (National Map Accuracy Standards).
CEC . . . . . Commission of the European Communities (Brussels, Belgium)
CEES . . . . . Committee on Earth and Environmental Sciences (US interagency committee)
CEMAGREF . . . Centre d’Etude du Machinisme Agricole du Genie Rural et des Eaux et Forests (France)
CentrAl . . . . . Central Reinforced Aluminum (as of 2007, a new fatigue resistant material developed by the Delft University of Technology, Delft, The Netherlands with partners GTM Advanced Structures, The Hague, and Alcoa, USA). The CentrAl concept comprises a central layer of fiber metal laminate (FML), sandwiched between one or more thick layers of high−quality aluminum.

CEOS ..... Committee on Earth Observation Satellites (since 1984). CEOS coordinates internationally all civil spaceborne missions designed to observe and study our planet. As of 2002, CEOS comprises 39 space agencies and other national and international organizations.

CEP ..... Circular Error Probable (in S/C or instrument pointing or in a navigation vector – it is a measure in a systems precision to provide the location or position knowledge)

CEPEX ..... Central Equatorial Pacific Experiment (campaign)

CEPT ..... European Conference of Postal and Telecommunications Administrations (Montreux, Switzerland, since 1959). CEPT comprises 43 European countries and is charged with representing Europe on such items as spectrum issues, etc.

CERFACS ..... Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique (Toulouse, France, since 1987) European Center for Research and Advanced Training in Scientific Computation

CERGA ..... Centre d'Etudes et des Recherches en Geodynamique et Astrometrie (in Grasse, France)

CERISE ..... Caracterisation de l'Environnement Radioelectrique par un Instrument Spatial Embarque, (French S/C), F.62.11

CERN ..... Centre Européen de Recherche Nucléaire (European Center for Nuclear Research), Geneva, Switzerland. CERN, founded in 1954, was born out of a need to collaborate: no single European country could afford the facilities that were needed in the field of nuclear research. CERN is an international organization with 20 member states, whose business is scientific research into the fundamental laws of matter.

CES ..... Committee on Earth Studies – a standing committee of the Space Studies Board within the National Research Council (NRC), USA

CESAR ..... Cooperacion Española–Argentina (satellite of INTA and CONAE)

CESBIO ..... Centre d'Etudes Spatiales de la Biosphère (Toulouse, France)

CESIC® ..... Carbon–fiber reinforced Silicon Carbide, a product of ECM Ingenieur–Unternehmen, Munich, Germany. CESIC (also written as Cesic) is a ceramic matrix composite material (made of SiC , Si and C) of high stiffness, high thermal conductivity, and low thermal expansion from room to cryogenic temperatures. It is an ideal material to produce lightweight, stable structures and a range of high–precision optomechanical components, such as lightweight mirrors, telescope, instrument structures, and optical benches for both land– and space–based applications.

CESR ..... Centre d'Etude Spatiale des Rayonnements (Toulouse, France, part of CNRS)

CETA ..... Crew and Equipment Translation Aids (Shuttle experiment)

CETP ..... Centre d'etude des Environnements Terrestre et Planetaire (Velizy/Saint–Maur, France, CNRS Lab)

CEU ..... Commission of the European Union (successor of previous CEC)

CEV ..... Centre d'Essais en Vol (French Test Flight Center)

CEV ..... Crew Exploration Vehicle (NASA). CEV is a new transport vehicle development which will succeed the Space Shuttle as NASA's spacecraft for human space exploration (in the time frame 2010 and beyond).
Note: As of July 2006, the crew launch vehicle was renamed to **Ares I**, and the cargo launcher was renamed to **Ares V**. The Ares I will carry just the crew exploration vehicle and astronauts into orbit, while the much larger Ares V will carry the cargo and equipment. Once in orbit, the crew exploration vehicle will link up with the cargo vehicle to travel on to the moon. The "I and V" designations of "Ares" pay homage to the Apollo program's Saturn I and Saturn V rockets, the first large US space vehicles conceived and developed specifically for human spaceflight.

CfAO ..... Center for Adaptive Optics, UCSC (University of California at Santa Cruz)
CFAR ..... Constant False Alarm Rate (radar technique)
CFCs ..... Chlorofluorocarbons
CFC−11 ..... CCl_3F, trichlorofluoromethane, Freon−11
CFC−12 ..... CCl_2F_2, dichlorodifluoromethane, Freon−12
CFDP ..... CCSDS File Delivery Protocol (a standardized file transfer protocol for space missions)
CFES ..... Continuous Flow Electrophoresis System (Shuttle payload)
CFRP ..... Carbon Fiber Reinforced Polymer (also: CFRM for Material)
CFRS ..... Carbon Fiber Reinforced Silicone
CGBA ..... Commercial Generic Bioprocessing Apparatus (Shuttle experiment)
CGI ..... Computer Generated Imagery
CGWIC ..... China Great Wall Industry Corporation (Beijing, since 1980), provider of Long March launch services to the world market. CGWIC is a subsidiary of CAST (China Aerospace Science & Technology) Corporation.
CGM ..... Camera Geometric Model. CDWIC is the exclusive commercial organization authorized by the Chinese Government to offer Long March launch services to international market (since 1985). [7114)]
CGMS ..... Coordination Group for Meteorological Satellites [since 1972; active CGMS members are: EUMETSAT (Europe), JMA (Japan), China, Russia, NOAA (USA), WMO]. The global network of meteorological satellites constitutes a major portion of the space−based GOS (Global Observing System) of WWW (World Weather Watch).
CGP ..... Shuttle payload consisting of: [CSE (Cryo System Experiment), GP (Glow Phenomenon)]
CGU ..... Canadian Geophysical Union
CGWIC ..... China Great Wall Industry Corporation (launch service provider of the Long March family). CGWIC was established in 1980 and restructured in 2004.
CH_3Cl ..... Methyl chloride
CH_4 ..... Methane
CHAMP ..... Challenging Minisatellite Payload
CHAMP ..... Comet Halley Active Monitoring Program (Shuttle experiment)
Charter ..... International Charter "Space and Major Disasters", signed in October 2000, was the first international initiative aimed at establishing a unified system for triggering the acquisition of space data when a major disaster strikes. It was initiated following the UNISPACE−III meeting held in Vienna, Austria in July 1999 by the French Space Agency, CNES and ESA (European Space Agency).
CHASE ..... Coronal Helium Abundance Spacelab Experiment (Spacelab−2)
CHEOPS ..... CHEmistry of Ozone in the Polar Stratosphere (airborne campaign)
CHIRP ..... Commercially Hosted Infrared Payload − a technology demonstration instrument of DoD (USAF/SMC) developed at SAIC, launch in 2010 on a SES AGS (Americom Government Services) spacecraft (SES−2) into GEO
CHORUS ..... Chemistry of Ozone Reduction in the Lower Stratosphere (first Strato−2C mission)
CHROMEX .... Chromosomes and Plant Cell Division (Shuttle experiment)
CHRPT ..... Chinese High Resolution Picture Transmission (downlink mode)
CIB ..... Cosmic Infrared Background
CICERO ..... Community Initiative for Continuing Earth Radio Occultation (a future constellation in planning as of 2007)
CICESE ..... Center for Scientific Research and Higher Education (located at Ensenada, Baja California, Mexico, since 1973)

7114) Liu Bo, Ling Fei, "Long March,Easy And Reliable Access To Space For Small Satellites," Proceedings of the 64th International Astronautical Congress (IAC 2013), Beijing, China, Sept. 23−27, 2013, paper: IAC−13−B4.5.1

CID ..... Charge–Injection Device (a charge–transfer detection technology)
CID ..... Collision–Induced Dissociation (a measurement technique in the atmospheric sciences for studies of ion–molecule reactions, etc.)
CIDESON ..... Centro de Investigacion y Desarrollo de los Recursos Naturales de Sonora (Hermosillo, Mexico)
CIEMAT ..... Centro de Investigaciones Energéticas y Medioambientales (Environmental and Energetic Research Center), a meteorological station at the Almeria site, Spain. CIEMAT is stationed at the "Plataforma Solar de Almeria" in southern Spain — measuring of how much solar energy reaches a power plant. DLR and the CIEMAT commission set up the station. [7115)]
CIESIN ..... Consortium for International Earth Science Information Network (a private nonprofit corporation in Ann Arbor, Michigan (University Center). CIESIN serves scientific, policy–making, educational, and public access data and information needs. CIESIN developed and is operating SEDAC (Socio–Economic Data and Applications Center) as part of one of nine data centers of EOSDIS.
CIGNET ..... Cooperative International GPS Network of IAG (International Association of Geodesy), J.5.3.6
CIGS ..... Cu (In,Ge) Se_2 type solar cells or Copper Indium Germanium Diselenide (solar arrays based on thin film technology)
CIMS ..... Chemical Ionization Mass Spectrometry (a measurement technique frequently used for atmospheric measurements)
CIMSS ..... Cooperative Institute for Meteorological Satellite Studies (University of Wisconsin, Madison)
CINDE ..... Convection Initiation and Downburst Experiment (campaign)
CINDIS ..... Cold Interferometric Nulling Demonstration In Space (NASA mission)
CIR ..... Color Infrared (video images)
CIRA ..... Centro Italiano Ricerche Aerospaziali (Italian Aerospace Research Center) since 1984, Capua, Italy
CIRAC ..... Canadian Institute for Research in Atmospheric Chemistry
CIRES ..... Cooperative Institute for Research in Environmental Sciences (University of Boulder, and at NOAA, Boulder, CO, USA)
CIRRIS ..... Cryogenic Infrared Radiance Instrumentation for Shuttle (DoD Shuttle payload)
CIS ..... Commonwealth of Independent States (part of former Soviet Union or USSR)
CIS ..... Copper Indium Gallium Diselenide ($CuInSe_2$, integrated thin–film solar cell technology)
Cislunar space ... the region between the Earth and slightly beyond the Moon– and eventually on to Mars
CIT ..... California Institute of Technology (Pasadena, CA)
CIT ..... Computerized Ionospheric Tomography
CITE ..... Chemical Instrumentation Test and Evaluation (campaign)
CIV ..... Critical Ionization Velocity (Shuttle experiment)
CIVEX ..... Cloud Instruments Validation Experiment (campaign)
CLARA ..... Cloud And Radiation (campaign)
CLASS ..... Cross–chain LORAN Atmospheric Sounding System (NCAR ground–based sounding stations)
CLC ..... CubeSat Launch Company, of Boulder, CO (since 2001, provider of CubeSat launch arrangements, etc.)
CLEO ..... Conference on Lasers and Electro–Optics (annual conference)
CLEOPATRA ... Cloud Experiment Oberpfaffenhofen and Transports (campaign)
CLIVAR ..... Climate Variability and Predictability (WCRP campaign program)

7115) "Always looking to the sky – DLR and CIEMAT commission a meteorological station for solar power plants," DLR, June 6, 2013, URL: http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid–10202/334_read–7240/year–all/#gallery/3669

CLIVAR−ACC . CLIVAR − Anthropogenic Climate Change
CLIVAR−DecCen CLIVAR − Decadal−to−Centennial time−scales
CLIVAR−GOALS CLIVAR − Global Ocean−Atmosphere−Land System
CLOUDS ..... Cloud and Radiation Monitoring Satellite (a proposed ESA mission as of 2001, C.9)
CLOUDS ..... Cloud Logic to Optimize Use of Defense Systems (Shuttle payload)
ClO ..... Chlorine monoxide
CIOMP/CAS .... Changchun Institute of Optics, Fine Mechanics and Physics/Chinese Academy of Sciences (located in Changchun, China, since 1952).
$ClONO_2$ ..... ($ClONO_3$) Chlorine nitrate
CLPS ..... Commercial Lunar Payload Services (NASA Program). CLPS is a program to contract transportation services able to send small robotic landers and rovers to the Moon's south polar region mostly with the goals of exploration, ISRU (In Situ Resource Utilization), and lunar science to support the Artemis lunar program. CLPS is intended to buy end−to−end payload services between Earth and the lunar surface using fixed priced contracts.
CLRC ..... Central Laboratory of the Research Councils (UK)
CLS ..... Collecte Localisation Satellites (a CNES subsidiary with HQ in Toulouse, France) CLS was set up in 1986 to process the data of the Argos (data collection) system and deliver it to the end user. In this context: A second CNES subsidiary, Service Argos Inc. of Largo, MD (USA) provides the same service for US customers.

As of 2018, CLS employs 700 people at its headquarters in Toulouse and 26 other sites around the world. The company operates in six strategic business sectors: sustainable fisheries management, environmental monitoring, maritime safety and security, fleet management, energy and mining, and space and ground systems. In particular, CLS provides satellite services based on the location and collection of environmental data (100,000 beacons and terminals processed each month, drifting buoys, animals, fishing and commercial fleets, etc.), observation of the oceans and inland waters (more than 20 instruments on board satellites provide daily information to CLS on the world's seas and oceans), and monitoring of land and maritime activities (CLS processes nearly 10,000 radar images every year). The CLS Group achieved a turnover of more than €122 million in 2017, and plans to increase it to nearly €135 million in 2018. The Group has been growing strongly in recent years and has set itself ambitious objectives by breaking into new markets.

With the support of CNES, CLS (Collecte Location Satellites) a subsidiary of CNES, announced the creation of a new subsidiary, **Kinéis**. Kinéis aims to become a major player in NewSpace and allow, by 2030, several million objects to be connected wherever they are on the surface of the globe. Professionals and the general public will have access to a global satellite location and connectivity service, very easy to use and very affordable. The basis of this connectivity: a constellation of nanosatellites, unpublished, developed with strategic partners: Thales Alenia Space, Nexeya, Syrlinks. This constellation will be put into orbit as early as 2021. [7116)]

CLTP ..... Cansat Leader Training Program. CLTP was established in 2010 by UNISEC (Japan) to contribute to capacity building in space technology and improve teaching methods−based space engineering education.
CLUSTER ..... ESA/NASA Solar−Terrestrial Mission (M.7)
C−MAN ..... Coastal−Marine Automated Network [NOAA/NWS/NDBC moored buoy network (over 100 buoys) with hourly reports via GOES DCS]
CMA ..... China Meteorological Administration, Beijing (government agency)

7116) "Kinéis, a unique constellation," CLS Group, 9October 2018, URL: https://www.cls.fr/en/kineis−unique−constellation/

CMA/NSMC .... CMA/National Satellite Meteorological Center, Beijing, China
CMB ..... Cosmic Microwave Background. The CMB is the so−called afterglow of the Big Bang,it is one way the expansion is measured . The CMB is like an echo from the early days of the Universe. The CMB has been measured and studied pretty thoroughly, most notably by the ESA's Planck Observatory, and by the WMAP (Wilkinson Microwave Anisotropy Probe) mission. [7117)]
CMC ..... Canadian Meteorological Centre
CMC ..... Ceramic Matrix Composite (material)
CME ..... Coronal Mass Ejection (of the sun)
CMEMS ..... Copernicus Marine Environment Monitoring Service. CMEMS provides regular and systematic reference information on the state of the physical oceans and regional seas. The observations and forecasts produced by the service support all marine applications.
CMEMS is provided by Mercator Ocean (formerly Ifremer) of France. In Nov. 2014, the EC and Mercator Ocean signed an agreement setting up the European Union's Copernicus Marine Environment Monitoring Service (CMEMS).
CMESS−95 .... Cooperative Multiscale Experiment Spring/Summer 1995 (campaign)
CMG ..... Control Moment Gyroscope
CMIX ..... Commercial Materials Dispersion Apparatus Instrument Technology Associates Experiments (Shuttle experiment)
CMOS ..... Complementary Metal−Oxide Semiconductor (solid−state microprocessor technology)
CMS ..... Centre de Météorologie Spatiale (Lannion, France)
CMSA ..... China Manned Space Agency (Beijing, since 1993). CMSA is a branch of the PLA (People's Liberation Army) that controls the Shenzhou crew vehicles and the Tiangong space station development.
CMSE ..... Commercialization of Military and Space Electronics (conferences)
CMT ..... CdHgTe (Cadmium Mercury Telluride − a photodiode detector type for detection in the spectral range of 3.5 − 11 μm). Detection of very long wavelengths ($\lambda > 15$ μm) using CdHgTe implies very small band gaps.
CN ..... Condensation Nuclei
CNCR ..... Characterization of Neurospora Circadian Rhythms (Shuttle payload)
CNEOS ..... Center for Near Earth Object Studies. CNEOS is a fireball events database at NASA/JPL. Fireballs and bolides are astronomical terms for exceptionally bright meteors that are spectacular enough to to be seen over a very wide area. — As of 7 April 2022, the USSF released its database to NASA/JPL. [7118)]
CNES ..... Centre National D'Etudes Spatiales (Space Agency of France, Paris, Toulouse, Evry, and Kourou, since 1962). Employment (1999) of 2500 scientists and engineers; of these, about 1700 employees are in Toulouse. CNES/HQ is in Paris with about 250 employees.
CNES/AVISO ... CNES/Archiving, Validation and Interpretation of Satellites oceanographic data (CNES data center for GEOSAT, Topex/Poseidon, ERS−1/2, ENVISAT, Jason−1, etc.)
CNET ..... Centre National d'Etudes des Télécommunications (France Télécom)
CNGB ..... CubeSat Next Generation Bus (Reference Architecture) [7119)]

7117) Evan Gough, "The Laws Of Cosmology May Need A Re−Write," Universe Today, April 12, 2016, URL: http://www.universetoday.com/128367/laws−cosmology−may−need−re−write/
7118) "US Space Force Releases Decades of Bolide Data to NASA for Planetary Defense Studies," NASA/JPL, 7 April 2022, URL: https://tinyurl.com/yc4nv2au
7119) Vincent Riot, Lance Simms, Darrell Carter, Todd Decker, Jim Newman, Lara Magallanes, Jim Horning, David Rigmaiden, Meagan Hubbell, Dave Williamson, "Government−owned CubeSat Next Generation Bus Reference Architecture," Proceedings of the AIAA/USU Conference on Small Satellites, Logan, Utah, USA, August 2−7, 2014, paper: SSC14−V−9, URL: http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=3049&context=smallsat

CNIE . . . . . Comision Nacional de Investigaciones Espaciales (former Space Agency of Argentina)

CNR . . . . . Consiglio Nazionale delle Ricerche (National Research Counsel of Italy, Rome). CNR is a government agency which promotes and coordinates institutional research in the interests of Italy. CNR was founded in 1923 and reorganized in 1945 and 1979. CNR funds/maintains 157 institutes, 117 study centers, and 16 research groups throughout Italy. Research is supported in the natural and human sciences. In 1980 PSN (National Space Program) was created within CNR. Some space projects supported by CNR are: Italsat, TSS (Tethered Satellite System), Iris (propulsion system for the transfer of useful loads from the Space Shuttle's "hold" to a higher orbit), Lageos−2, and Sax (X−ray astronomy). CNR maintains a number of cooperations with various space agencies. In 1988 ASI (Agenzia Spaziale Italiana) was founded which succeeded CNR in relations concerning matters of planning and administrative nature. Nevertheless, CNR continues to follow specific aspects of research within the context of its own bodies.

CNR/DCAS . . . . CNR / Direzione Centrale Attività Scientifiche (Rome, Italy)

CNR/FISBAT . . . CNR / Istituto per lo Studio dei Fenomeni Fisici e Chimici della Bassa ed Alta Atmosfera (Institute of Physics and Chemistry of the Lower and Upper Atmosphere, Bologna, Italy)

CNR/IFA . . . . . CNR / Istituto di Fisica dell' Asmosfera (Institute for the Physics of the Atmosphere, Frascati, Italy)

CNR/IFAM . . . . . CNR / Istituto di Fisica Atomica e Molecolare (Pisa, Italy)

CNR/IFCTR . . . . CNR / Istituto die Fisica Cosmica e Teccnologie Relative (Milano)

CNR/IFSI . . . . . CNR / Istituto de Fisica dello Spazio Interplanetario (Frascati, Italy)

CNR/IROE . . . . . CNR / Istituto di Richerca sulle Onde Elettromagnetiche (Florence, Italy)

CNR/IMAA . . . . CNR / Istituto di Metodologie per l'Analisi Ambientale (Potenza, Italy, Basilicata Region)

CNR/IMGA . . . . CNR / Istituto per lo Studio delle Metodologie Geofisiche Ambientali (Bologna, Italy)

CNR/IMM . . . . . CNR / Istituto per la Microelettronica e i Microsistemi (Bologna, Italy)

CNR/ISAC . . . . . CNR / Istituto Scienze dell'Atmosfera e del Clima (Bologna, Rome, etc., Italy), CNR/Institute of Atmospheric Sciences and Climate

CNR/ITRE . . . . . CNR / Istituto di Technologie e Studie della Radiazioni Extraterrestri (Bologna, Italy)

CNR/LARA . . . . CNR / Laboratorio Aereo per Ricerche Ambientali (Laboratory for Airborne Environmental Studies, Rome, Italy)

CNR/PSN . . . . . Consiglio Nazionale delle Ricerche / Piano Spaziale Nationale (Italy)

CNRM . . . . . Centre National des Recherches Meteorologiques (France)

CNRS . . . . . Centre National de la Recherche Scientifique (National Research Center of France). CNRS is a government−funded basic−research organization which employs about 26,000 people, including more than 11,000 research scientists. The agency maintains facilities throughout France. There are over 1500 CNRS laboratories active in all fields of science. Most CNRS laboratories rely for their research on partnerships with French universities. There are also many CNRS cooperations and exchanges with other research organizations on a national and international level as well as with French industry. Only a few facilities (dealing mostly with the sciences of the universe, such as: oceanography, geophysics, climatology, hydrology, volcanology, seismology, astronomy, astrophysics, etc.) are listed below.

CNRS/CESR . . . . CNRS/Centre d'Etude Spatiale des Rayonnements (Toulouse, France)

CNRS/CERGA . CNRS/Centre d'Etudes et des Recherches en Geodynamique et Astrometrie (Grasse, France)

CNRS/CETP .... CNRS/Centre d'Etude des Environnenments Terrestre et Planétaires, (sites at: Vélizy, Issy−les−Moulineaux, and Saint−Maur des Fossés, France)
CNRS/IAS ..... CNRS/Institut d'Astrophysique Spatiale (Orsay, France)
CNRS/INSU .... CNRS/Institut National des Sciences de l'Univers (Paris, France)
CNRS/LAM .... CNRS/Laboratoire d'Astrophysique de Marseille (Marseille, France)
CNRS/LEGI .... CNRS/Laboratoire des Ecoulements Géophysiques et Industriels (Laboratory of Geophysical and Industrial Fluid Flows), Grenoble, France
CNRS/LMD .... CNRS/Laboratoire de Météorologie Dynamique (Palaiseau, France)
CNRS/LOA ..... CNRS/Laboratoire d'Optique Atmosphérique (University of Lille, France)
CNRS/LPCA .... CNRS/Laboratoire de Physique et Chimie de l'Atmosphère (University of Strasbourg, France)
CNRS/LPCE .... CNRS/Laboratoire de Physique et de Chimie de l'Environnement (Orleans−la−Source, France)
CNRS/SA ..... CNRS/Service d'Aeronomie (Verrières−le−Buisson, France)
CNRSC ..... China National Remote Sensing Center (since 1981)
CNSA ..... China National Space Administration (Beijing, since 1993). The principal role of CNSA is to serve as China's policy organization and interface with other national space agencies.
CNS/ATM ..... Communication, Navigation and Surveillance/Air Traffic Management)
CNSS ..... Compass/Beidou Navigation Satellite System (China)
CNT ..... Carbon Nanotube (an emerging display and semiconductor technology as of 2003).
CNTS ..... Centre National des Techniques Spatiales [Arzew(Algiers), Algeria]
CO ..... Carbon monoxide
CO_2 ..... Carbon dioxide
COARE ..... Coupled Ocean Atmosphere Response Experiment (campaign, see TOGA/COARE)
COAST ..... Coastal Oxidant Assessment for Southeast Texas (campaign)
CODAG ..... Cosmic Dust Aggregation (Shuttle payload)
CODAR ..... Coastal Ocean Dynamic Application Radar (a ground−based, over−the−horizon radar which reflects off of the ionosphere to measure sea surface roughness and currents)
CODAR ..... Cooperative Object Detection And Ranging (technology)
CODE ..... Coastal Ocean Dynamics Experiment (campaign)
CODER ..... Center for Orbital Debris Education and Research [since 2014 of UMD (University of Maryland)]. CODER is the first academically led center established to address the full range of issues surrounding the orbital debris problem. [7120)]
COF ..... Columbus Orbital Facility (ESA module on ISS)
COFDM ..... Coded Orthogonal Frequency Division Multiplexing (a technique used in DAB)
COHMEX ..... Cooperative Huntsville Meteorological Experiment (campaign)
COLLIDE ..... Collisions into Dust Experiment (Shuttle payload on STS−90)
COM DEV ..... A manufacturer of space hardware (subsystems and microsatellites) and services with facilities in Canada, the United Kingdom and the United States. COM DEV's majority−owned subsidiary, exactEarth Ltd., provides satellite data services for global maritime surveillance. On Feb. 4, 2016, Honeywell announced that it has completed the acquisition of Ontario, Canada−based COM DEV International.
COMETS ..... Communications and Broadcasting Engineering Test Satellite (prototype data relay satellite of Japan)

7120) "UMD Establishes Orbital Debris Research Center," Space Daily, May 23, 2014, URL: http://www.spacedaily.-com/reports/UMD_Establishes_Orbital_Debris_Research_Center_999.html

ComSpOC™ .... Commercial Space Operations Center. ComSpOC is an AGI (Analytical Graphics Inc.) developed facility. It is a state−of−the−art SAA (Space Situational Awareness) facility that collects, fuses and processes space object tracking data from a global network of diverse commercial sensors to generate accurate and timely SSA products. By subscribing to the SpaceBook™ web portal, satellite owner/operators and space operations centers can leverage ComSpOC's high−definition ephemeris (HiDEph™) to analyze conjunctions, characterize maneuvers and increase the accuracy of identifying RF interference sources while monitoring satellite status, historical events and trending information for all tracked objects. [7121] [7122]

COMSTAC ..... Commercial Space Transportation Advisory Committee (Washington, DC, since 1984). COMSTAC is an advisory board within the US FAA (Federal Aviation Administration).

CONAE ..... Comisión Nacional de Actividades Espaciales, Buenos Aires, Argentina (National Commission on Space Activities, since 1991) – Space Agency of Argentina. The forerunner agency was CNIE (Comisión Nacional de Investigaciones Espaciales), created in 1960.

CONCAP ..... Consortium for Materials Development in Space Complex Autonomous Payload (Shuttle experiment)

CONFERS ..... Consortium For Execution of Rendezvous and Servicing Operations. CONFERS is an industry−led initiative with initial seed funding provided by DARPA (Defense Advanced Research Projects Agency) that aims to leverage best practices from government and industry to research, develop, and publish non−binding, consensus−derived technical and operations standards for OOS (On−Orbit Servicing) and RPO (Rendezvous and Proximity Operations). [7123]

CONIDA ..... Comisión Nacional de Investigación y Desarrollo Aeroespacial, National Space Agency of Peru, founded in 2014.

CONOPS ..... Concept of Operations

CONTOUR .... Comet Nucleus Tour (a NASA Discovery mission)

CONUS ..... Continental United States ('lower 48 states')

COPE ..... Coastal Ocean Probing Experiment (campaign)

COPS−91 ..... Cooperative Oklahoma Profiler Study−1991 (campaign)

CoReH$_2$O ..... Cold Regions Hydrology High−resolution Observatory (in 2007 a proposed ESA candidate mission in the Earth Explorer program)

CORF ..... Committee on Radio Frequencies

CORISTA ..... Consorzio Di Ricerca Su Sistemi Di Telesensori Avanzati (Consortium for Research on Advanced Remote Sensing Systems), Naples, Italy

CORONAS ..... Complex of Orbital Observations of the Activity of the Sun (Satellite of the Russian Space Agency, M.8)

CORPS ..... Comprehensive Radiance Profile Synthesizer (an Earth radiance model developed in the 1960s, CORPS was used in connection with Earth horizon sensors of an AOCS)

CORS ..... Continuously Operating Reference Stations [NOAA/NGS (National Geodetic Survey) network of ground−based GPS stations collecting continuously GPS data for a number of services]

COSMIAC ..... Configurable Space Microsystems Innovations & Applications Center, COSMIAC is a congressionally supported space electronics center established at the University of New Mexico in Albuquerque, NM.

7121) http://comspoc.com/

7122) Brendan Houlton, Dan Oltrogge, "Commercial Space Operations Center (ComSpOC): A Commercial Alternative for Space Situational Awareness (SSA)," 30th Space Symposium, Technical Track, Colorado Springs, CO, USA, May 19−22, 2014, URL: http://spacesymposium.org/sites/default/files/downloads/B.Houlton_and_D.Oltrogge_30th_Space_Symposium_Tech_Track.pdf

7123) "The Consortium for Execution of Rendezvous and Servicing Operations (CONFERS)," URL: https://www.satelliteconfers.org/about−us/

COSMIC ..... Constellation Observing System for Meteorology, Ionosphere and Climate (a Taiwanese/US mission). In Taiwan, the mission is referred to as FormoSat−3, in USA the mission is known as COSMIC.

COSMOS ..... The term 'Cosmos' or 'Kosmos' is used in Russia to designate any of a series of unmanned satellites that were launched starting in 1962 with Cosmos−1 (the counting in 1988 was up to 1800, in 1993 it is around 2200). The Cosmos satellite series has been used for a wide variety of purposes, including scientific research, Earth observation, experimental/technological payloads, preoperational meteorological satellites, navigation satellites, etc. There are also many satellites with military payloads under the Cosmos designation.

COSMOS ..... "COSMOS" is also the world's most successful two stage space transportation system with liquid propellant rocket engines, which has been designed and developed by the Russian company PO/KB POLYOT. First launch in 1964, from 1970−'87 there were 371 successful flights of the Cosmos launcher). This launch system is used for the transportation of small to medium payloads up to 1400 kg to low earth orbits as well as for sub−orbital missions and re−entry tests.

COSMOS ..... Comprehensive Open−architecture Space Mission Operations System (a NASA/ARC funded distributed ground station network in support of small satellite operations − under development in 2012 by the University of Hawaii at Manoa). COSMOS is a framework of software and hardware elements that addresses all phases of a spacecraft life cycle; Design, Development, Implementation and Operations. [7124)]

COSPAR ..... Committee on Space Research (of ICSU, since 1958). COSPAR is an interdisciplinary scientific organization concerned with international progress in all areas of scientific research carried out with space vehicles, rockets, and balloons.

COSPAS ..... Space System for the Search of Distressed Vessels (Russia's equipment flown on polar−orbiting S/C). Cospas is a Russian acronym that stands for "Cosmicheskaya Systyema Poiska Aariynyich Sudov".

COSPLI ..... Correlation on Spatially−mapped Photon−Level Image. COSPLI has the potential to become a versatile solution for performing quantum particle measurements in large−scale photonic quantum computers. [7125)]

COSSA ..... CSIRO Office of Space Science and Applications (since 1984, Canberra, Australia)

COST ..... Cooperation in the Field of Scientific and Technical Research (an EU program)

COTES ..... Conventional Terrestrial Reference System (an IERS program for the specifications of positions on or near the Earth's surface)[7126)]

COTS ..... Commercial−Off−The−Shelf (products or components)

COTS ..... Commercial Orbital Transportation Services (NASA program to coordinate the delivery of crew and cargo to the ISS). COTS must be distinguished from the related CRS (Commercial Resupply Services) program. COTS relates to the development of the vehicles, CRS to the actual deliveries.

COVID−19 .... Coronavirus Disease 2019. An infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS−CoV−2)

CPCG ..... Commercial Protein Crystal Growth (Shuttle experiment)

7124) Trevor Sorensen, Bruce Yost, Joan Differding, Eric Pilger, Miguel Nunes, "Plug and Play Mission Operations," Proceedings of the 2012 IEEE Aerospace Conference, Big Sky, Montana, USA, March 3−10, 2012

7125) Ke Sun, Jun Gao, Ming−Ming Cao, Zhi−Qiang Jiao, Yu Liu, Zhan−Ming Li, Eilon Poem, Andreas Eckstein, Ruo−Jing Ren, Xiao−Ling Pang, Hao Tang, Ian A. Walmsley, and Xian−Min Jin, "Mapping and measuring large−scale photonic correlation with single−photon imaging," Optica, Vol. 6, Issue 3, pp. 244−249 (2019), https://doi.org/10.1364/OPTICA.6.000244, URL: https://www.osapublishing.org/DirectPDFAccess/043592DB−B070−3293−76CF18D1A4B9BF11_406823/optica−6−3−244.pdf?da=1&id=406823&seq=0&mobile=no

7126) See : "The International Earth Rotation Service," in 'The Interdisciplinary Role of Space Geodesy,' Springer Verlag, 1989, pp. 229−232

cPCI . . . . . Compact Peripheral Component Interface (a bus – electrically identical to the PCI specification)
CPDL . . . . . Complex Programmable Logic Device
CPFSK . . . . . Continuous Phase Frequency Shift Keying (a modulation techniique)
CPL . . . . . Capillary Pumped Loop Experiment (Shuttle payload series)
CPLD . . . . . Complex Programmable Logic Device
CPMA . . . . . Code Position Multiple Access (communication access concept)
CPOM . . . . . Center for Polar Observation and Modelling, located at the University of Leeds, UK. CPOM is a NERC (Natural Environment Research Council) Center of Excellence that studies processes in the Earth's polar latitudes that can affect the Earth's albedo, polar atmosphere and ocean circulation, and global sea level.
CPR . . . . . Cloud Profiling Radar (GEWEX)
CPRA . . . . . Control of the Reception Pattern multi–element Antenna
CPV . . . . . Common Pressure Vessel (type of battery)
CPV . . . . . Concentrator Photovoltaic (solar cells). CPV systems use a large area of lenses or mirrors to focus sunlight on a small area of photovoltaic cells.
CQT . . . . . Center for Quantum Technologies at NUS (National University of Singapore)
CRA . . . . . Centro Ricerche Aerospaziali (University of Rome, Italy)
C–RAM . . . . . Chalcogenide–Random Access Memory (a non–volatile memory technology, originally developed (1980s) by Ovonyx, Inc., Santa Clara, CA)
CR . . . . . Cognitive Radio. A CR is an extension of modern Software Defined Radio. This extension creates new capabilities for users.
CRC . . . . . Communication Research Center (an institute of Industry Canada, located at Shirleys Bay, west of Ottawa)
CRC . . . . . Cooperative Research Centers (an Association of Australia)
CRCSS . . . . . Cooperative Research Center for Satellite Systems (Canberra, Australia, the new Australian space agency, as of Jan. 1, 1998 – it is also referred to as simply "CRC"). CRCSS, under the Cooperative Research Centers Program of the Commonwealth of Australia, is a union of 12 Australian organizations, including government, university and industry. Some of the participants are: CSIRO, University of South Australia, Queensland University of Technology, University of Newcastle, University of Technology, Sydney, Auspace Ltd. of Mitchell, ACT [Note: since 1990, Auspace has been a subsidiary of MMS (Matra Marconi Space) of France]
CREAM . . . . . Cosmic Ray Effects and Activation Monitor (Shuttle payload)
CRESDA . . . . . China Center for Resource Satellite Data and Application (Beijing, since 1991), operator of CBERS S/C and CBERS data center. Also operator of HJ–1 series S/C and HJ–1 data center.
CReSIS . . . . . Center for Remote Sensing of Ice Sheets (at the University of Kansas in Lawrence, Kansas)
CREST . . . . . Center for Research in Earth and Space Technology (North York, Ontario, Canada). Formerly known as ISTS (Institute of Space and Terrestrial Science)
CREST . . . . . Center for Research in Satellite Technology (since 2001). CREST is a facility of NTU (Nanyang Technology University), Singapore.
CRI . . . . . Crown Research Institute (New Zealand)
CRISP . . . . . Center for Remote Imaging, Sensing and Processing [since 1992, a facility of NUS (National University of Singapore), Singapore. CRISP operates 4 X–band antennas in Dec. 2013]
CRL . . . . . Communications Research Laboratory, Tokyo, a division of the Ministry of Posts and Telecommunications (MPT) of Japan. Note: the former name of CRL (until 1987) was RRL (Radio Research Laboratories)

CRO ..... Chemical Release Observation (Shuttle experiment)
CRP ..... Cloud Radiation Program
CRPE ..... Centre de Recherches en Physique de l'Environnement Terrestre et Planetaire, at the following sites: Vélizy, Issy−les Moulineaux, and Saint−Maur−des−Fossés, France (Lab was part of CNRS and of CNET, starting in January 1994 CRPE was reorganized and renamed CETP, there is no more dependence on CNET)
CRPSM ..... Centro di Ricerca Progetto San Marco (San Marco ground receiving station and processing/archiving facilities located at Malindi, Kenya), CRPSM is owned and operated by the University of Rome, Italy. The station is located at 3° S, 40° E.
CRREL ..... Cold Regions Research and Engineering Laboratory (US Army research facility in Hanover, NH, USA)
CRRES ..... Combined Release and Radiation Effects Satellite (C.13)
CRS ..... Commercial Resupply Service (provided for NASA ISS flights by the SpaceX uncrewed Dragon cargo spacecraft). Note: The SpaceX CRS−2 flight is also known as SpX−2.
CRSS ..... Commercial Remote Sensing System; Note: the S/C was renamed to IKONOS
CRSS ..... Canadian Remote Sensing Society (since 1973); CRSS is part of CASI (Canadian Aeronautics and Space Institute)
CRT ..... Cathode Ray Tube
CRTS ..... Centre Royal Teledetection Spatiales, Rabat, Morrocco
CRTS ..... Collapsible Rib−Tensioned Surface (reflector antennas, such as a deployable membrane reflector type)
CRSR ..... Commercial Reusable Suborbital Research program (a new NASA program of 2010)
CRV ..... Crew Return Vehicle (or X−38 CRV of NASA, used for ISS evacuation in case of an emergency)
CRYOFD ..... Cryogenic Flexible Diode (Shuttle payload)
CRYOHP ..... Cryogenic Heat Pipe Experiment (Shuttle payload)
CRYOTSU ..... Cryogenic Thermal Storage Unit (Shuttle payload)
CRYSYS ..... Use of the Cryospheric System to Monitor Global Change in Canada (campaign program)
CSA ..... Canadian Space Agency (since 1989; CSA HQs and control center at Saint−Hubert, Québec)
CSAC ..... Chip Scale Atomic Clock (market introduction in January 2011 by Symmetricom Inc.)
CSCE ..... Commercial Space Center for Engineering (established under contract with NASA/JSC, located on the Texas A&M University campus; CSCE supports industry development of palletized commercial payloads on external platforms on ISS)
CSDL ..... Charles Stark Draper Laboratory Inc., Cambridge, MA, USA (nee the MIT Instrumentation Laboratory)
CSE ..... Consortium for Superconducting Electronics (USA) involving Bell Labs, IBM, MIT, MIT/LL, etc.
CSEM ..... Centre Suisse d'Electronique et de Microtechnique (or: Swiss Center for Electronics and Microtechnology), Neuchatel, Switzerland
CSER ..... Center for Satellite Engineering Research (University of Surrey, UK, since 1993 CSER accommodates SSTL)
CSGC ..... Colorado Space Grant Consortium − a NASA−funded institution which supports student−designed satellites
CSIC ..... Consejo Superior de Investigaciones Cientificas (Spanish Research Council, Madrid)
C/SiC ..... Carbon fiber−reinforced/Silicon Carbide [ceramic material for precision applications in optics, power technology (heat exchangers), vehicle technology (brakes, valves), chemical engineering, etc.]

CSIR ..... Council for Scientific and Industrial Research, Pretoria, South Africa. CSIR is Africa's largest scientific and technological research, development and implementation organization.

CSIR–NPL ..... Council of Scientific & Industrial Research–National Physical Laboratory, New Delhi, India (since 1947). CSIR–NPL is the "National Measurement Institute of India". [7127)]

CSIRO ..... Commonwealth Science and Industrial Research Organization (Canberra, Australia)

CSIST ..... Chung–Shan Institute of Science and Technology – a leading institution for the research, development, and design of defense technology in Taiwan (ROC) with HQs in Lungt'an, Taoyuan County.

CSL ..... Centre Spatial de Liège, Liège, Belgium

CSLI ..... CubeSat Launch Initiative (of NASA)

CSMA/CD ..... Carrier Sense Multiple Access / Collision Detection (commercially known under Ethernet)

CSMT ..... Center for Space Microelectronics Technology (NASA/JPL facility, since 1987)

CSOC ..... Consolidated Space Operations Contract (NASA/Lockheed Martin contract for Shuttle operations, etc.). The objective is to achieve a low–risk, commercially–based space operations program for Shuttle.

CSpOC ..... Combined Space Operations Center at VAFB (as of July 2018, formerly the JSpOC (Joint Space Operations Center).

CSR ..... Centro de Sensores Remote (Italy)

CSSI ..... Center for Space Standards & Innovation, Colorado Springs, CO, USA. CSSI is a research arm of Analytical Graphics, Inc. (AGI).

CSSR ..... Chinese Society of Space Research

CST ..... CORE Software Technology, Pasadena, CA [developer of the world's first commercial on–line geo–spatial (image, cartographic, & demographic) indexing and distribution system]

CST–100 ..... Crew Space Transportation. CST–100 is a spacecraft design developed by Boeing in collaboration with Bigelow Aerospace as their entry for NASA's Commercial Crew Development (CCDev) program. Its primary mission will be to transport crew to the ISS (and eventually to private space stations of Bigelow). First test flights are planned for early 2017.

CSTG ..... Commission on International Coordination of Space Techniques for Geodesy and Geodynamics (since 1979), (Commission VIII of the International Association of Geodesy)

CSU ..... Colorado State University, Fort Collins, CO

CTA ..... Canadian Target Assembly (Shuttle payload)

CTA ..... Centro Tecnico Aerospacial (Sao José dos Campos, S.P., Brazil)

CTA ..... CTA Space Systems, McLean, VA, (since 1979) manufacturer of small satellite systems (Clark, EarlyBird, REX, etc.) and instruments; CTAST (CTA Space and Telecommunications) is the parent company of CTA Space Systems. Note: CTA Space Systems was acquired by OSC of Dulles, VA, in Aug. 1997

CTBTO ..... Comprehensive Nuclear Test–Ban Treaty Organization (an international organization with HQs in Vienna, Austria). CTBTO is a global network observational technology (stations) which helps to verify compliance with and detect and confirm violations of the CTBT. The network can aid in the detection and identification of nuclear explosions (or seismic events) anywhere on the planet.

CTD ..... Conductivity–Temperature–Depth profilers (a buoy type used in a number of campaigns like NORSEX, TOGA/COARE, etc.)

CTE ..... Coefficient of thermal expansion

7127) CSIR–National Physical Laboratory "National Measurement Institute of India", URL: http://nplindia.org/directors–message

CTIA ..... Capacitive Transimpedance Amplifier (detector technology)
CTIS ..... Computed Tomographic Imaging Spectrometer
CTIV ..... Processing Center for VEGETATION Imagery (operated by Vito in Mol, Belgium, VEGETATION is a SPOT−4, 5 instrument
CTP ..... Cloud Top Pressure
CUE ..... Collaborative Ukrainian Experiment (Shuttle experiment)
CULPRiT ..... CMOS Ultra Low−Power Radiation−Tolerant (logic technology, a processor developed for ST−5)
CUZK ..... Czech office for Surveying, Mapping and Cadastre
CVD ..... Chemical Vapor Deposition (technique – involves a gas−phase chemical reaction occurring above a solid surface, which causes deposition onto that surface)
CVF ..... Circular Variable Filter (filter technology)
CVR ..... Chemical Vapor Reaction [also referred to as CVD (Chemical Vapor Deposition), technique]
CVTE ..... Chemical Vapor Transport Experiment (Shuttle payload)
Cyclops ..... A dedicated 50−100 kg class ISS microsatellite deployment system. Cyclops utilizes NASA's ISS resupply vehicles to launch microsatellites to the ISS in a controlled pressurized environment in soft stow bags. [7128)]
CYGNSS ..... Cyclone Global Navigation Satellite System (NASA's weather prediction project, a constellation of 8 microsatellites)
Cygnus ..... A spacecraft of OSC (Orbital Sciences Corporation). Cygnus is part of NASA's **COTS** (Commercial Orbital Transportation Services) demonstration program.
CVX ..... Critical Viscosity of Xenon (Shuttle payload)
CW ..... Continuous Wave
CWAAS ..... Canadian WAAS (Wide Area Augmentation System)
CWICOM ..... CCSDS Wavelet Image COMpression. CDICOM is a large dynamic, large image and very high speed image compression ASIC. CWICOM implements the CCSDS 122.0−B−1 Image Compression Standard.
CX−OLEV ..... ConeXpress−Orbital Life Extension Vehicle (ESA project). ConeXpress converts the Ariane 5 payload adaptor into a small satellite with plasma propulsion. In GEO, the spacecraft will be able to rendezvous and capture the client spacecraft and take over the attitude control and extending the life of the client spacecraft.
CZT ..... Cadmium Zinc Telluride (a detector material – also referred to as CdZnTe)

D

DAAC ..... Distributed Active Archive Center (NASA EOSDIS Program)
DAB ..... Digital Audio Broadcasting
DALSA Corp. ... DALSA Corporation of Waterloo, Ontario (Canada, since 1980) manufacturing of semiconductor products, CCDs, etc.
DAM ..... Debris Avoidance Maneuver. DAM is a maneuver conducted by a spacecraft to avoid colliding with another object in orbit. One is most commonly used in order to avoid a piece of space junk.
DARA ..... Deutsche Agentur für Raumfahrtangelegenheiten, Bonn (German space agency (from 1989 to Sept. 30, 1997, DARA was integrated into DLR effective Oct. 1, 1997)
DARPA ..... Defense Advanced Research Projects Agency (US DoD agency, since 1958, DARPA started as ARPA with an early focus on space research). Technological innovations such as the Transit navigation system, Inter-

7128) Daniel R. Newswander, James P. Smith, Craig R. Lamb, Perry G. Ballard, "Space Station Integrated Kinetic Launcher for Orbital Payload Systems (SSIKLOPS) – Cyclops," Proceedings of the 27th AIAA/USU Conference, Small Satellite Constellations, Logan, Utah, USA, Aug. 10−15, 2013, paper: SSC13−V−2, URL: http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=2941&context=smallsat

net (in 1969 ARPANET started which become later Internet), stealth technology, and many activities in the space program were sponsored by DARPA.

DARWIN ..... Detection and Analysis of Remote Worlds by Interferometric Nulling (planned ESA mission of six spacecraft in a hexagonal configuration), planned launch in 2015.

DASA ..... DaimlerChrysler Aerospace AG, Munich (HQ), Germany (with 45,000 employees). Prior to Nov. 1998, DASA stood for 'Daimler–Benz Aerospace AG.' Prior to January 1995 the meaning of the acronym DASA was 'Deutsche Aerospace AG' (since 1989). DASA/DSS (Dornier Satellitensysteme GmbH) is a DASA business unit responsible for all satellite–related activities with facilities in Friedrichshafen and Ottobrunn. DASA (founded in 1989) is a conglomerate of the previous companies: Dornier, MBB (Messerschmitt–Bölkow–Blohm), MTU (Motoren– und Turbinen–Union), and TST (Telefunken Systemtechnik). – In addition, DASA is a partner in many alliances such as: Airbus, Ariane, Eurocopter, etc. Today, the three independent business entities of DASA are: DASA/Airbus, DASA/DSS, and DASA/MTU. – As of 2000, DASA is called **Astrium GmbH** (see Astrium)

DASIA ..... DAta Systems In Aerospace (a European conference organized by Eurospace)

DASS ..... Distress Alerting Satellite System (a new payload to be added to the next–generation GPS series – in about 2010)

DAT ..... Digital Audio Tape (a high–volume data recording technique, helical scan tape storage)

DAT ..... Dynamic Area Telethermometry (a medical application of an infrared device (made possible with QWIP technology) for the detection of breast cancer in the early stage]. The DAT–method is based on the variation of the local skin temperature over time, which allows to distinguish between malignous versus healthy subcutaneous tissue.

DATA–CHASER Distribution and Automation Technology Advancement – Colorado Hitchhiker and Student Experiment of Solar Radiation (Shuttle)

DAVID ..... Data and Video Interactive Distribution (a communications demonstration satellite of ASI, Italy)

DBCP ..... Data Buoy Cooperation Panel [of the Intergovernmental Oceanographic Commission (of UNESCO) and WMO]

DBF ..... Digital Beamforming (radar antenna technique for electronic beam steering)

DBMS ..... Database Management System

DBNet ..... Direct Broadcast Network. [7129)]

DBPSK ..... Differential Binary Phase Shift Keying (modulation technique)

DBS ..... Direct Broadcasting Satellite

DBSI ..... Direct Broadcasting Satellite Industries Inc. of Mill Valley, CA

DC ..... Direct Current

DCGS–IC ..... Distributed Common Ground System–Intelligence Community [a US DoD initiative as of 2009 to achieve data and service interoperability for the user community – in particular through SOA (Service Oriented Architecture)]

DCRS ..... Danish Center for Remote Sensing (at EMI of TUD, Lyngby, Denmark)

DCRS ..... Digital Cassette Recorder System

DCP ..... Data Collection Platform (ground segment platform for environmental data measurement, Meteosat, GOES, GMS)

DCPI ..... Data Collection Platform Interrogation (GOES)

7129) Mikael Rattenborg, Jerome Lafeuille, Stephan Bojinski, "DBNet – Fast processing and delivery of regionally acquired LEO satellite data," Proceedings of the EUMETSAT 2016 Meteorological Satellite Conference, Darmstadt, Germany, Sept. 26–30, 2016, availability of the proceedings at the end of December 2016, URL: http://www.eumetsat.int/website/home/News/ConferencesandEvents/DAT_2833302.html

DCS . . . . . Data Collection System (NOAA– GOES series, Meteosat series, GMS series, geostationary satellites).
DCT . . . . . Discrete Cosine Transformation (compression technique)
DCW . . . . . Digital Chart of the World (a vector map database by DMA, Fairfax, VA, USA)
ΔDOR . . . . . Delta–Differential One–way Ranging (or DDOR). The ΔDOR technique provides very accurate plane–of–sky measurements of spacecraft position which complement existing line–of–sight ranging and Doppler measurements. Note: ΔDOR is the same as ΔVLBI.
DEBITS . . . . . Deposition of Biogeochemically Important Trace Species
DECAFE . . . . . Dynamics and Chemistry of the Atmosphere in Equatorial Forest (campaign)
DEE . . . . . Dexterous End Effector (Shuttle)
DEM . . . . . Digital Elevation Model (also referred to as DTM = Digital Terrain Model)
DEMETER . . . . Detection of Electro–Magnetic Emissions Transmitted from Earthquake Regions (a CNES microsatellite mission within the program Myriade), O.28.1
DEOS . . . . . Delft Institute for Earth–Oriented Space Research [at Delft University of Technology (DUT), Delft, The Netherlands]
DEPFET . . . . . Depleted P–channel Field Effect Transistor [an APS (Active Pixel Sensor) detector type]. DEPFET structures can be used as building blocks for a large variety of different devices ranging from optical photon sensors to X–ray imagers and particle trackers. Due to their extremely low detector capacitance they exhibit excellent signal–to–noise ratio and energy resolution.
DERA . . . . . Defence Evaluation and Research Agency [Farnborough, UK, an agency of MoD (Ministry of Defense)]. DERA was established in April 1995 from elements of the former RAE (Royal Aerospace Establishment).
DES . . . . . Dark Energy Survey. DES is an international, collaborative effort to map hundreds of millions of galaxies, detect thousands of supernovae, and find patterns of cosmic structure that will reveal the nature of the mysterious dark energy that is accelerating the expansion of our Universe. DES began searching the Southern skies on August 31, 2013. – The collaboration built and is using an extremely sensitive 570–Megapixel digital camera, DECam, mounted on the Blanco 4 m telescope at Cerro Tololo Inter–American Observatory, high in the Chilean Andes, to carry out the project. [7130)]
DESI . . . . . Dark Energy Spectroscopic Instrument. A newly designed optics telescope (2016) for the National Optical Astronomy Observatory's 4–m Mayall telescope at Kitt Peak, Arizona, USA. DESI is an international science collaboration managed by the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) with primary funding for construction and operations from DOE's Office of Science. — DESI was principally funded by the US DOE, and by other numerous sources including the US National Science Foundation, the UK Science and Technology Facilities Council, France's Alternative Energies and Atomic Energy Commission, Mexico's National Council of Science and Technology, Spain's Ministry of Science and Innovation, by the Gordon and Betty Moore Foundation, by the Heising–Simons Foundation, and by collaborating institutions worldwide. – DESI sits at an elevation of 2,100 m, where it has been retrofitted onto the Mayall Telescope on top of Kitt Peak in the Sonoran Desert, which is located 55 miles (89 km) from Tucson, Arizona, US.

7130) "The Dark Energy Survey;" URL: https://www.darkenergysurvey.org/the–des–project/overview/

DESPA ..... Départment de Recherche Spatiale de L'Oservatoire de Paris/Meudon (France)
Dextre ..... Dexterous manipulator – a two–armed 3.5 m long device on ISS provided by Canada (installation on STS–123 in March 2008)
DFD ..... Deutsches Fernerkundungsdatenzentrum (German Remote Sensing Data Center, DLR, Oberpfaffenhofen)
DFG ..... Deutsche Forschungsgemeinschaft (German National Research Council)
DFH ..... Dong Fang Hong (East is Red – also spelling as Dongfanghong !), a Chinese communication satellite series in GEO which started with DFH–1 (launch Apr. 24, 1970)
DFHSat ..... DFH Satellite Co Ltd., established in Aug. 2001 by CAST (China Academy of Space Technology), Beijing and by the China Aerospace Science and Technology Corporation. DFH is mainly engaged in the research and development of small satellites. Standard (LEO, MEO) platforms like the CAST968 bus and the CAST2000 bus are part of DFH activities. The DFH–3 bus is a medium capacity 2nd generation platform (170 kg payload) being used for communication S/C, navigation S/C as well as for the lunar mission Chang'e.
DFL ..... David Florida Laboratory, Ottawa, ON, Canada. DFL is Canada's national spacecraft integration and environmental test facility since 1972. DFL is a facility of CSA (Canadian Space Agency). DFL was built on the CRC (Communications Research Center) campus in Ottawa to support Canadian space projects. In 1989, when the CSA was created, the DFL became part of the Canadian Space Agency (CSA).
DFN ..... Deutsches Forschungsnetz
DFS ..... Development Flight Satellite [a US DoD communication satellite constellation (Milstar) with a first launch of DFS–1 in 1994]
DFVLR ..... Deutsche Forschungs– und Versuchsanstalt für Luft– und Raumfahrt (predecessor name of DLR from 1969 until 1989). History: In 1969 (April 1) a merger of the following German research facilities occurred, resulting in DFVLR with HQ in Köln–Porz: AVA (Aerodynamische Versuchsanstalt, founded 1907 in Göttingen), DFL (Deutsche Forschungsanstalt für Luftfahrt, founded 1936 in Braunschweig), DVL (Deutsche Versuchsanstalt für Luftfahrt, founded 1912 in Berlin–Adlershof, after WW–II in Mühlheim–Ruhr, since the 1960s in Köln–Porz). FFO (Flugfunkforschungsinstitut Oberpfaffenhofen), founded in 1937, was integrated into DVL (Köln–Porz) in 1965. FFM (Flugwissenschaftliche Forschungsanstalt München) joined DVL in 1963.
DGA ..... Délégation Générale pour l'Armement (French Arms Procurement Agency, since 1977). Prior to 1977 the agency was called: DMA (Délégation Ministérielle pour l'Armement). DGA is the heart of the French defense system.
DGASP ..... Dye 3 Gas and Aerosol Sampling Program (IGBP/IGAC program)
DGFI ..... Deutsches Geodätisches Forschungsinstitut (Munich, Germany)
DGGTN ..... Direction General de Geografica del Territorio Nacional (Mexico)
DGLR ..... Deutsche Gesellschaft für Luft– und Raumfahrt – Lilienthal–Oberth e. V., Bonn
DGON ..... Deutsche Gesellschaft für Ortung und Navigation (Düsseldorf, Germany – German Institute of Navigation)
DGPF ..... Deutsche Gesellschaft für Photogrammetrie und Fernerkundung
DGPS ..... Differential GPS
D–HVPE ..... Dynamic–Hydride Vapor Phase Epitaxy). A technology for fabricating high–efficiency solar cells in a high–throughput, low–cost manner. [7131] AFRL is collaborating with NREL (National Renewable Energy

7131) "AFRL collaborates in break–through solar power development," Space Daily, 13 July 2020, URL: https://www.solardaily.com/reports/AFRL_collaborates_in_break_through_solar_power_development_999.html

Laboratory) of DOE (Department of Energy). Researchers at NREL "have refined the D−HVPE process to produce solar cells more than 20 times faster than the process now commonly used called metalorganic vapor−phase epitaxy (MOVPE)."

DHI ..... Deutsches Hydrographisches Institut (Hamburg, Germany)

DIAL ..... Differential Absorption Lidar (lidar observation technique)

Digipeater ..... A contraction of the words "digital repeater". Digipeaters are used in the amateur radio community. Store and forward digipeaters generally receive a packet radio transmission and then retransmit it on the same frequency, unlike repeaters that receive on one and transmit on another frequency.

DigitalGlobe Inc. Earth observation company in Longmont, CO, USA. Provider of high−resolution commercial imagery (since 2001, formerly EarthWatch). Operator of WorldView−1 and WorldView−2 spacecraft.
In July 2012, DigitalGlobe, Inc. and GeoEye, Inc. (Dulles, VA) have announced that the boards of directors of both companies have unanimously approved a definitive merger agreement under which the companies will combine in a stock and cash transaction. The combined company will be named **DigitalGlobe**. The combination of DigitalGlobe and GeoEye creates a global leader in earth imagery and geospatial analysis. [7132) 7133)] − The merger was realized on January 31, 2013.
The current (2013) constellation of DigitalGlobe includes the following missions: Ikonos−2 (launch 1999), QuickBird (2001), WorldView−1 (2007), GeoEye−1 (2008), and WorldView−2 (2009). [7134)]

DIN ..... Deutsches Institut für Normung (German Institute for Standardization)

DInSAR ..... Differential SAR Interferometry. A method for mapping and monitoring centimetric ground surface deformations.

DISA ..... Defense Information Systems Agency (Washington D.C., since 1960, purchaser of commercial satellite imagery for DoD)

Discoverer II .... A US (military) technology demonstration program of DARPA, USAF and NRO, started in 1998, with the objective to develop a high−resolution interferometric SAR system (IFSAR) for surveillance and reconnaissance. In 2000 the US Congress terminated the program.

DISCOS ..... Database and Information System Characterizing Objects in Space (ESA/ESOC database for space debris and meteoroids, since 1990)

DIVA ..... Deutsches Interferometer für Vierkanalphotometrie und Astronomie (German Interferometer for Four−channel−photometriy and Astronomy), DIVA is a microsatellite within the ESA Horizon program

DKIST ..... Daniel K. Inouye Solar Telescope, formerly ATST (Advanced Technology Solar Telescope). DKIST represents a collaboration of 22 institutions, reflecting a broad segment of the solar physics community. DKIST, on the Pacific island of Maui, will be the largest solar telescope in the world (4 m) when construction is finished in 2019. The objective of DKIST is the measurement of magnetic fields in the outer regions of the Sun's atmosphere. [7135)]

7132) "Digitalglobe And Geoeye Combine To Create A Global Leader," Space Daily, July 26, 2012, URL: http://www.spacedaily.com/reports/Digitalglobe_And_Geoeye_Combine_To_Create_A_Global_Leader_999.html

7133) Brett Thomasie, "Digitalglobe Incorporated Corporate and Satellite Program Update," 12th Annual JACIE (Joint Agency Commercial Imagery Evaluation) Workshop , St. Louis, MO, USA, April 16−18, 2013, URL: https://calval.cr.usgs.gov/wordpress/wp−content/uploads/DigitalGlobeOverview_−JACIE2013.pdf

7134) "DigitalGlobe and GeoEye complete combination," DigitalGlobe, January 31, 2013, URL: http://media.digitalglobe.com/press−releases/digitalglobe−and−geoeye−complete−combination−nyse−dgi−980726

7135) Thomas R. Rimmele, Joseph P. McMullin, Brett Simison, Simon C. Craig, David F. Elmore, Bret D. Goodrich, Robert P. Hubbard, Erik M. Johansson, Steve Shimko, Alexandra Tritschler, Mark Warner , Friedrich Wöger, "Design and Construction Status of the Daniel K. Inouye Solar Telescope," AMOS conference, 2014, URL: http://www.amostech.com/TechnicalPapers/2014/Daylight_Imaging/RIMMELE.pdf

DLR . . . . . Deutsches Zentrum für Luft– und Raumfahrt e.V. (German Aerospace Center, with HQ in Köln; DLR is also the German Space Agency). On Oct. 1, 1997 DARA was re–integrated into DLR. Prior to Oct.1.1997 the meaning of DLR was: Deutsche Forschungsanstalt für Luft– und Raumfahrt e.V.

DLR/DFD . . . . . DLR/Deutsches Fernerkundungsdatenzentrum (German Remote Sensing Data Center), Oberpfaffenhofen and Neustrelitz

DLR/FB . . . . . DLR/Flugbereitschaft (aircraft operations; FB provides the services of flying sensors for other institutes of DLR)

DLR/GfR . . . . . DLR/Gesellschaft für Raumfahrtanwendungen. GfR is a company of DLR having its seat at the Galileo Control Center (GCC–D) in Oberpfaffenhofen, Germany.

DLR/GSOC . . . . DLR/German Space Operations Center, Oberpfaffenhofen

DLR/IKN . . . . . DLR/Institute of Communication and Navigation, Oberpfaffenhofen

DLR/IMF . . . . . DLR/Institut für Methodik der Fernerkundung, Oberpfaffenhofen

DLR/IOE . . . . . DLR/Institut für Optoelektronik (Institute of Optoelectronics), Berlin

DLR/IPA . . . . . DLR/Institut Physik der Atmosphäre (Institute of Atmospheric Physics), Oberpfaffenhofen

DLR/HR . . . . . DLR/Institut für Hochfrequenztechnik und Radar (Microwave and Radar Technology Institute, Oberpfaffenhofen), also referred to as MRI.

DLR/IRM . . . . . DLR/ Institut für Robotik und Mechatronik (Institute of Robotics and Mechatronics), Oberpfaffenhofen

DLR/ISST . . . . . DLR/Institut für Weltraumsensorik (Institute of Space Sensor Technology and Planetary Exploration, Berlin–Adlershof). There is also the abbreviation: DLR/IWS

DLR/MUSC . . . . DLR/Microgravity User Support Center (Cologne, Germany)

DMA . . . . . Defense Mapping Agency (Fairfax, VA, USA, mapping, charting & geodetic products & services to the military, since 1972 – since 1996 DMA is an integral part of NIMA)

DMA . . . . . Direct Memory Access

DMC . . . . . Disaster Monitoring Constellation (a 5 S/C constellation constructed and coordinated by SSTL, UK)

DMCii . . . . . DMC International Imaging Ltd. In 2004, SSTL set up the company DMCii at SSTL that manages the Disaster Monitoring Constellation for the International Charter for Space and Major Disasters.
DMCii is supported by all members of the DMC consortium, to maintain a central catalog of the DMC constellation and to coordinate requests for imagery in particular to cover rapid response imagery services after disaster events. DMCii also sells satellite imaging services under contract.
DMCii, a 100% subsidiary of SSTL, which itself is a subsidiary of Airbus Defence and Space.

DMI . . . . . Danmarks Meteorologiske Institut (Danish Meteorological Institute, founded in 1872) Copenhagen, Denmark

DMN . . . . . Direction de la Météorologie National (France)

DMOS . . . . . Diffusive Mixing of Organic Solutions (Shuttle payload)

DMS . . . . . Dimethylsulphide

DMSP . . . . . Defense Meteorological Satellite Program (USA), I.1

DND . . . . . Department of National Defense (Canada)

Dnepr . . . . . Russian/Ukrainian launch vehicle for satellites. As part of a nuclear disarmament agreement, former Soviet SS–18 ICBMs (Intercontinental Ballistic Missiles), were renamed to Dnepr. They are either being used for commercial launches, or must be destroyed by Dec. 31, 2007. Commercial Dnepr launches are being conducted by ISC (International Space Company) Kosmotras of Moscow, Russia. The first launch of Dnepr took place in April 1999 with the UoSat–12 payload.

DNSC ..... Danish National Space Center, Copenhagen, Denmark (founded in Jan. 2005) a new research center under the Ministry of Science, Technology and Innovation. As of Jan. 2005, DNSC has taken over all the responsibilities of DSRI.
DOAS ..... Differential Optical Absorption Spectroscopy
DOC ..... Department of Commerce (USA)
DOC ..... Dissolved Organic Carbon
DoD ..... Department of Defense (USA)
DOE ..... Department of Energy (USA). Some major laboratories of DOE are:
ANL (Argonne National Laboratory), Argonne IL
BNL (Brookhaven National Laboratory), Upton, NY
FNAL (Fermi National Accelerator Laboratory), Batavia, IL
LANL (Los Alamos National Laboratory), Los Alamos, NM
LBL (Lawrence Berkeley Laboratory), Berkeley, CA
LLNL (Lawrence Livermore National Laboratory), Livermore, CA
ORNL (Oak Ridge National Laboratory), Oak Ridge, TN (since 1948)
PNL (Pacific Northwest Laboratory), Richland, WA
SLAC (Stanford Linear Accelerator Center), Stanford, CA
SNL (Sandia National Laboratory), Albuquerque, NM and Livermore, CA
DODGE ..... Department of Defense Gravity Experiment (O.10)
DOI ..... Digital Object Identifier (a system for identifying and exchanging intellectual property in the digital environment as defined in the International DOI Foundation)
DOM ..... Dissolved Organic Matter (in particular in ocean color measurements)
DOP ..... Dilution of Precision – or Geometric Dilution of Precision (GDOP) is a GPS term used in geomatic engineering to describe the geometric strength of satellite configuration on GPS accuracy.
DORIS ..... Determination Orbite Radiopositionnement Integres Satellite (CNES tracking system for the measurement of precision orbits); another name convention is: Doppler Orbitography and Radiopositioning Integrated by Satellite, see J.8.1
DoT ..... Department of Transportation (USA)
DPCA ..... Displaced Phase Center Antenna (SAR/radar technique)
DPCM ..... Differential Pulse Code Modulation (compression technique)
DPSK ..... Differential Phase Shift Keying (a common form of phase modulation used in analog modems)
DQPSK ..... Differential Quadrature Phase Shift Keying (modulation technique)
DRA ..... Defence Research Agency [Malvern, Farnborough, etc., UK, with over 6000 employees; DRA was established in 1991, it is the successor organization of RAE (Royal Aerospace Establishment), ARE (Admiralty Research Establishment), RARDE (Royal Armament Research & Development Establishment), and RSRE (Royal Signal and Radar Establishment)]. As of April 1995 DRA was regrouped again and integrated as a division into DERA (Defense Evaluation and Research Agency). Another DERA reorganization in April 1997 dissolved DRA altogether.
DRAM ..... Dynamic Random Access Method; DDR–RAM (Double Data Rate–Random Access Method)
Draper Lab ..... Charles Stark Draper Laboratory Inc. of Cambridge, MA. An MIT lab founded in the 1930s; an independent non–profit research lab since 1973. Focus on GN&C (Guidance, Navigation & Control) technologies.
DRB ..... Defense Research Board, Canada
DRDC ..... Defense Research and Development Canada (an agency of the Canadian Department of Defense). DRDC is supporting the development of microsatellite and nanosatellite technologies in Canada with a view toward helping enable low cost space systems for the Canadian Armed

Forces (CAF). Projects supported by DRDC: CanX−2, CanX−4&5, CanX−7, NEOSSat, M3MSat, NTS, SAPPHIRE, RADARSAT−1 and −2, and RCM. [7136]

DREO ..... Defense Research Establishment, Ottawa, Canada

DRI ..... Desert Research Institute (of the University of Nevada)

DRPM ..... Dynamic Reconfigurable Processing Module

DRS ..... Data Relay Satellite (ESA system to relay information from the European space plane)

DRS ..... Direct Receiving Station (of GeoNorth in Fairbanks, Alaska, since June 2014). Airbus Defense and Space and its client GeoNorth have inaugurated the first commercially available multi−satellite Direct Receiving Station (DRS) in the world, set to give a host of new markets quick access to both high−resolution and very high−resolution optical and radar satellite imagery. [7137]
In addition, Airbus Defence and Space and KSAT (Kongsberg Satellite Services) signed a contract for TDX/TDX DRS station in Svalbard, to be operational by the end of 2014. [7138]

DRTS ..... Data Relay Technology Satellite (Japan, Ka−band transmission)

DS4G ..... Dual−Stage 4−Grid ion thruster (as of 2006, a new ion thruster technology of ESA)

DSB ..... Double Sideband

DSCOVR ..... Deep Space Climate Observatory (an approved NASA mission, previously named as Triana)

DSCS−III ..... Defense Satellite Communications System−3. DSCS is a military satellite constellation of DoD (USA) placed in geosynchronous orbit to provide high−volume, secure voice and data communications. The Air Force began launching the DSCS−III in 1982 (launch of the DSCS−III−F1 took place Oct. 30, 1982). The DSCS−III series satellites employ SHF (Super−High Frequency) communications on a global scale (six SHF transponder channels). With DSCS−III−B6 (launch Aug. 29, 2003), the DSCS constellation contains 14 spacecraft, built by Lockheed Martin. Each DSCS S/C has a design life of 10 years.
As of Feb. 2009, the DSCS constellation has surpassed 200 years of on−orbit operations, the longest total operational experience of any U.S. military communications satellite constellation.

DSL ..... Digital Subscriber Line. The DSL technology is a modem technology that uses existing twisted−pair telephone lines to transport high−bandwidth data, such as multimedia and video, to service subscribers.

DSM ..... Digital Surface Model (processing of imagery). The DSM includes vegetation and buildings − while DTM (Digital Teerain Model) covers the bare Earth.

DSN ..... Deep Space Network (NASA/JPL). DSN operates a network of three complexes around the world (Goldstone, CA; Madrid, Span; Canberra, Australia) that permit continuous coverage of solar system spacecraft and their critical mission events. DSN started operations on Dec. 24, 1963. The largest dish antenna at the Goldstone complex has a diameter of 70 m. [7139]

7136) Patrick Gavigan, "Operational Use of Small Satellites for the Canadian Armed Forces," Proceedings of the 65th International Astronautical Congress (IAC 2014), Toronto, Canada, Sept. 29−Oct. 3, 2014, paper: IAC−14.B4.4.7

7137) "ADS unveils multi−satellite Direct Receiving Station for GeoNorth," Space Daily, June 26, 2014, URL: http://www.spacedaily.com/reports/ADS_unveils_multi_satellite_Direct_Receiving_Station_for_GeoNorth_999.html

7138) "Airbus Defence and Space supplies KSAT with Norway's first TerraSAR−X Direct Receiving Station," Airbus Group, June 26, 2014, URL: http://www.airbus−group.com/airbusgroup/germany/de/presse/press.20140626_airbus_defence_and_space_ksat.html

7139) Leslie J. Deutsch, Stephen A. Townes, Philip E. Liebrecht, Pete A. Vrotsos, Dr. Donald M. Cornwell, "Deep Space Network: The Next 50 Years," Proceedings of the 14th International Conference on Space Operations (**SpaceOps 2016**), Daejeon, Korea, May 16−20, 2016, URL: http://arc.aiaa.org/doi/pdf/10.2514/6.2016−2373

DSNU ..... Dark Signal Non−Uniformity (DSNU is the standard deviation of the mean pixel value across an array of pixels)
DSP ..... Defense Support Program (USA, DoD S/C series in GEO using infrared sensors to detect missile plumes against the Earth's background, to detect and report missile launches, space launches, and nuclear detonations) DSP S/C operate since the 1970s.
DSP ..... Digital Signal Processor (computer, technology)
DSP ..... Double Star Project, China, see M.10
DSRI ..... Danish Space Research Institute (Lyngby, Copenhagen, Denmark), since 1968 [Note: in Jan. 2005 DRSI changed its name to **DNSC** (Danish National Space Center), and in January 2007 it became **DTU Space**, an institute at the Technical University of Denmark].
DSS ..... Dornier Satellitensysteme GmbH (of DASA, Germany)
DSS ..... Delft Sensor Systems (provider of optoelectronic instruments). DSS has been created by the integration of OIP (Optronic Instruments & Products), located in Oudenaarde, Belgium − and DIEO (Delft Instruments Electro−Optics, located in the Netherlands
DSS ..... Digital Sun Sensor (based on CCD or CMOS Active Pixel Sensor technology)
DSSP ..... Danish Small Satellite Program
DSSS ..... Direct Sequence Spread Spectrum (communication technique). DSSS allows multiple users to share the same bandwidth.
D−STAR ..... Digital Smart Technologies for Amateur Radio (a new standard developed in Japan)
DSX ..... Deployable Structures Experiment (mission of USAF planned for 2006)
DTE ..... Digital Terrain Elevation
DTED−2 ..... Digital Terrain Elevation Data Level 2. DTED−2 is the current basic high resolution elevation data source for all military activities and systems that require landform, slope, elevation, and/or terrain roughness in a digital format. DTED−2 is a uniform gridded matrix of terrain elevation values with post spacing of one arc second (approximately 30 m).
DTH ..... Direct To Home (television service)
DTM ..... Digital Terrain Model (also referred to as DEM = Digital Elevation Model). DTM is a "bare Earth model".
DTM94 ..... Drag Temperature Model 1994 (an empirical thermospheric model to determine the drag forces of a spacecraft for reentry analysis)
DTMF ..... Dual Tone Multi−Frequency (encoding technique)
DTN ..... Delay/Disruption Tolerant Networking. DTN is an end−to−end network architecture designed to provide communication in and/or through highly stressed networking environments. DTN networks are characterized by intermittent connectivity, long delays and non−contemporaneous end to end paths.
Note: DTN is also referred to as "Disjoint/delay Tolerant Networking"
DTP ..... Digital Transparent Processor (a key technology for payloads). DTPs are particularly well−suited for routing channels or subchannels with fine bandwidth granularity in telecommunication missions with multiple−beam antenna coverage, and offer reconfiguration flexibility when mission reorientation is needed. − DTPs with additional digital beamforming (DBF) functionality will collect and handle digital samples of the electromagnetic waves from many antenna array elements.
DTU ..... Danmarks Tekniske Universitet (Technical University of Denmark), Lyngby, Denmark
DUT ..... Delft University of Technology (Delft, The Netherlands)
DVB ..... Digital Video Broadcast [a broadcast standard first introduced the mid 1990s by the communication industry for TV broadcasting. The DVB

project quickly expanded to include multimedia applications as well as television. Data standards (DVB−IP and other protocols) were established in 1997.] A single DVB carrier may contain multiple logical data channels, or PIDs, thereby allowing multiple data streams to be logically multiplexed on a single DVB carrier and decoded for distribution on a site LAN.

DVB−ASI ..... DVB−ASI (Asynchronous Serial Interface)

DVB−IP ..... DVB−IP (Internet Protocol)

DVB−H ..... Digital Video Broadcast−Handheld (as of late 2007 an EU−wide proposed standard for mobile TV services)

DVB−RCS ..... Digital Video Broadcast − Return Channel via Satellite (DVB−RCS is an open standard for user terminals)

DVB−S ..... DVB−Satellite

DVB−S2 ..... Digital Video Broadcasting − Satellite − Second Generation. DVB−S2 is a CCSDS adaptation standard fully reusing the ETSI DVB−S2 mass−market telecommunication standard, thus providing the advantage of a wide diversity of very robust commercial mass market receivers, cheaper than the receivers dedicated to space telemetry links. [7140)]

Syrlinks and CNES are working on the implementation of the DVB−S2 CCSDS telemetry standard in CubeSat HDR transmitters, in X−band. Syrlinks is also considering to develop such an equipment in Ka band. These equipment, complementary to the current EWC27 X−band OQPSK CC (7,1/2) HDR transmitter validated in orbit on−board GOMX−3, could satisfy data rate needs lower and also higher than 100 Mbit/s.

DVB−S2X ..... New DVB standard (an extension to the DVB−S2 Standard) as of March 2014. Enhancements to DVB−S2 marked by increased bandwidth efficiency of up to 50% for professional applications. [7141)]

DVD ..... Digital Versatile Disk [some standard DVD formats are: DVD−5 (4.7 GByte storage capacity, one layer per disk), DVD−9 (8.5 GByte, two layers per disk on one side, one layer is semi−permeable), DVD−10 (9.4 GByte, one layer per side and disk), DVD−18 (17 GByte, two layers per side and disk, one layer per side is semi−permeable)]

DWD ..... Deutscher Wetterdienst [German Weather Service, with seven forecast centers in Offenbach (HQ), Hamburg, Potsdam, Leipzig, Essen, Stuttgart, and Munich]. DWD employs over 3000 people in over 150 localities throughout Germany.

DWDM ..... Dense Wavelength Division Multiplexing (a network technique)

DWL ..... Doppler Wind Lidar (a active laser instrument based either on coherent heterodyne receiver technology or on incoherent direct receiver technology)

DWSS ..... Defense Weather Satellite System. A new observation system of the USAF which was planned after cancellation of the NPOESS program in Feb. 2010. However, DWSS was cancelled in Jan. 2012 due to budgetary problems. [7142)]

DYCOMS ..... Dynamics and Chemistry of Marine Stratocumulus Experiment (campaign)

7140) Miguel Fernandez, Anis Latiri, Thomas Dehaene, Gabrielle Michaud, Philippe Bataille, "X−band transmission evolution towards DVB−S2 for Small Satellites," Proceedings of the 30th Annual AIAA/USU SmallSat Conference, Logan UT, USA, August 6−11, 2016, paper: SSC16−VII−6, URL: http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=3386&context=smallsat

7141) "DVB−S2X Specification receives approval from steering board," DVB Project, 27 Feb. 2014, URL: http://www.dvb.org/resources/public/pressreleases/dvb_pr241_steering_board_approves_dvb−s2x.pdf

7142) Warren Ferster, "U.S. Air Force Draws Final Curtain on DWSS Program," Space News, Jan. 24, 2012, URL: http://spacenews.com/military/air−force−draws−final−curtain−dwss.html

E

E2v . . . . . e2v technologies Ltd. is a semiconductor imaging technology company, based in Chelmsford, Essex, UK. Founded in 1947, e2v started life as Phoenix Dynamo Company, manufacturing components for radar transmitters. In 2014, the firm employs 1,600 people across Europe, North America and Asia. Its high−performance image sensors (CCDs) are used in almost 150 ground− and spaceborne telescopes, including: IRIS, Gaia, Pleiades, STEREO, SDO, Hubble, Mars Curiosity Rover and Rosetta.

EA . . . . . Environment Agency (of Japan)

EADS N. V. . . . . European Aeronautic, Defense and Space company, registered in Amsterdam, The Netherlands. EADS is a holding company of DASA and a French pool group with Lagardère as the major partner. Merger announcement of DASA (Germany) and Aerospatiale Matra S. A. (France) in Oct. 1999 − the merger was realized July 10, 2000 with DASA, Aerospatiale Matra, and CASA (Construcciones Aeronáuticas SA) of Madrid, Spain. The following units are part of EADS: 1) EADS Space (France, Germany, UK and Spain), 2) EADS Astrium (France, Germany, UK, Spain), 3) EADS Space Transportation (France, Germany), 4) EADS CASA Espacio (ECE, Madrid, Spain, 5) EADS Sodern (Limeil−Brévannes, France), 6) EADS Space Services (Paris, Portsmouth, Stevenage, Ottobrunn)

EAN . . . . . European Aviation Network. EAN is a revolutionary new integrated satellite and air−to−ground network, developed by Inmarsat in partnership with Deutsche Telekom that promises aviation customers a high quality broadband service when flying over Europe. [7143)]
The first of its kind worldwide, the European Aviation Network combines high capacity satellite coverage with a complementary 4G LTE (Long−Term Evolution) ground network to provide high−speed connectivity across all 28 European Union states.
Designed specifically for high−traffic flight paths and busy airport hubs, the network delivers over 50 Gbit/s capacity. This means passengers can enjoy a reliable high bandwidth broadband service in the air that matches their expectations on the ground.

EAP . . . . . Electro−active Polymer. EAP is a shape−changing light−weight material. An EAP changes its shape and size in response to an electric stimulus.

EARLINET . . . . European Aerosol Research LIdar NETwork (since 2000), a coordinated network of ground−based lidar stations for the vertical profiling of aerosols at continental long−term scale

EarlyBird . . . . . Commercial imaging satellite

EARS . . . . . EUMETSAT ATOVS Retransmission Service (started in 2002)

EARS . . . . . EUMETSAT Advanced Retransmission Service (started in 2012). EARS provides instrument data (ATMS and CrIS) from the Suomi NPP satellite collected via a network of Direct Readout stations.

EARSC . . . . . European Association of Remote Sensing Companies, (Brussels, Belgium, since 1989). EARSC is a non−profit organization to foster development of the European Geo−Information Service Industry and to stimulate a sustainable market for Geo−information services.

EARSEC . . . . . European Airborne Remote Sensing Capabilities [program since 1990 between CEC (JRC in Ispra, Italy) and ESA]

EARSeL . . . . . European Association of Remote Sensing Laboratories (since 1976)

EarthCARE . . . . Earth Clouds Aerosol and Radiation Explorer (a proposed ESA core mission)

7143) "European Aviation Network," inmarsat, 2017, URL: https://www.inmarsat.com/aviation/aviation−connectivity−services/european−aviation−network/

EarthKAM ..... Earth Knowledge Acquired by Middle school students (a NASA education program, PI: Sally Ride, UCSD). The camera program started in 1996 as KidSat on Shuttle flight STS−76. EarthKAM was taken onboard the ISS with STS−98 (Feb. 7−21, 2001) and installed on ISS as ISS EarthKAM. EarthKAM photographs are taken by remote operation from the ground. Since 1996, EarthKAM students have taken thousands of photographs of Earth.

EARTHNET .... ESA Program since 1977. Earthnet refers to an ESA organization responsible for the ground segment of Earth Observation. Functions: acquisition, archiving and distribution of Earth science data.

EarthScope ..... A US integrated initiative and a US national program to explore the structure and evolution of the North American continent and the physical processes controlling its earthquakes and volcanic eruptions.

EarthWatch Inc. . A US Earth observation company in Longmont, CO. EarthWatch was formed in January 1995 and is a joint venture of Ball Aerospace & Technologies Inc. and WorldView Imaging Corporation (builder of EarlyBird and QuickBird). In October 2001 EarthWatch was renamed to **DigitalGlobe Inc**.

Earth Watch .... ESA program [these are the operational (or pre−operational) service−oriented missions addressing specific application areas of Europe]. The Earth Watch missions are operational ESA missions and represent first steps of service provision. They have to be driven by operational users and be sustainable in the long term without ESA financial support. They are to be developed in partnership with EUMETSAT or other agencies or public entities such as the EC, or with industry or commercial ventures. The Earth Watch Initiative started in 2001 with the goal to secure for Europe an independent sustainable capability in operational Earth observation. The Copernicus (formerly GMES) initiate fits into Earth Watch.

EASAC ..... European Academies Science Advisory Council

EASC ..... European Air and Space Conference

EASE ..... Experimental Assembly of Structures in Extravehicular Activity (Shuttle)

EASOE ..... European Arctic Stratospheric Ozone Experiment (campaign)

EBCCD ..... Electron−bombarded CCD array

EBL ..... Extragalactic background Light, or simply EGB (ExtraGalactic Background) is the faint diffuse light of the night sky, consisting of the combined flux of all extragalactic sources. Its main significance for astronomers is that it contains information regarding the history and formation of other galaxies, and also the large−scale structure of the universe.

EC ..... European Commission (since 1995: CEU (Commission of the European Union)

ECAPS ..... Ecological Advanced Propulsion Systems, Inc. (Solna, Sweden). Development of ADN (Ammonium Dinitramide) based thruster and propellant technology. ECAPS was founded in 2000 and focuses on green propulsion−based products for space applications. ECAPS is the developer of the **HPGP** (High Performance Green Propulsion) system, first demonstrated on the PRISMA mission.

ECBAQ ..... Entropy Constrained Block Adaptive Quantization

ECD ..... Electron Capture Detector

ECLIPS ..... Experimental Cloud Lidar Pilot Study (campaign)

ECMWF ..... European Centre for Medium−Range Weather Forecasts (located in Reading, UK, founded in 1973). ECMWF is an international organization supported by the following European states: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom. ECMWF has working arrangements with WMO, EUMET-

SAT and ACMAD (African Centre for Meteorological Applications for Development).

ECS ..... EOSDIS Core System (USA)

ECSAT ..... European Centre for Space Applications and Telecommunications (located at the Harwell Oxford campus, UK). The ESA facility ECSAT was opened on May 14, 2013. ECSAT supports activities related to telecommunications, climate change, technology science and 'integrated applications' – the combined use of different space and terrestrial technologies, data and infrastructures to create new everyday applications. Specific emphasis will be put on the development of innovative public–private–partnerships, such as with the UK's new Satellite Applications Catapult. [7144) 7145)]

ECSS ..... European Cooperation for Space Standards (ESA)

ECV ..... Essential Climate Variable (in 2010, GCOS defined 50 ECVs for the domains: Atmospheric, Oceanic, and Terrestrial)

EDA ..... European Defence Agency (since July 2004). EDA is an Agency of the European Union (EU) with HQs in Brussels, Belgium.

EDAC ..... Earth Data Analysis Center (NASA contractor center at the University of New Mexico, Albuquerque, NM, since 1964)

EDAC ..... Error Detection and Correction (information processing term)

EDC ..... EROS Data Center of the US Geological Survey (Sioux Falls, SD, DAAC of NASA EOS Program for Land Processes)

EDI ..... Electronic Data Interchange, (Format Specification according to ANSI Standard X.12; (an existing but non–ISO Protocol)

EDIFACT ..... Electronic Data Interchange for Administration, Commerce, and Transport

EDLC ..... Electric Double Layer Capacitor

EDO ..... Extended Duration Orbiter (Shuttle)

EDOS ..... Earth Observing System Data Operations System (a multimission high–rate system of NASA, since 1999). TDRSS mission support for Terra, ALOS, Aqua, Aura, EO–1, ICESat, etc.)

EDR ..... Experiment Data Record

EDRS ..... European Data Relay Satellite (constellation)

EEA ..... European Environment Agency (since 1990, located in Copenhagen since 1993, Denmark)

EECF ..... Earthnet ERS–1 Central Facility (ESA facility at ESRIN, Italy)

EEGS ..... Environmental and Engineering Geophysical Society

E–ELT ..... European Extremely Large Telescope, will be the largest ground–based telescope of ESO (European Southern Observatory) in Chile. E–ELT features a 42 m filled aperture collector (a 5 mirror anastigmatic optical system) with exquisite image quality thanks to an internal adaptive optics corrector, and large platforms for putting on–line a dedicated set of powerful post–focal instruments.
In April 2010, the ESO Council selected Cerro Armazones as the baseline site. Cerro Armazones is a mountain at an altitude of 3060 m in the central part of Chile's Atacama Desert. The final go–ahead for construction is expected at the end of 2010. Completion of the project is expected in the time frame 2024.

EELV ..... Extended Envelope Launch Vehicle [US Air Force launcher; launch of first EELV mission on Mar. 11, 2003 (Delta–4M launch vehicle from Cape Canaveral, FLA), a military communications satellite, A3 payload, on Boeing's DSCS–III (Defense Satellite Communications System) platform]
Note: In March 2019, the National Defense Authorization Act

7144) "European Space Agency opens its doors in UK," UKSA, May 14, 2013, URL: http://bis.gov.uk/ukspaceagency/news–and–events/2013/May/european–space–agency–opens–its–doors–in–uk

7145) "ESA opens its doors in UK," ESA Press Release No 14–2013, May 14, 2013, URL: http://www.esa.int/For_Media/Press_Releases/ESA_opens_its_doors_in_UK

(NDAA) directed the name change from EELV to **NSSL**(National Security Space Launch) program, effective March 1, to reflect consideration of both reusable and expendable launch vehicles future solicitations. [7146]
The NSSL program is designed to continue to procure affordable National Security Space launch services, maintain assured access to space and ensure mission success with viable domestic launch service providers. The program is driven to provide launch flexibility that meets warfighter needs while leveraging the robust U.S. commercial launch industry, which has grown significantly during the past five to seven years.

EEP ..... Earth Explorer Program (ESA). Earth Explorer missions are designed to address critical and specific issues that have been raised by the science community whilst demonstrating breakthrough technology in observing techniques. Some approved Earth Explorer missions are: CryoSat, GOCE, SMOS, ADM−Aeolus, Swarm and EarthCARE.

EEPROM ..... Electrically Erasable Programmable Read−Only Memory

EETFI ..... European Environmental Test Facility Inventory. EEFTI is a searchable web−based database of European space environmental test facilities.

EEV ..... English Electric Valve, Chelmsford, UK (manufacturer of detectors)

EEVT ..... Electrophoresis Equipment Verification Test (Shuttle)

EFDA ..... European Fusion Development Agreement

EFEDA ..... European Field Experiment in Desertification−threatened Areas (campaign)

EFI ..... European Forest Institute (since 1993 with HQs in Joensuu, Finland). EFI is an international organization established by the European states. It has 28 Member Countries, and ca. 115 member organizations from 37 different countries working in diverse research fields. EFI provides forest−related knowledge around three interconnected and interdisciplinary themes: bioeconomy, resilience and governance. [7147]

EFIMED ..... European Forest Institute, Mediterranean Reginal Office

EFTF ..... European Frequency and Time Forum. EFTF is an international conference and exhibition, providing information on recent advances and trends of scientific research and industrial development in the fields of Frequency and Time.

e.g. ..... abbreviation (Latin: exempli gratia) “for example”

e−GEOS ..... An international geospatial company of ASI (Italian Space Agency, 20%) and Telespazio (80%) providing optical and radar imagery on a commercial basis. e−GEOS and its subsidiary GAF/Euromap operate their own data processing services at the Earth Observation Space Centers of Matera, Italy (radar and optical) and Neustrelitz, Germany (optical). Multiple satellites are received and processed in these two hubs, also for near−real−time monitoring (Matera).

EGNSS ..... European Global Navigation Satellite Systems. The objective of EGNSS is to facilitate the integration of Galileo and EGNOS into different user applications.

EGPM ..... European Global Precipitation Measurement (a contribution to the GPM project of NASA and NASDA

EGM96 ..... Earth Gravity Model 1996 (developed at NASA/GSFC, NIMA, and Ohio State University). It is based on surface gravity data, altimeter−derived gravity anomalies from ERS−1 and from GEOSAT, extensive satellite tracking data (GPS, TDRSS, DORIS, TRANET), and direct altimeter ranges from TOPEX/POSEIDON, ERS−1, and GEOSAT.

7146) ”The National Security Space Launch Program is Established by the U.S. Air Force,” Satnews Daily, 2 March 2019, URL: http://www.satnews.com/story.php?number=457024622

7147) http://www.efi.int/portal/home/

EGNOS ..... European Geostationary Navigation Overlay System (planned ESA complementary system to GPS and GLONASS to provide Europe with GPS/GLONASS service availability, continuity and signal integrity)

EGS ..... Energia GPI (Georgian Polytechnical Intellect) Space, [a Russian–Georgian company in Korolev (Moscow region), Russia and in Tbilisi, Georgia]. EGS was founded in 1999 by Rocket Space Corporation (RSC) Energia, referred to as S.P.A. EGS, and the company "Georgian Polytechnical Intellect, Ltd," referred to as EGS Ltd. EGS is an expert in large–scale deployable structures.

EGS ..... European Geophysical Society (since 1971)

EGS–CC ..... European Ground Systems – Common Core (a strategic initiative started in 2012). [7148) 7149)] EGS–CC is a collaboration of European prime industry and space agencies to develop a common core (Astrium Satellites, Astrium Space Transportation, Thales Alenia (France and Italy), OHB System, ESA (ESTEC and ESOC), CNES, DLR). [7150)]

EGS ..... Experimental Geodetic Satellite of NASDA, (Ajisai)

EGU ..... Europen Geosciences Union (since 2002)

EHF ..... Extremely High Frequency (30 – 300 GHz band)

EHIC ..... Energetic Heavy Ion Composition Experiment

EHT ..... Event Horizon Telescope. EHT is a project to create a large telescope array consisting of a global network of radio telescopes and combining data from several VLBI stations around the Earth. The goal is to create a "virtual" telescope with an effective diameter of the entire planet. Each year since its first data capture in 2006, the EHT array has moved to add more observatories to its global network of radio telescopes. Over the years, more and more radio astronomy facilities have joined the project. A key recent addition is the ALMA (Atacama Large Millimeter/submillimeter Array) in Chile. — A long standing goal in astrophysics is to directly observe the immediate environment of a black hole with angular resolution comparable to the event horizon.

EIROforum .... A forum of "European Intergovernmental Research Organizations" (since 2002). EIROforum is made up of 7 of Europe's leading intergovernmental research organizations: CERN (particle physics), EMBL (molecular biology), ESA (space activities), ESO (astronomy and astrophysics), ESRF (synchrotron radiation), ILL (neutron source) and EFDA (fusion).

EIRP ..... Effective Isotropic Radiated Power

EISAC ..... European Imaging Spectrometry Aircraft Campaign (1989–90)

EIAST ..... Emirates Institution for Advanced Science and Technology (since 2006). EIAST was established in order to promote advanced research and technological innovation, more specifically satellite technology; to build a well established internationally competitive base for human skills development; to position Dubai and the United Arab Emirates (UAE) as a hub for space technology development internationally. DubaiSat–1 was launched on July 29, 2009; DubaiSat–2 was launched on Nov. 21, 2013.
Note: On April 18, 2015, EIAST was officially renamed to **MBRSC** (Mohammed Bin Rashid Space Center).

EISCAT ..... European Incoherent Scatter Radar. EISCAT is an international research organization operating three incoherent scatter radar systems,

7148) Mauro Pecchioli, Juan María Carranza, "The Main Concepts of the European Ground Systems – Common Core (EGS–CC)," GSAW (Ground System Architechtures Workshop) 2013, March 18–21, 2013, Los Angeles, CA, USA, URL: http://sunset.usc.edu/GSAW/gsaw2013/s2/pecchioli.pdf

7149) Mauro Pecchioli, Juan María Carranza, Anthony Walsh, "Highlights of the European Ground Systems – Common Core Initiative," SpaceOps 2014, 13th International Conference on Space Operations, Pasadena, CA, USA, May 5–9, 2014

7150) Martin Götzelmann, Luke Tucker, Joaquim Sanmarti, Nicholas Mecredy, "The Design of the European Ground Systems – Common Core (EGS–CC)," SpaceOps 2014, 13th International Conference on Space Operations, Pasadena, CA, USA, May 5–9, 2014

at 931 MHz (UHF), 224 MHz (VHF), in Northern Norway (Tromsø). EISCAT has also a 500 MHz radar system consisting of a steerable 32 m dish and a fixed 42 m dish in Longyearbyen, Svalbard. Studies the interaction between the Sun and the Earth in the magnetosphere and the ionized parts of the atmosphere.
The primary mission of the EISCAT network is to perform ionospheric measurements. However, following the development of a dedicated space−debris computer to run at the back-end of the processing units, these radars are capable of statistical observations of LEO debris down to some centimeters in size, without compromising the main EISCAT objectives.

EIT ..... Electro−bombardment Ion Thruster (electric propulsion system of MMS, France)

EIT ..... Electromagnetically Induced Transparency

EKOSat ..... ELOP−KARI−OHB Satellite

ELAC ..... European Lidar Airborne Campaign

ELaNa ..... Education Launch of Nanosatellite (NASA initiative of 2010 to foster CubeSat launch opportunities)

ELDO ..... European Launcher Development Organization (since 1962) ELDO is, along with ESRO, a predecessor organization of ESA

ELDP ..... European Lake Drilling Project (campaign under PANASH)

ELF ..... Extremely Low Frequency (30 − 3000 Hz)

ELGRA ..... European Low Gravity Research Association (since 1979)

ELINT ..... Electronic Intelligence (used in the context of DoD missions)

ELITE ..... European LITE (campaign) LITE = Lidar In−space Technology Experiment (Shuttle payload)

ELOISE ..... European Land−Ocean Interaction Studies (campaign)

El−Op ..... El−Op Electro−Optics Industries of Rehovot, Israel (as of 2000 El−Op is part of Elbit Systems Ltd. of Haifa, Israel)

ELRAD ..... Earth−Limb Radiance Experiment (Shuttle payload)

E−ELT ..... European Extremely Large Telescope (ground−based telescope of ESO in the Atacama Desert of Chile). The E−ELT, the largest optical/near−infrared telescope in the world with an aperture of 39 m for the main mirror, will start operations in the timeframe 2024. [7151)]
At a ceremony at ESO HQ in Garching, Germany, four contracts were signed for major components of the ELT (European Large Telescope) that ESO is building. These were for: the casting of the telescope's giant secondary and tertiary mirrors, awarded to SCHOTT; the supply of mirror cells to support these two mirrors, awarded to the SENER Group; and the supply of the edge sensors that form a vital part of the ELT's huge segmented primary mirror control system, awarded to the FAMES consortium. The secondary mirror will be largest ever employed on a telescope and the largest convex mirror ever produced. The giant telescope employs a complex five−mirror optical system that has never been used before and requires optical and mechanical elements that stretch modern technology to its limits. [7152)]
E−ELT represents the next step forward and it will complement the research done with the GMT (Giant Magellan Telescope) and other large telescopes being built. The E−ELT's primary mirror will be made up of individually manufactured hexagonal segments; 798 of them. The primary mirror will be fitted with edge sensors to ensure that each segment of the mirror is corrected in relation to its neighbors as the scope is aimed or moved, or as it is disturbed by temperature changes, wind, or

7151) "The European Extremely Large Telescope (E−ELT) Project," ESO, URL: http://www.eso.org/sci/facilities/eelt/

7152) "Contracts Signed for ELT Mirrors and Sensors," Space Daily, Jan. 19, 2017, URL: http://www.spacedaily.com/reports/Contracts_Signed_for_ELT_Mirrors_and_Sensors_999.html

vibrations. [7153]
The E−ELT is actually a 5 mirror system. Along with the enormous primary mirror, and the secondary mirror, there are three other mirrors. An unusual aspect of the E−ELT's design is its tertiary mirror. This tertiary mirror will give the E−ELT better image quality over a larger field of view than a primary and secondary mirror can.

ELT−121.5 ..... Emergency Locator Transmitter (see COSPAS−S&RSAT, K.11)

ELVES ..... Emission of Light and Very Low Frequency Perturbations From Electromagnetic Pulse Sources (lightning phenomenon, a flash of millisecond lifetime)

EMAC ..... European Multi−Sensor Airborne Campaign (in the framework of ESA/JRC collaboration)

EMBL ..... European Molecular Biology Laboratory

EMBRAER .... Empresa Brasileira de Astronautica SA (aircraft and space payload manufacturer, Saò José dos Campos, SP, Brazil)

EMC ..... Electromagnetic Compatibility

EMCCD ..... Electron Multiplying Charge Coupled Device (as of 2003, a new and more sensitive CCD detector technology)

EMEA ..... Europe, the Middle East and Africa (regional designation)

EMEX ..... Equatorial Mesoscale Experiment (campaign)

EMF ..... Electromotive Force

EMFF ..... Electromagnetic Formation Flight (a proposed concept of actuating multiple spacecraft in relative degrees of freedom using electromagnetic forces and reaction wheels)

EMI ..... Electromagnetic Interference

EMIC ..... Electromagnetic Ion Cyclotron (waves). EMIC waves are believed to be responsible for ring current loss by wave−particle interaction. EMIC waves are strongly enhanced during geomagnetic storms.

eMMRTG ..... Enhanced Multi−Mission Radioisotope Thermoelectric Generator. [7154]

EMP ..... Electromagnetic Pulse

EMS ..... Electromagnetic Spectrum)

EMS ..... EMS Technologies, Inc. (since 1968), Atlanta, GA, USA, provider of space communications equipment (first beam−forming network for the DSCS communication satellites of DoD in 1976 − thus providing electronic antenna steering); EMS has also a major facility in Montreal, Canada

EMSA ..... European Maritime Safety Agency (Lisboa, Portugal). EMSA was established by the EU in 2003.

EMSL ..... Environmental Monitoring Systems Laboratory (Las Vegas, NV, EPA facility)

EMWIN ..... Emergency Managers Weather Information Network (of the GOES S/C series). EMWIN is a dissemination system (and service) used to provide timely dissemination of warnings, watches, graphics, and other hydro meteorological products to emergency managers with minimal equipment cost to them.

ENA ..... Energetic Neutral Atoms [neutral atoms or molecules created by charge exchange between energetic ions (such as the Earth's radiation belts) and a cold neutral gas (such as the Earth's exosphere)]

ENEA ..... Ente per le Nuove tecnologie l'Energia e l'Ambiente (Rome, Italy)

ENRCSD ..... External NanoRacks Cygnus Deployer. − This historic and innovative satellite deployment service is a part of the first−ever program in which an ISS Commercial Resupply Vehicle is able to deploy satellites at an

7153) Evan Gough, "Rise of the Super Telescopes: The European Extremely Large Telescope," Universe Today, 1 March 2017, URL : http://www.universetoday.com/133992/rise−super−telescopes−european−extremely−large−telescope/

7154) "Spacecraft 'Nuclear Batteries' Could Get a Boost from New Materials," NASA/JPL Nws, Oct. 13, 2016, URL: http://www.jpl.nasa.gov/news/news.php?feature=6646

altitude higher than the ISS after completing its primary cargo delivery mission. Flying at 500 kilometers provides an open door for new technology development as well as an extended life for CubeSats deployed in low−Earth orbit. [7155)]

ENSO ..... El Niño Southern Oscillation

ENVISAT ..... Environmental Satellite (ESA, see F.13)

EO ..... Earth Observation

EO−1 ..... Earth Observing−1 (NASA S/C)

EOCAP ..... NASA's Earth Observations Commercial Applications Program, since 1987 (NASA's intent is to commercialize remote sensing technology originally developed to support scientific exploration)

EOL ..... End of Life

EONET ..... Earth Observatory Natural Event Tracker. EONET is a NASA web service − a repository of metadata about natural events. Development of EONET began in 2015 and has been supported by NASA's Earth Observatory and Earth Science Data and Information System (ESDIS) Project. [7156)]

EOPP ..... Earth Observation Preparatory Programme (of ESA)

EORF ..... Environment Measurements by the Real−Time Radiation Monitor (Shuttle payload)

EOS ..... Earth Observing System (NASA), F.15

EOS ..... European Optical Society

EOSAT ..... Earth Observation Satellite Company (Commercial distributor of Landsat imaging data, located in Lanham, MD, since 1985, EOSAT is a joint venture of Lockheed Martin and Hughes Aircraft). Space Imaging Inc. (since 1994) of Thornton, CO of LM and E−Systems, acquired EOSAT in 1995. The new company was subsequently renamed into: Space Imaging EOSAT [distributor of IKONOS imagery, ERS−1/2, JERS and Radarsat data (USA), global distributor of IRS−1C/D imagery]. Since 1998 the company name is: Space Imaging. The owners of Space Imaging are: LM, E−Systems (of Raytheon Co, Lexington, MA), Mitsubishi, Vander Horst (Singapore), Halla Heavy Industries (Korea).

EOSDIS ..... EOS Data and Information System

EP ..... Electric Propulsion (of spacecraft)

EPA ..... Environmental Protection Agency (USA, since 1970)

EPFL ..... Federal Institute of Technology Lausanne, Switzerland. As of 2012, the EPFL Space Center was renamed to "Swiss Space Center"

EPIRB ..... Emergency Position Indicating Radio Beacon (on COSPAS and S&RSAT payloads)

EPOCS ..... Equatorial Pacific Ocean Climate Studies (campaign)

EPOCS ..... European Committee on Ocean and Polar Sciences

EPOP ..... European Polar Platform (old name, now POEM)

EPOS ..... European Proximity Operations Sensor (ESA test of GPS Tensor receivers and an optical rendezvous sensor for Shuttle−Mir docking maneuvers on STS−84 and STS−86)

EPS ..... Earth, Planets and Space (journal, since 1998). EPS is the continuation of the "Journal of Geomagnetism and Geoelectricity" and the "Journal of Physics of the Earth"

EPS ..... EUMETSAT Polar System. EPS) comprises a series of three polar orbiting meteorological satellites, MetOp, and is the European contribution to the EUMETSAT/NOAA Initial Joint Polar System (IJPS) in providing "morning" service for operational meteorology.

7155) "External Cygnus Deployment," NanoRacks, URL: http://nanoracks.com/products/external−cygnus−deployment/

7156) http://eonet.sci.gsfc.nasa.gov/eonet−project

EPSCoR ..... Experimental Program to Stimulate Competitive Research (NASA educational program). EPSCoR helps develop partnerships among NASA research missions and programs, academic institutions and industry. It also helps the awardees establish long−term academic research enterprises that will be self−sustaining and competitive. [7157)]

EQM ..... Engineering Qualification Model

Equator−S ..... Solar Terrestrial Mission (M.11)

ER−2 ..... Extended Range U−2 (US research aircraft of NASA/ARC)

ERA ..... European Robotic Arm, built by Dutch Space as prime contractor, (joint ESA and Roskosmos contribution to ISS; installation of the 11 m long robotic arm is planned for 2009). ERA will be part of the Russian MLM (Multi−purpose Laboratory Module)

ERB ..... Earth Radiation Budget

ERB ..... Erasmus Recording Binocular (an ESA 3D video camera flown on the ISS since Feb. 2010)

ERBS ..... Earth Radiation Budget Satellite (NASA), C.16

ERC32 ..... Embedded Real−time computing Core − 32 bit. ERC32 is an ESA−sponsored radiation−tolerant processor developed for space applications [ERC32 is a variation on the SPARC (V, 32−bit, RISC, 10 Mips) architecture]. The ERC32 consists of: IU (Integer Unit), FPU (Floating Point Unit), and MEC (Memory Controller). All three devices are manufactured by Temic/MHS on a 0.8 µm CMOS/EPI radiation−tolerant technology. A single−chip version of the ERC32 is available as of 2001: ERC32SC/TSC695E of ATMEL Wireless and Microcontrollers, Nantes, France.

ERG ..... Energization and Radiation in Geospace (a mission under development at JAXA/ISAS − for launch in 2013)

ERICA ..... Experiment on Rapidly Intensifying Cyclones over the Atlantic (campaign)

ERIM ..... Environmental Research Institute of Michigan (HQ in Ann Arbor, MI). ERIM is a nonprofit contract research organization in the field of remote sensing. In May 1997, ERIM was transformed into a profit−seeking company and changed its name to "ERIM International." History: The Willow Run Laboratories were founded in 1947. In 1973 the Willow Run Laboratories team separated from the University of Michigan and became ERIM. − In 2000 ERIM International Inc. became part of Veridian Systems, the new company is called: Veridian ERIM International

EROS ..... Earth Resources Observation and Science (Data Center of USGS in Sioux Falls, SD, archive for Landsat and other data)

EROS ..... Earth Remote Observation System (R.91)

ERS−1,2 ..... European Remote Sensing Satellite (ESA program), F.17 and F.18

ERS ..... Earth Resource Satellite

ERSDAC ..... Earth Remote Sensing Data Analysis Center (Tokyo, Japan, a non−profit organization in the areas of instrument calibration−validation and data applications, since 1981)

ERTMS ..... European Railway Traffic Management System. The European−wide standard for train control and command systems, ERTMS has been promoted by the European Union to ensure cross−border interoperability and simplify procurement of signalling equipment.
Introducing satellite navigation and communications into ERTMS has been a significant challenge due to the stringent safety requirements that railway signalling systems must comply with. But once the approach is validated, satellites could play an important role in making rail transport safer and expanding the market opportunities for

7157) http://www.nasa.gov/offices/education/programs/national/epscor/home/index.html

ERTMS. A first ERTMS demonstration system was introduced in 2014 on a regional railway on the island of Sardinia (Italy). [7158]

ERTS−1 ..... Earth Resources Technology Satellite (NASA satellite, in 1975 ERTS−1 was renamed to Landsat−1 and the entire ERTS program was renamed to Landsat)

ESA ..... European Space Agency (since 1975), ESA−HQ in Paris (ESA member states are: Austria, Belgium, Czech Republic (since 2008), Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom (UK). Poland became the 20th ESA member state in Sept. 2012. [7159] Estonia became the 21st ESA member on Feb. 4, 2015. [7160] Hungary became the 22nd ESA member on Nov. 4, 2015. [7161] — Canada participates in some projects under long−term cooperation agreements (over 30 years).
European cooperating states are: Hungary, Slovenia and Slovakia.
Cooperation agreements with ESA: Cyprus, Latvia, Lithuania, Israel, Croatia.
On 30 June 2020, Latvia signed an Association Agreement with ESA. [7162]

ESA/AMBC .... ESA/Additive Manufacturing Benchmarking Centre (as of May 2017), an ESA MTC (Manufacturing Technology Centre) facility based in Coventry UK and home to the UK National Centre for Additive Manufacturing. [7163]

ESA/EAC ..... ESA/European Astronaut Centre, ESA facility at Cologne, Germany.

ESA/ECSAT .... ESA/ECSAT (European Center for Space Applications and Telecommunications), Harwell, UK. ESA/ECSAT opened in July 2015. ESA's new UK facility, ECSAT, has been developing steadily since 2008, following the UK government's decision to increase its contribution to ESA. — ECSAT supports activities related to telecommunications, climate change, technology, science and 'integrated applications' – the combined use of different space and terrestrial technologies, data and infrastructures to create new everyday applications. [7164] [7165]
Named after ESA's British first Director General, Roy Gibson, ECSAT's new building will host 120+ jobs including teams in telecommunications and integrated applications. Special emphasis will be put on the development of new markets for satellite−based services and applications.

ESA/ESAC ..... ESA/European Space Astronomy Center, ESA facility in Villafranca, Spain (since 2004). ESAC is located about 30 km west of Madrid. The Spanish National Centre for ESA's SMOS (Soil Moisture and Ocean Salinity) mission will be located at ESAC (launch of SMOS in 2008). ESAC was officially opened in Feb. 2008.

7158) "Tracking Trains by Satellite: a premiere for Europe," ESA, April 23, 2014, URL: http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=32985

7159) "Poland accedes to ESA Convention," ESA, Sept. 13, 2012, URL: http://www.esa.int/esaCP/SEM82KAYT6H_index_0.html

7160) "Nº 5–2015: Estonia accedes to ESA Convention," ESA, Feb. 4, 2015, URL: http://www.esa.int/For_Media/Press_Releases/Estonia_accedes_to_ESA_Convention

7161) "Hungary becomes ESA's 22nd Member State," ESA, Nov. 15, 2015, URL: http://m.esa.int/About_Us/Welcome_to_ESA/Hungary_becomes_ESA_s_22nd_Member_State

7162) "Latvia becomes ESA Associate Member State," ESA, 29 July 202, URL: https://www.esa.int/About_Us/Latvia_becomes_ESA_Associate_Member_State

7163) "New centre introducing ESA projects and space firms to 3D printing," ESA, May 30, 2017, URL: http://m.esa.int/Our_Activities/Space_Engineering_Technology/New_centre_introducing_ESA_projects_and_space_firms_to_3D_printing

7164) "UK space industry boosted: major new space facilities launched," UKSA, July 9, 2015, URL: https://www.gov.uk/government/news/uk−space−industry−boosted−major−new−space−facilities−launched

7165) "Flags are raised at ESA's first UK Center," ESA, July 9, 2015, URL: http://www.esa.int/ESA_in_your_country/United_Kingdom/Flags_are_raised_at_ESA_s_first_UK_centre

ESA/ESEC ..... ESA/European Space Security and Education Center. – Just short of its 50th anniversary, ESA's base in Belgium, namely Redu, will now be known by a new name: **ESEC** (European Space Security and Education Center). Letters posted to 'ESA Redu Belgium' over many years led to this becoming the recognized public name, but in fact it has been an ESA center since 2007. Redu has been engaged in new activities for several years, and has been given its new name to reflect that. [7166]

ESA/ESOC ..... ESA/European Space Operation Centre (ESA facility in Darmstadt, Germany). ESOC was inaugurated on 8 September, 1967. Fifty years later on 8 September 2017, ESOC is celebrating its success of mission operations. [7167]

ESA/ESRIN .... ESA/European Space Research Institute (ESA facility, Frascati, Italy)

ESA/ESTEC .... ESA/European Space Research and Technology Centre (ESA facility in Noordwijk, Netherlands). ESTEC was inaugaurated on 3 April 1968 by Her Royal Highness Princess Beatrix and His Royal Highness Prince Claus of the Netherlands. [7168]

ESA/ESRIC .... European Space Resources Innovation Centre (ESA facility in Luxembourg). The objective is to support early–stage startups in the space resources sector in developing their business models, attracting their first customers and securing their first investments. [7169] [7170]

ESA–IRS ..... ESA – Information Retrieval Service (online database at ESRIN)

ESA/PB–EO ... ESA/Programme Board – Earth Observation

ESAC ..... Earth Sciences Advisory Committee (ESA)

ESASDT ..... ESA Space Debris Telescope (a 1 m Zeiss telescope located at the Optical Ground Station (OGS) at the Teide Observatory at Tenerife, Spain.

ESEA ..... European Union Aviation Safety Agency (established in 2002, HQs in Cologne, Germany). ESEA is responsible for ensuring safety and environmental protection in air transport in Europe.

ESCAP ..... (UN) Economic and Social Commission for Asia and the Pacific, Bangkok, Thailand

ESCAPE ..... Experiment of the Sun for Complementing the ATLAS Payload and for Education (Shuttle Payload)

ESCC ..... European Space Components Coordination (a standardization body, since Oct. 2002, signed by ESA, CNES, DLR, BNSC, ASI and Eurospace on behalf of the user industries); ESCC secretariat at ESTEC

ESCCON ..... European Space Components Conference

ESDE ..... Earth Science Decadal Survey (a NASA mission series under development)

ESDP ..... European Security and Defense Policy. When the Lisbon Treaty came into force in 2010, the former ESDP was renamed to **CSDP** (Common Security and Defence Policy).

ESE ..... Earth Science Enterprise [NASA program with the previous designation of MTPE (Mission to Planet Earth)]. ESE projects include such missions as: TOMS–EP, SeaWiFS, ACRIMSat, SORCE (SOlar Radiation and Climate Experiment), OCO (Orbiting Carbon Observatory), AQUARIUS, HYDROS, and OSTM (Ocean Surface Topography Mission)

7166) "The European Space Security and Education Centre at Redu," ESA Bulletin No 171, 1 November 2017, pp: 12–19, URL: http://esamultimedia.esa.int/multimedia/publications/ESA–Bulletin–171/offline/download.pdf

7167) "ESOC inauguration 1967," ESA, 8 Sept. 2017, URL: http://m.esa.int/About_Us/ESOC/ESOC_history/ESOC_inauguration_1967

7168) "Place for Space–50 years of ESTEC, the heart of Europe's space research," 2018, URL: http://esamultimedia.esa.int/docs/ESTEC/50ESTEC_BR–339_final.pdf

7169) https://www.esric.lu/

7170) "ESRIC unveils the first five start–ups selected as part of the "Start–up Support Programme"," ESRIC News, 2022, URL: https://www.esric.lu/news/esric–unveils–the–first–five–start–ups–selected–as–part–of–the–start–up–support–programme

ESEM ..... Evaluation of Space Environment Effects on Materials (Shuttle payload of NASA/LaRC) ESEM experiments are focused on cosmic dust collection

ESERO ..... European Space Education Resource Office. ESA is addressing primary and secondary education in Europe through its European Space Education Resource Office (ESERO) project. ESERO offers an annual series of national or regional training sessions for both primary and secondary school teachers. These are offered in collaboration with national partners who are already active in STEM education. ESA has established several ESERO national offices in member states such as: Austria, Belgium, Czech Republic, Denmark, Germany, Ireland, Italy, Finland, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, UK. Romania is the latest country to join ESERO in 2014. — On 26 June 2018, ESERO was officially launched in Luxembourg. [7171)]

ESF ..... European Science Foundation (Strasbourg, France)

ESDIS ..... Earth Science Data and Information System (NASA/GSFC)

ESIC ..... Earth Science Information Center (USGS operates a network of ESICs to distrubute Earth science data and related products)

ESIS ..... European Space Information System (ESA data system)

ESNI ..... European Satellite Navigation Industries (since 2000, development of Galileo system). ESNI, with HQs in Ottobrunn near Munich, Germany, is owned by Alcatel Alenia Space SAS of France, Finmeccanica SpA of Italy, EADS Astrium GmbH of Germany, EADS Astrium Ltd of United Kingdom, Galileo Sistemas y Servicios of Spain, a consortium of seven Spanish companies, and three Thales subsidaries.
Note: Until 2006, ESNI was referred to as GaIn (GalileoIndustries SA) with HQ in Brussels.

ESO ..... European Southern Observatory. ESO is an intergovernmental, European organization for astronomical research (since 1962). ESO is supported by Belgium, Denmark, France, Germany, Italy, the Netherlands, Portugal, Sweden, Switzerland and the United Kingdom. The ESO/HQ are located in Garching, near Munich, Germany. ESO operates two major observatories in the Atacama desert in Chile: 1) La Silla Observatory, located about 600 km north of Santiago at an altitude of 2400 m, and 2) VLT (Very Large Telescope) at Paranal, located on a 2.600 m high mountain some 130 km south of Antofagasta, Chile.

ESOC ..... European Space Operation Centre [ESA facility in Darmstadt, Germany, since Sept. 1967; formerly ESDAC (European Space Data Center) under ESRO]. — In 2017, ESOC is celebrating its 50th anniversary, highlighting a rich history of achievement in space. [7172)]

ESPA ..... EELV (Evolved Expendable Launch Vehicle) Secondary Payload Adapter — a multiple launch system for small satellites used in the Space Test Program (STP) of the USAF

ESPI ..... European Space Policy Institute (Vienna, Austria, since 2003)

ESPRIT ..... Effects of Space Weather on Technology Infrastructure (NATO Advanced Research Workshop)

ESRF ..... European Synchrotron Radiation Facility (Grenoble, France)

ESRI ..... Environmental Systems Research Institute, Inc. (HQ in Redlands, CA, since 1969)

ESRIC ..... European Space Resources Innovation Centre, Luxembourg.

ESRIN ..... European Space Research Institute (ESA facility in Frascati, Italy)

ESRO ..... European Space Research Organization (founded in 1962 by ten European countries; predecessor organization of ESA)

7171) "Official launch of ESERO Luxembourg," ESA, 26 June 2018, URL: http://m.esa.int/spaceinimages/Images/2018/06/Official_launch_of_ESERO_Luxembourg

7172) "Brief histrory of ESOC," ESA, 17 August 2017, URL: http://www.esa.int/About_Us/ESOC/ESOC_history/ESOC_History_highlights/Brief_history_of_ESOC

ESSA ..... Environmental Science and Services Administration (this was a predecessor organization of NOAA)

Essaim ..... Essaim means 'swarm' in French. Essaim is also the name of 4 microsatellites of DGA (Defense Procurement Agency), France. The objective is analysis of the electromagnetic environment (military use). The satellites use the Myriade microsatellite bus of CNES.

ESSP ..... Earth System Science Pathfinder, a NASA program that started in 1997 (small−scale, low−cost, and quick−turnaround NASA missions like QuikTOMS, VCL, GRACE, SORCE, CALIPSO (formerly PICASSO−CENA), CLOUDSAT, VOLCAM, etc.)

ESSP ..... European Satellite Services Provider [AENA (Spain), DFS (Germany), DSNA (France), ENAV (Italy), NATS (United Kingdom), NAV (Portugal) and Skyguide (Switzerland)]. ESSP is the operator of the EGNOS system and the provider of EGNOS safety critical services.

ESTC ..... Earth Science Technology Conference (a yearly NASA conference)

ESTEC ..... European Space Research and Technology Centre (ESA facility in Noordwijk, Netherlands)

ESTL ..... European Space Tribology Laboratory (an ESA lab since 1972, located in Warrington, UK). Tribology is a term coined in the 1960s, which is based on the Greek term 'tribos' and describes the science of rubbing, or more technically, the study of 'interacting surfaces in relative motion'. ESTL has played a role in virtually all ESA missions – along with many other European ones – from performing consultancy and test simulations to inhouse lubrication of many hundreds of flight parts per year. [7173]

ESTF ..... Earth Science Technology Forum (conferences of ESTO)

ESTO ..... Earth Science Technology Office [at NASA/HQ −− the IIP (Instrument Incubator Program) is sponsored by ESTO]

ESTRACK ..... ESA Tracking Network. The core ESTRACK network comprises 10 stations in seven countries: Kourou (French Guiana), Maspalomas, Villafranca (Spain), Redu (Belgium), Santa Maria (Portugal), Kiruna (Sweden), Perth (Australia) which host 5.5 m, 13 m, 13.5 m or 15m antennas.

In December 2012, the new tracking station (DSA3) at Malargüe in Argentina, joined two other 35 m deep−space antennas at New Norcia (DSA1) in Australia (completed in 2002) and Cebreros (DSA2) in Spain, (completed in 2005) to form the European Deep Space Network. [7174] [7175]

On 19 May 1975, a ground station at Villafranca del Castillo, Spain, built for the International Ultraviolet Explorer satellite, was assigned to ESRO to support future ESA missions. Later that month, ESRO merged with ELDO to form ESA, and the Villafranca 15 m station became the kernel of Estrack. [7176]

ESTRACK has stations on three continents, all remotely operated from ESOC (European Space Operations Centre) in Darmstadt, Germany. The network is now tracking more than a dozen science and Earth observation missions, including Swarm, the Sentinels, Rosetta, Gaia and Mars Express.

On 18 August 2016, ESA's tracking station at New Norcia, Western Aus-

7173) "Science of friction: keeping things moving in space," ESA, Space Engineering & Technology, May 20, 2015, URL: http://www.esa.int/Our_Activities/Space_Engineering_Technology/Science_of_friction_keeping_things_moving_in_space

7174) ESA's Powerful new Tracking Station ready for Service," ESA, Dec. 14, 2012, URL: http://www.esa.int/Our_Activities/Operations/ESA_s_powerful_new_tracking_station_ready_for_service

7175) R.Maddè, P.M. Besso, J.de Vicente, P.Droll, S.Halté, M.Lanucara, M.Mercolino, S.Martí, M.Ramos, "DSA3 – The 3rd ESA Deep Space Station in Malargüe, Argentina," Proceedings of TTC 2013, 6th International Workshop on Tracking Telemetry and Command Systems for Space Applications, Darmstadt, Germany, Sept. 10−13, 2013

7176) "Four decades of tracking European spacecraft," ESA, May 18, 2015, URL: http://www.esa.int/Our_Activities/Operations/European_Space_Tracking_Estrack_network/Four_decades_of_tracking_European_spacecraft

tralia, hosting a 35 m diameter, 630 ton deep−space antenna, received signals transmitted by NASA's Cassini orbiter at Saturn, through 1.44 billion km of space. [7177)]
In April 2017, ESA is investing in a series of significant upgrades for its Malargüe station. The upgrades will be spread over two years and include a new main signal−processing system and the addition of a 26 GHz downlink that will enable high−speed data receipt from space. "This means our station at Malargüe will be able to download data from ESA's future Euclid mission, for example, at 150 Mbit/s, 15 times faster than today," says Michel Dugast, ESA's station engineer and project manager for the upgrade. "It will also support cornerstone ESA missions like ExoMars 2020, BepiColombo and Juice, as well as partner missions from Russia, the US and Japan, among others." [7178)]
In November 2017, ESA announced that it is transferring ownership of three ESA ground stations to other operators. The objective is to foster commercial competitiveness in Europe while focusing on its core aims, the agency has transferred ownership of several ground tracking stations for reuse by external organizations. By the end of 2017, ESA will have transferred three stations to national organizations in Spain and Portugal, who will take over the provision of satellite tracking services to a wide variety of commercial customers, including ESA, leaving the Agency free to focus on meeting the demanding technical requirements of its deep−space stations, in Spain, Argentina and Australia, and on operation of a select group of four other stations. [7179)]

ETALON ..... Russian passive satellite series for geodetic measurements, G.4

ETCs ..... Extraterrestrial Technological Civilizations

ETHZ ..... Eidgenoessische Technische Hochschule, Zürich (Swiss Federal Institute of Technology, Zürich)

ETHZ/IGP ..... ETHZ/Institute of Geodesy and Photogrammetry

ETL ..... Electrotechnical Laboratorium (of MITI, Japan)

ETRI ..... Electronic and Telecommunications Research Institute, Daejeon, Korea (since 1976, a non−profit government organization)

ETS ..... Engineering Test Satellite (NASDA technology series, Japan)

ETS ..... European Telecommunication Standard

ETSI ..... European Telecommunications Standards Institute (since 1988)

EU ..... European Union (formerly EC = European Community)

EUCREX ..... European Cloud and Radiation Experiment (campaign)

EUG ..... Europen Union of Geosciences (Strasbourg, France, since 1980)

EUGENIUS .... European Group of Enterprises for a Network of Information using Space. EUGENIUS is an association of European SMEs active in the geo−information sector that are cooperating to set up an open network of commercial EO services platforms in the frame of the EUGENIUS project co−funded by the European Commission as an innovation action of the H2020 (Horizon 2020) framework program. The objective is to share their know−how and address new regional and local customers – both public and private – in a cost−effective and sustainable way.

EUMETSAT .... European Organization for the Exploitation of Meteorological Satellites (Darmstadt, Germany, since 1986 − operational agency of the Meteosat and the future MetOp systems; EUMETSAT inherited the Meteosat program operation from ESA). EUMETSAT member states in 2014 are: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal,

7177) "The longest call," ESA, Aug. 18, 2016, URL: http://m.esa.int/spaceinimages/Images/2016/08/The_longest_call

7178) "ESA boosting its Argentine link with deep space," ESA, April 25, 2017, URL: http://www.esa.int/Our_Activities/Operations/Estrack/ESA_boosting_its_Argentine_link_with_deep_space

7179) "Transferring ownership of three ESA ground stations," ESA 16 November 2017, URL: http://m.esa.int/Our_Activities/Operations/Estrack/Transferring_ownership_of_three_ESA_ground_stations

Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

EUMETCast .... EUMETSAT data distribution system (a multi−cast system based on a client/server configuration). EUMETCast distributes data files using DVB (Digital Video Broadcast) to its user community

EurasSpace ..... EurasSpace GmbH, Munich; Euro−Asian Space venture between DASA of Germany and CASC (Chinese Aerospace Corp. of Beijing); builders of telecommunication satellites (Sinosat−1, etc.)

EURECA ..... European Retrievable Carrier (platform deployed and retrieved on Shuttle) L.5

EUREF ..... European Reference Frame (since 1987). EUREF is a sub−commission of IAG's (International Association of Geodesy) Commission X on Global and Regional Geodetic Networks. EUREF maintains an array of GPS permanent sites − the EUREF Permanent Network (EPN). About 100 GPS stations were part of the EUREF in 2000 (for interdisciplinary monitoring/investigations including geodynamics, sea level monitoring and GPS meteorology).

EURIMAGE ... European Consortium for Satellite Image Dissemination (Rome, Italy − a commercial data distributor. The consortium is made up by the following companies: SSC, MATRA, NRSC and Dornier)

EURISY ..... European Association for ISY [one of two ISY (International Space Year) organizers in Europe, see SAFISY] Paris, France (since 1989). EURISY is an independent non−governmental body, fostering collective actions for bridging space and society.

Eurockot ..... Eurockot Launch Services GmbH, Bremen, Germany. A joint venture company between Russia's Khrunichev and Germany's EADS Space Transportation (formerly DASA). The launcher is the Rockot vehicle, built by KhSC (Khrunichev Space Center), Moscow. Rockot is a modified version of Russia's SS−19 missile, a three−stage liquid−fueled launch vehicle. Eurockot maintains its launch facilities in Plesetsk, Russia. The first launch demonstration of a Rockot vehicle occurred on May 16, 2000 from Plesetsk with Simsat−1 and −2, two dummy payloads.

EUROLAS ..... European Laser Stations (ground network of SLR stations)

EUROPTO ..... A joint venture between EOS (European Optical Society) and SPIE (Society of Photo−Optical Instrumentation Engineering)

EuroSDR ..... European Organization of Spatial Data Research

Eurospace ..... The association of European space industry, Paris, since 1961

EUSAR ..... European SAR Conference (established in 1996, a conference is held on a 2−year basis)

EUSC ..... European Union Satellite Center (Torrejón de Ardoz, in the vicinity of Madrid, Spain, since 2001). EUSC is an agency of the Council of the European Union dedicated to the exploitation and production of information derived primarily from the analysis of Earth observation space imagery.

EUSI ..... European Space Imaging (Munich, Germany, since 2002), commercial distributor of high−resolution data. In April 2010, EUSI started operating EDAF (European Direct Access Facility) for the acquisition of WorldView−1/2 data. In 2013, EDAF is providing imagery of the following satellites: Ikonos, Quickbird, WorldView−1/2, GeoEye−1, and EROS−B. [7180)] EDAF is located at DLR, Oberpfaffenhofen and is jointly operated by EUSI and DLR.

EUSPA ..... European Union Agency for the Space Program (as of 28 April 2021). **EUSPA replaces and expands on the European Agency for Global Navi-**

7180) "European Space Imaging's optical satellite services help keep the seas safe and clean," July 11, 2013, URL: http://www.directionsmag.com/pressreleases/european−space−imagings−optical−satellite−services−help−keep−the−seas−safe−/339225

gation Satellite Systems (GSA) and evolve its mandate.EUSPA is located in Prague.

EUSIPCO ..... European Signal Processing Conference

Eutelsat ..... European Telecommunications Satellite Organization (international consortium). On July 2, 2001, Eutelsat became a private, liability−limited company, Eutelsat SA

EUV ..... Extreme Ultra Violet (spectral range), see also: XUV

EVA ..... Extravehicular Activity (Astronaut activity outside a space vehicle)

EVN ..... European VLBI Network (since 1980)

EXA ..... Ecuadorian Civilian Space Agency (Guayaquil, Ecuador, since Nov. 1, 2007)

Exolaunch ..... A German spinoff launch service provider of the Technical University of Berlin. Since its founding in 2013, Exolaunch has supported the deployment of over 100 satellites (in size from a CubeSat to a 110 kg microsatellite). Two well−known constellation startups, Spire Global and Iceye, are Exolaunch customers. [7181)]

EXOS ..... Exospheric Observations, ISAS program (M.12)

EXPERT ..... European eXPErimental Reentry Testbed (ESA research program, suborbital launch)

EXPRESSO .... Experiment for Regional Sources and Sinks of Oxidants (campaign)

F

FAA ..... Federal Aviation Administration (since 1958, regulatory agency for all civil aviation in the Department of Transportation, USA)

FACH ..... Fuerza Aerara de Chile (Chilenian Air Force)

FAGS ..... Federation of Astronomical and Geophysical Services

FAISAT ..... Final Analysis Inc. Satellite (E.3)

Fakel ..... EDB (Experimental Design Bureau) Fakel, Kaliningrad, Russia; manufacturer of EPS (Electric Propulsion Systems) and LPT (Liquid Propellant Thrusters), etc. – EDB Fakel is part of a joint venture named ISTI (International Space Technology, Inc.)

FAME ..... Full−sky Astrometric Mapping Explorer (US MIDEX mission)

FAO ..... Food and Agriculture Organization (of the UN)

FARE ..... Fluid Acquisition and Resupply Experiment (Shuttle)

FASat−Alfa .... Fuerza Aerea Satellite – Alfa (F.62.12)

FASINEX ..... Frontal Air−Sea Interaction Experiment (campaign)

FAST ..... Fast Auroral Snapshot Explorer (GSFC mission, M.25.2)

FAST ..... Five hundred meter Aperture Spherical Telescope. FAST is a Chinese radio telescope. It is the world's largest and most sensitive radio telescope and three times more sensitive than the Arecibo Observatory. FAST is managed by NAOC/CAS (National Astronomical Observatories/Chinese Academy of Sciences).
The FAST telescope will spend the coming decades exploring space and assisting in the hunt for extraterrestrial life. And once it commences operations in September 2016, the Chinese expect it will remain the global leader in radio astronomy for the next ten or twenty years. FAST is capable of forming a parabolic mirror. That will allow researchers a greater degree of flexibility. [7182)] — On September 25, 2016, the FAST telescope began operating in southwestern China. [7183)]
FAST uses a data system developed at ICRAR (International Center for Radio Astronomy) in Perth, Australia and at ESO (European

7181) Debra Werner, "Exolaunch plans ambitious launch campaign," SpaceNews, 11 February 2019, URL: https://spacenews.com/exolaunch−biggest−cluster/

7182) Matt Williams, "Now, Witness The Power Of This Fully Operational Radio Telescope!," Universe Today, July 7, 2016, URL: http://www.universetoday.com/129769/now−witness−power−fully−operational−radio−telescope/

7183) "China begins operating world's largest radio telescope," Gillian Wong, Sept. 25, 2016, URL: http://phys.org/news/2016−09−china−world−largest−radio−telescope.html

Southern Observatory) to manage the huge amounts of data it generates. The software is called NGAS (Next Generation Archive System), and will help astronomers using the telescope to search for rotating neutron stars and look for signs of extra−terrestrial life. The NGAS data system will help to collect, transport and store about 3 PB (Petabytes, 3 x 10^{15}) of information a year from the telescope. [7184)]

Figure 1622: An aerial photo of the FAST facility, released on Sept. 24, 2016, showing the FAST in Pingtang county in the southwestern province of Guizhou, China (image credit: Liu Xu, Xinhua News Agency)

FAST ..... Fore−Aft Scan Technique (radar)
FASTEX ..... Fronts & Atlantic Storm Track Experiment (campaign)
FATE ..... FIRST ATSR Tropical Experiment (campaign)
FBG ..... Functional Cargo Block (first element of ISS also referred to as Zarya)
FBG ..... Fiber Bragg Grating (a sensor system based on optical fibers). The low mass and volume, the multiplexing capability and the electromagnetic immunity are the key enablers for FBG sensor employment in satellite applications.
FCC ..... Federal Communications Commission (Washington, DC, USA)
FDE ..... Fault Detection and Exclusion [capability of GPS to: 1) detect a satellite failure which effects navigation; and 2) automatically exclude that satellite from the navigation solution]
FDDI ..... Fiber Distributed Data Interface
FDIR ..... Failure Detection, Isolation and Recovery (of an onboard subsystem or individual components)
FDMA ..... Frequency Division Multiple Access (access scheme)
FDP ..... Fluorescent Dye Particles (a tracer technique in lidar observations)
FEA ..... Fluid Experiment Apparatus (Shuttle)

7184) "Australian Technology Installed on Largest Single−Dish Radio Telescope,"Space Daily, Sept. 29, 2016, URL: http://www.spacedaily.com/reports/Australian_Technology_Installed_on_Largest_Single_Dish_Radio_Telescope_999.html

FEC ..... Forward Error Correction (data coding technique) FEC coding (also called channel coding) is a type of digital signal processing that improves data reliability by introducing a known structure into a data sequence prior to transmission or storage. FEC types: convolutional coding (since 1955), Viterbi decoding (since 1967), concatenated coding (since 1974), turbo coding (since 1993), etc.

FEEP ..... Field Effect Electric Propulsion

FEMA ..... Federal Emergency Management Agency. FEMA is an agency of the United States Department of Homeland Security, created in 1978.

FET ..... Field−Effect Transistor (JFET = Junction Field−Effect Transistor)

FET ..... Free Elliptical Trajectory (formation flying)

FF ..... Formation Flying (spacecraft)

FFG/ALR ..... Forschungsförderungsgesellschaft/Agentur für Luft− und Raumfahrt, Wien, Österreich.
Note: FFG is the "Austrian Research Promotion Agency", Vienna, Austria. The ALR (Aeronautics and Space Agency) is part of FFG (the funding/coordination agency of the Austrian Ministry, BMVIT), while ALR implements the Austrian aerospace policy and manages the various programs. As of April 2005, the former ASA (Austrian Space Agency) was renamed to ALR and integrated into FFG/ALR.

FFI ..... Norwegian Defense Research Establishment, Kjeller, Norway

FFSK ..... Fast Frequency Shift Keying (modulation technique)

FFT ..... Fast Fourier Transform [7185)]

FGAN ..... Forschungsgesellschaft für Angewandte Naturwissenschaften e.V. (German Defense Research Facility for Applied Science), Wachtberg near Bonn, Germany. FGAN was founded in 1955, it maintains three major institutes: 1) FHR (Research Institute for High−Frequency Physics and Radar techniques), 2) FHIE (Research Institute for Communication, Information Processing and Ergonomics), and 3) FOM (Research Institute for Optronics and Pattern Recognition).

FGGE ..... First GARP Global Experiment (campaign)

FhG ..... Fraunhofer Gesellschaft (in honor of Joseph von Fraunhofer, 1787 − 1826), a leading organization of applied research in Germany (HQ in Munich). FhG operates 47 research institutes in Germany with about 8500 employees. About 2/3 of FhG research is through contracts for industry and government. There are also FhG institutes in USA and Asia. Only a few institutes are listed here:

FhG/FIRST ..... Fraunhofer Gesellschaft/Institut für Rechnerarchitektur und Softwaretechnik (Institute of Computer Architecture and Information Technology), Berlin Adlershof, Germany

FhG/IAF ..... Fraunhofer Gesellschaft/Institut für Angewandte Festkörperphysik (development of detectors), Freiburg, Germany

FhG/IFU ..... Fraunhofer Gesellschaft/Institut für Atmosphären und Umweltforschung (Institute of Atmospheric and Environmental Research), Garmisch−Partenkirchen, Germany

FhG/IOF ..... Fraunhofer Gesellschaft/Institut für Angewandte Optik und Feinmechanik (Institute of Applied Optics and Precision Engineering), Jena, Germany

FhG/IPM ..... Fraunhofer Gesellschaft/Institut für Physikalische Messtechnik (Institute of Physical Measurement Techniques), Freiburg, Germany

FHT ..... Frequency Hopping Telemetry (a communication access method)

7185) Jean Baptiste Joseph Fourier (1768−1830) French mathematician (contemporary of Laplace, Lagrange, and Monge). Fourier was elected to the Académie des Sciences in 1817. Inventor of the Fourier series and transform. The Fourier transform is used in linear systems analysis, antenna studies, optics, random process modeling, probability theory, quantum physics, boundary−value problems, and in many other fields. The Fourier transform, a pervasive and versatile tool, is used in many fields of science as a mathematical or physical tool to alter a problem into one that can be more easily solved.

FIRAS ..... P. N. Lebedev Physical Institute of the Russian Academy of Sciences (RAS), Moscow. FIRAS was established in 1967 as part of IKI. Since 1991 it is named AKTs FIRAS (radio astronomy)
FIRST ..... Far Infrared Submillimeter Telescope (an astrophysics mission of ESA with a planned launch in 2007). FIRST was renamed to Herschel Space Observatory in 2002.
FID ..... Flame Ionization Detector
FIFE ..... First ISLSCP Field Experiment (campaign)
FILE ..... Feature Identification and Location Experiment (part of OSTA−1 payload on Shuttle STS−2 in Nov. 1981)
FIMR ..... Finnish Institute of Marine Research (Helsinki, Finland)
FINCH ..... Fresnel INcoherent Correlation Holography (a 3−D imaging technique invented by JHU/APL and Ben−Gurion University of the Negev)
FINDS ..... Foundation of the International Non−Governmental Development of Space (USA, created in 1997)
FIR ..... Far infrared: from about 10 − 1000 μm (note: 1000 μm = 1 mm)
FIRE ..... First ISCCP Regional Experiment (campaign)
FIRESCAN ..... Fire Research Campaign Asia−North (IGBP−IGAC−BIBEX campaign)
FIRESCHEME . Fire Information Systems Research in the Socio−Culture, History and Ecology, of the Mediterranean Environment (campaign)
FITS ..... Flexible Image Transport System format (a format of radio astronomy heritage developed in the 1970s by ESA and NASA. FITS is now (21st century) used to store data from many space missions.
FLA ..... Film Lens Antenna (a new antenna architecture)
FLINN ..... Fiducial Laboratories for an International Network (a global network supporting Crustal Dynamics Test Sites)
FLIR ..... Forward Looking Infrared (sensor).
Note: FLIR Systems Inc., with HQs in Wilsonville Oregon, specializes in the design and production of thermal imaging cameras, components and imaging sensors. Founded in 1978, the company produces thermal cameras and components for a wide variety of commercial and government applications. The company FLIR took its name from the acronym for FLIR (Forward Looking Infrared).
FLL ..... Frequency Locked Loop
FLTSATCOM ... Fleet Satellite Communications System (of DoD, USA). FLTSATCOM provides worldwide, high−priority UHF communications between naval aircraft, ships, submarines, and ground stations and between the Strategic Air Command and the national command authority network. Fully operational in January 1981, the FLTSATCOM constellation is being replaced by the UFO (UHF Follow−On) spacecraft.
FM ..... Frequency Modulation (modulation technique of the main carrier)
FMC ..... Forward Motion Compensation
FMCW ..... Frequency Modulation Continuous Wave (a radar measurement technique to obtain range information − a sequence of FMCW echoes contains both, range and Doppler information)
FMI ..... Finnish Meteorological Institute (Helsinki, Finland)
FMS ..... Flight Management System (avionics)
FNMOC ..... Numerical Meteorology and Oceanography Center (of US Navy) at Monterey, CA
FOA ..... Försvarets Forskningsanstalt (National Defense Research Establishment, Department of Information Technology, Linköpping, Sweden)
FOG ..... Fiber−Optic Gyroscope (an angular rate gyro)
FÖMI ..... Hungarian Remote Sensing Center, Budapest, Hungary
FOO ..... Flight of Opportunity

FOR . . . . . Field of Regard (total width of a ground imaging surface that is within the pointing potential of a sensor. Note: the FOV (or swath width) is always contained in the FOR)
FORTE . . . . . Fast On−Orbit Recording of Transient Events (LANL, C.18)
FOS . . . . . Fiber Optic Sensor
FOV . . . . . Field of View
FPA . . . . . Focal Plane Array (also: Focal Plane Assembly − detector assembly of an imager instrument)
FPGA . . . . . Field Programmable Gate Array
FR . . . . . Frame Relay (an IP transmission technique, the other is ATM)
FRAM . . . . . Ferroelectric Random Access Memory (a chip technology providing non−volatile storage)
FRAM . . . . . Flight Releasable Attachment Mechanism (ISS)
FRB . . . . . Fast Radio Bursts. FRBs were first detected in November 2012, but astronomers didn't know if FRB 121102 originated from within the Milky Way galaxy or from across the Universe. A concentrated search by multiple observatories around the world has now determined that the signals are coming from a dim dwarf galaxy about 2.5 billion light years from Earth. But astronomers are still uncertain about exactly what is creating these bursts. [7186)]
FREESTAR . . . . Fast Reaction Experiments Enabling Science, Technology, Applications & Research (Shuttle STS−107 Hitchhiker payload), see L.6
FREJA . . . . . Swedish Solar−Terrestrial Mission (M.13)
FSK . . . . . Frequency Shift Keying (modulation technique)
FSL . . . . . Femto−Second based Laser
FSS . . . . . Fixed Satellite Service. According to the ITU, FSS is defined as a radiocommunication service between Earth stations at given positions, when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas.
FSUE / RISDE . . Federal State Unitary Enterprise / Russian Scientific Institute of Space Device Engineering, Moscow, Russia (note: the Russian abbreviation of FSUE/RISDE is **RNIIKP**)
FSW . . . . . Fanhui Shei Weixing (Chinese satellite class to support both military and civilian Earth observation needs). FSW−3−2 was launched on Aug. 29, 2004
FTAM . . . . . File Transfer Access and Management (OSI File Transfer Method)
FTFPV . . . . . Flexible Thin−Film Photovoltaic (a solar cell technology)
FTIR . . . . . Fourier Transform Infrared (radiometer or spectrometer)
FTS . . . . . Fourier Transform Spectrometer
FUV . . . . . Far Ultraviolet (spectral region 90 − 125 nm)
FWG . . . . . Forschungsanstalt der Bundeswehr für Wasserschall und Geophysik (Kiel, Germany)
FWHM . . . . . Full−Width−Half−Maximum (of distribution curve)
FY . . . . . FengYun, Chinese meteorological satellite series, I.3
FZJ . . . . . Forschungszentrum Jülich (Germany, old name was KfA)
FZK . . . . . Forschungszentrum Karlsruhe (Germany, old name was KfK)
FZK/IMK . . . . . FZK (Forschungszentrum Karlsruhe)/Institut für Meteorologie und Klimaforschung (Institute of Meteorology and Climate Research)

G

Ga . . . . . Gallium (detector material)
GaAs . . . . . Gallium Arsenide (a material used for solar panels, for detectors, and for fast computer chips)
GaIn . . . . . Galileo Industries SA, located in Brussels, Belgium (a joint venture of Astrium, Alenia Spazio, and Alcatel Space, founded May 25, 2000) for

7186) Nancy Atkinson, "Source of Mysterious 'Fast' Radio Signals Pinpointed, But What Is It?," Universe Today, Jan. 4, 2017, URL: http://www.universetoday.com/132705/source−mysterious−fast−radio−signals−pinpointed/

	the development and manufacturing of Galileo satellites (European Radionavigation System). Note: In 2006, Galileo Industries SA was renamed to **ESNI** (European Satellite Navigation Industries)
$GaInP_2$	Gallium Indium Phosphide (solar cell type)
GaN	Gallium Nitride compound−based semiconductor (used in GaN photoconductive detectors, etc.). GaN works better at much higher voltages and temperatures than silicon or the widely−used gallium arsenide (GaAs). Its 'wide bandgap' nature means it can operate with high RF output power, low noise, or at high temperature – silicon electronics will not function beyond about 180°C but GaN will go on working at temperatures as high as 500 °C to 600 °C. Significantly for space, GaN is also inherently radiation−resistant. [7187]
GAC	Global Area Coverage (the term is used for AVHRR data of NOAA)
GAC	Global Aerospace Corporation (Altadena, CA)
GAF	Gesellschaft für Angewandte Fernerkundung, Munich (since 1985, German commercial distributor of Earth observation data, such as Resurs data, Landsat data, IRS−1C/D data (via EOSAT), representative of EURIMAGE and SPOT−IMAGE in Germany, distributor for SOVINFORMSPUTNIK data, Radarsat data distributor for Germany, etc.
GABLE	Global Atmospheric Backscatter Lidar Experiment (campaign)
GADACS	GPS Attitude Determination and Control Experiment (a GSFC GPS instrument package on Shuttle SPARTAN)
GADFLY	GPS Attitude Determination Flyer (experiment on Lewis S/C)
GAGAN	GPS Aided Geo−Augmented Navigation system (SBAS of ISRO to provide coverage for the region of India)
GAIM	Global Analysis, Interpretation and Modeling (IGBP project)
GAIM	Global Assimilation of Ionospheric Measurements (model)
GALE	Genesis of Atlantic Lows Experiment (airborne campaign in 1986)
Galileo Avionica	Galileo Avionica Space Equipment B.U. (a Finemeccanica Company), Campi Bisenzio (Firenze), Italy
Galileo Industries	Galileo Industries SA is a European joint venture of the following companies(to define and build the Galileo System): Alenia Spazio of Rome, Alcatel Space of Paris, Astrium Ltd. of Stevenage, UK, and Astrium GmbH of Friedrichshafen, Germany.
GAME	GEWEX−related Asian Monsoon Experiment (campaign)
GAMES	Gravity and Magnetic Earth Surveyor (a NASA/GSFC mission)
GANDER	Global Altimeter Network Designed to Evaluate Risk (an SSTL, UK constellation planned to be launched in 2002)++++
GANE	GPS Attitude Navigation Experiment (NASA Shuttle payload)
GARP	Global Atmospheric Research Program (of WMO, since 1968)
GAS	Get−Away Special (Shuttle canisters)
GATE	GARP Atlantic Tropical Experiment (campaign)
GAUSS	Galaktische Ultraweitwinkel Schmidt System, Shuttle payload (Galactic super wide angle Schmidt system)
GAUSS	Galileo and UMTS Synergetic System (an integrated user terminal demonstrator capable of supporting the required navigation and communications functions)
GAUSS	Group of Astrodynamics of the University of Rome "La Sapienza", Rome, Italy. In 2011, after the closure of the School of Aerospace Engineering in Rome, the GAUSS team started a limited liability company (**GAUSS Srl**) which is following the more than ten−year old tradition of the Scuola di Ingegneria Aerospaziale.
GAW	Global Atmosphere Watch (WMO)
GBA	GAS Bridge Assembly (Shuttle payload)

7187) "From Blu−ray players to Earth−observing missions," ESA, Jan. 30, 2017, URL: http://m.esa.int/Our_Activities/Space_Engineering_Technology/Talking_technology/From_Blu−ray_players_to_Earth−observing_missions

GBAS ..... (GNSS) Ground Based Augmentation System
GBN ..... Graphene Boron Nitride (heterostructures) [7188]
GBRN ..... Global Baseline Radiation Network (WCRP)
GBT ..... Green Bank Telescope, located in Green Bank, West Virginia, USA. GBT is the largest steerable telescope in the world with a surface area of 100 m in diameter. GBT operates at meter to millimeter wavelengths (0.1−116 GHz operating range). It is used for astronomy about 6500 hours every year, with 2000–3000 hours per year going to high−frequency science. [7189]
GC ..... Gas Chromatograph
GCIP ..... GEWEX Continental−Scale International Project
GCM ..... General Circulation Model (atmosphere, ocean, climate, exchange at boundaries, global water cycle, etc.)
GCMD ..... Global Change Master Directory (at NASA/GSFC since 1989)
GCOM ..... Global Change Observation Mission (NASDA)
GCOS ..... Global Climate Observing System (of WMO, IOC, UNEP, and ICSU, established in 1992)
GCOS/JSTC .... GCOS/Joint Scientific and Technical Committee (Geneva, Switzerland)
GCP ..... Glow Cryoph Payload (DoD Shuttle payload)
GCP ..... Ground Control Point
GCR ..... Galactic Cosmic Rays (they are coming from outside the solar system − somewhere in the Milky Way or in others galaxies). These particles are charged and very energetic, with a typical energy range of 1 MeV to 1 GeV, and more rarely 1 TeV.
GCRP ..... Global Climate Research Program (of WMO)
GCTE ..... Global Change and Terrestrial Ecosystem (IGBP core program)
GDGPS ..... Global Differential GPS (NASA ground network for real−time orbit determination). The GDGPS network is managed by JPL and contains global and regional real−time data from hundreds of GPS sites and estimates their positions every second. It can detect ground motions as small as a few centimeters.
GE ..... General Electric Co., Fairchild, CT, USA
GE Americom .. GE American Communications Inc. (in 2001 GE Americom of Princeton, NJ, was acquired by SES Astra of Luxembourg)
Ge ..... Germanium (detector material)
GeGa ..... Germanium Gallium (detector)
GEIA ..... Global Emissions Inventory Activity (IGBP/IGAC focus 6 activity)
GEMINI ..... NASA program of the 1960s
GEMINUS ..... Galileo European Multimodal Integrated Navigation User Service
GeMS ..... Gemini Multi−conjugate adaptive optics System (in 2013 a new adaptive optics instrument at the Gemini Observatory Southern Operations Center in La Serena, Chile). The Gemini Observatory was built and is operated by a partnership of six countries including the United States, Canada, Chile, Australia, Brazil and Argentina.
GEMS ..... Global Environment Monitoring System (of UNEP)
GENESI−DR .. Ground European Network for Earth Science Interoperations − Digital Repositories (a single access point to Earth science data)
GENIE ..... Ground−based European Nulling Interferometer Experiment (using ESO's VLT in Chile (a collection of four 8 m diameter telescopes)
GENSO ..... Global Educational Network for Satellite Operations. GENSO, a project under auspices of ISEB (International Space Education Board), ESA's Education Office is one of the sponsors (other sponsors are CSA,

7188) L. Ju, J. Velasco Jr, E. Huang, S. Kahn, C. Nosiglia, Hsin−Zon Tsai, W. Yang, T. Taniguchi, K. Watanabe, Y. Zhang, G. Zhang, M. Crommie, A. Zettl, F. Wang, "Photoinduced doping in heterostructures of graphene and boron nitride," Nature Nanotechnology Letter, Vol. 9, April 2014, pp. 348−352, doi:10.1038/nnano.2014.60
7189) "Green Bank Telescope," Wikipedia, URL: https://en.wikipedia.org/wiki/Green_Bank_Telescope

NASA, CNES, and JAXA). GENSO is a software networking standard which allows each ground station on the network to communicate with non−local spacecraft and share data with the spacecraft controllers via the internet. The spacecraft use generally the AX25 protocol in telemetry.

GFRP ..... Glass Fiber Reinforced Polymer (a low−mass building material which has a very high strength to mass ratio)

GECCOS ..... GSOC Enhanced Command− and Control System for Operating Spacecrafts. GECCOS, based on SCOS−2000 Release 2.3 of ESA, is the new MCS (Mission Control System) of GSOC in 2014. [7190)]

GEO ..... Geostationary Earth Orbit [a geosynchronous orbit with zero inclination (orbit is in the equator plane and circular), the altitude is about 35,786 km]

GEO ..... Group on Earth Observations (created on July 31, 2003; an international intergovernmental initiative with the goal of furthering the creation of a comprehensive, coordinated, and sustained Earth observing system or systems). See also GEOSS

GEODA ..... Geodesic Dome Array Antenna (a smart, conformal and multiarray antenna which offers the opportunity to receive signals from several satellites simultaneously in S−band)

GEODE ..... GPS Enhanced Orbit Determination Experiment (a GSFC−developed flight navigation software package − an extended Kalman filter processor that incorporates accurate models of dynamics and measurements to optimize incorporation of GPS measurements). GEODE is a powerful real−time satellite orbit determination software suite.

GeoEye ..... On January 31, 2013, GeoEye Inc. merged with DigitalGlobe Inc. of Longmont, CO to become **DigitalGlobe,** effective as of Feb. 1, 2013. As of Jan. 2006, GeoEye is a commercial imaging company made up of former Orbimage of Dulles VA, and of Space Imaging of Thornton, CO (Orbimage acquired Space Imaging in 2005 and gave the merged company the new name of **GeoEye**). The new company has HQs in Dulles, VA.

GeoLITE ..... Geosynchronous Lightweight Technology Experiment (NRO funded communications satellite, launch May 18, 2001, design life of 9 years). GeoLITE features an advanced laser communications experiment (tests for 15 months).

GEO−IK ..... Russian S/C for solid Earth research, G.5

GEOINT ..... Geospatial Intelligence (the intelligence community uses this term to describe, assess, analyse, and visually depict physical features and geographically referenced activities on the Earth. GEOINT data sources include imagery and mapping data, whether collected by commercial satellite, government satellite, aircraft, or other means. GEOINT is a new discipline that builds on: imagery analysis, photo interpretation, cartography, geography, and much more.

GEOKhl RAN .. Vernadskiy Institute for Geochemistry and Analytical Chemistry of RAN, Moscow; since 1947, participation in programs: Luna, Venera, Salyut, MIR, Vega, Phobos, Voyager, Magellan, Mars Observer

GEOMAR ..... Research Center for Marine Geosciences (U. of Kiel, Germany)

GEONET ..... GPS Earth Observation Network System of Japan. The GSI (Geographical Survey Institute) of Japan established a permanent GPS observation station network, GEONET, covering the entire Japanese terrotory (including islands). GEONET provides monitoring services for crustal deformation. In 2012, GEONET consists of over 1,200 station network with an average average spacing of 25 km. Data from all sta-

7190) C. Stangl, B. Lotko, M.P. Geyer, M. Oswald, A. Braun, "GECCOS – the new Monitoring and Control System at DLR−GSOC for Space Operations, based on SCOS−2000," SpaceOps 2014, 13th International Conference on Space Operations, Pasadena, CA, USA, May 5−9, 2014, paper: AIAA 2014−1602

tions are downloaded and analyzed everyday to determine the three dimensional position of each station.

GEONETCast .. A near real−time, global network of satellite−based data dissemination systems designed to distribute spaceborne, airborne and in situ data, metadata and products to diverse communities (in particular among the meteorological community). As of 2006, GEONETCast is an initiative of GEOSS. NOAA, EUMETSAT and WMO are co−lead members in the organizational structure.

GEONS ..... GPS Enhanced Onboard Navigation System (autonomous real−time GPS performances of < 20 m are being achieved)

GEOS ..... Geostationary Satellite (ESA experimental program) G.6

GEOS ..... Geodetic Earth Orbiting Satellite, G.7

GEOS−3 ..... Geodynamics Experimental Ocean Satellite, G.7.3 (GEOS−3 is the first radar altimeter mission, end of mission in 1978)

GEOS&R ..... Geostationary Search and Rescue (system, a payload on GEO S/C)

GEOSAT ..... US Navy satellite (altimeter mission), G.8

GEOSS ..... Global Earth Observation System of Systems. GEOSS is an international framework to develop a 10−year implementation plan, a comprehensive, coordinated and sustained system that will help to better understand Earth systems, including weather, climate, oceans, geology, and ecosystems. The GEOSS document was signed at a summit in Tokyo, on April 25, 2004. Representatives of 47 countries and more than a dozen international organizations (UN, ESA, EC, ISCU, WMO, etc.) were present at the GEO (Group on Earth Observations) summit, signing the document (the finalization of a draft implementation plan). In this context: EuroGEOSS (European approach to GEOSS) is the European contribution of GEOSS funded by the EU.

GEOTAIL ..... Japanese (ISAS) mission to study the structure and dynamics of the geomagnetic tail (part of ISTP), M.15

GEOWARN .... Global Emergency Observation Warning and Relief Network (in planning phase by NASA/MSFC, etc.)

GER ..... Geophysical & Environmental Research Corp. (Millbrook, NY, USA)

GEWEX ..... Global Energy and Water Cycle Experiment (WMO program, since 1988, − to observe and model the hydrologic cycle and energy fluxes in the atmosphere, and at the land and ocean surface)

GFLOPS ..... Billion Floating Point Operations per Second (10^9 − a measure of computer processing power)

GETEX ..... German Technology Experiment on ETS VII (1999)

GFO−1 ..... Geosat Follow−On (Satellite), G.9

GFOI ..... Global Forest Observations Initiative (an initiative of GEO)

GFSK ..... Gaussian Frequency Shift Keying (modulation technique)

GFU ..... Geophysical Institute of the Academy of Sciences of the Czech Republic, Prague

GFZ ..... GeoForschungsZentrum (Potsdam, Germany, since 1992). Note: A renaming of GFZ took place on June 17, 2008. The new name is: **Helmholtz−Zentrum Potsdam Deutsches GeoForschungsZentrum GFZ (German Research Center for Geosciences)**

GGN ..... Global GPS Network (of NASA, consisting of more than 60 dual−frequency GPS geodetic reference stations)

GGOS ..... Global Geodetic Observing System (since 2003). GGOS is the official component (observing system) of IAG (International Association of Geodesy)

GGS ..... Global Geospace Science (US program within ISTP with two spacecraft: Wind and Polar)

GGSE ..... Gravity Gradient Stabilization Experiment. A technology satellite series (GGSE−1 to GGSE−5) launched by the US military (NRL of DoD) from Vandenberg AFB aboard Thor Agena−D rockets. GGSE−1 (39 kg mass): launch Jan. 11, 1964 into a 900 km altitude orbit

with an inclination of 69.9°; GGSE−2 and GGSE−3 (each S/C of 4 kg mass): launch March 9, 1965; GGSE−4 and −5 (each S/C of 4 kg mass): launch May 31, 1967

GGTS−1 ..... Gravity Gradient Test Satellite−1 (of the USAF was launched June 16, 1966 from Cape Canaveral)

GFW ..... Global Forest Watch. GFW is a online forest monitoring and alert system (started in Feb. 2014) that empowers people everywhere to better manage forests. GFW is an initiative of WRI (World Resources Institute), with partners including Google, USAID, ESRI, University of Maryland, etc. The forest change data have been used to measure global deforestation rates and to detect and monitor illegal clearing activity, primarily in Indonesia.

GHCC ..... Global Hydrology and Climate Center (at NASA/MSFC, Huntsville)

GHCD ..... Growth Hormone Crystal Distribution (Shuttle experiment)

GHG ..... Greenhouse Gas. GHG is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

GHRSST ..... Group for High Resolution Sea Surface Temperature [7191)]

GIAC ..... GPS Interagency Advisory Council

GIE ..... Gridded Ion Engine (electric propulsion)

GIF ..... Graphics Interchange Format of Compuserve (8−bit color format, used in HTML, etc.)

GIM ..... Global Integration and Modeling (IGBP/IGAC focus 6 activity)

GIMEX ..... Greenland Ice Margin Experiment (campaign)

GIOVE ..... Galileo In−Orbit Validation Element (a 2 S/C mission of ESA, GIOVE−A is being built by SSTL, GIOVE−B is being built by Galileo Industries)

GIPME ..... Global Investigation of Pollution in the Marine Environment

GIS ..... Geographic Information System (an archive in particular for forestry data)

GISP ..... Greenland Ice Sheet Project

GISS ..... Goddard Institute for Space Studies (New York, NY, since 1961 − a NASA/GSFC facility at Columbia University)

GIST ..... Globalizing and Internationalizing ORS Standards and Technology (a DoD program that allows international collaboration to develop ORS standards)

GISTDA ..... Geo−Informatics and Space Technology Development Agency, Bangkok, Thailand (since 2000)

GKSS ..... Gesellschaft für Kernergieverwertung in Schiffbau und Schiffahrt (Geesthacht, Germany)

GLAS ..... Geoscience Laser Altimeter System (previously GLRS)

GLAST ..... Gamma−ray Large Aerea Space Telescope (NASA mission), Note: NASA renamed the GLAST mission to "Fermi Gamma−ray Space Telescope" as of August 26, 2008

GLIS ..... Global Land Information System (an online land data directory guide, a public information system operated by USGS at EROS Data Center)

Glavkosmos ..... Russian space organization agency with the objective to develop the commercial side of space activities (created in 1985)

GLO ..... Glow Experiment (Shuttle payload)

GLOBE ..... Global Backscatter Experiment (campaign)

GLOBEC ..... Global Ocean Ecosystem Dynamics (since 1991). GLOBEC is one of 9 core programs of IGBP (International Geosphere−Biosphere Pro-

7191) https://www.ghrsst.org/ghrsst−science/what−is−ghrsst/

gram), an interdisciplinary scientific activity established and sponsored by the International Council for Science (ICSU).

GLOBSAT ..... Proposed Earth Observation Satellite by the French Earth Science Community.

GlobWave ..... The ESA GlobWave project is a three year initiative funded by the EESA in collaboration with CNES to service the needs of satellite wave product users across the globe. Led by Logica UK, with support from CLS, Ifremer, SatOC and NOC, the project offers a one stop for satellite data on ocean waves.

GLOCARB ..... Global Tropospheric Carbon Dioxide Network (IGBP/IGAC program)

GLOCHEM .... Global Atmospheric Chemistry Survey (IGBP/IGAC program)

GLOMR ..... Global Low Orbiting Message Relay (DARPA S/C flown on STS−61A)

GLONASS ..... Global Orbiting and Navigation Satellite System (USSR), J.4, GLONASS (GLObal'naya NAvigatisionnay Sputnikovaya Sistema)

GLONET ..... Global Tropospheric Ozone Network (IGBP/IGAC program)

GLOSS ..... Global Sea Level Observing System (of IOC)

GLRS ..... Geoscience Laser Ranging System (EOS Sensor), renamed in 1992 GLAS = Geoscience Laser Altimeter System

GLS ..... GBAS Landing System

GMD ..... Geomagnetic Disturbance. A GMD occurs when a solar storm on the sun's surface send electrically charged particles toward Earth, where they interact with Earth's magnetic field.

GMDSS ..... Global Maritime Distress and Safety System. GMDSS is an internationally agreed−upon set of safety procedures, types of equipment, and communication protocols used to increase safety and make it easier to rescue distressed ships, boats and aircraft.

GMES ..... Global Monitoring for Environment and Security (European initiative).

Copernicus is the new name of the European Commission's Earth Observation Programme, previously known as **GMES** (Global Monitoring for Environment and Security). The new name was announced on December 11, 2012, by EC (European Commission) Vice−President Antonio Tajani during the Competitiveness Council.

In the words of Antonio Tajani: "By changing the name from GMES to Copernicus, we are paying homage to a great European scientist and observer: Nicolaus Copernicus (1473−1543). As he was the catalyst in the 16th century to better understand our world, so the European Earth Observation Programme gives us a thorough understanding of our changing planet, enabling concrete actions to improve the quality of life of the citizens. Copernicus has now reached maturity as a programme and all its services will enter soon into the operational phase. Thanks to greater data availability user take−up will increase, thus contributing to that growth that we so dearly need today."

Table 983: Copernicus is the new name of the former GMES program [7192)]

GMS ..... Geostationary Meteorological Satellite, Operational Program of JMA (Japan Meteorological Agency), H.3

GMSEC ..... GSFC Mission Services Evolution Center. A NASA message bus architecture established in 2001 to coordinate ground and flight data systems development and services at GSFC. The GMSEC architecture provides a successful application of generalized principles of multi−use cross−compatibility to the data system domain, and specifically to mission operations. By concentrating on the interface and normalizing the capabilities of multiple middleware products, GMSEC allows the incorporation of software components and applications in an efficient and rapid fashion, enabling the acquisition of "new" data as quickly as

7192) "Copernicus: new name for European Earth Observation Programme," European Commission Press Release, Dec. 12, 2012, URL: http://europa.eu/rapid/press−release_IP−12−1345_en.htm

the application is ready or as quickly as it can be acquired from the commercial market as a COTS product.

GMSK ..... Gaussian Minimum Shift Keying (modulation technique)

GMT ..... Giant Magellan Telescope. A next generation of giant earth−based telescopes that promises to revolutionize our view and understanding of the universe. The GMT project consists of an international consortium of leading universities and science institutions. Founders come from the U.S., Australia, Brazil, and Korea, with Chile as the host country. [7193) 7194)]

The GMT will be constructed in the Las Campanas Observatory in Chile at an altitude of 2516 m. Commissioning of the telescope is scheduled to begin in 2022. The GMT has a unique design that offers several advantages. It is a segmented mirror telescope that employs seven of today's largest stiff monolith mirrors as segments. Six off−axis 8.4 m segments surround a central on−axis segment, forming a single optical surface of 24.5 m in diameter with a total collecting area of 368 m^2. The GMT ground breaking ceremony took place in November 2015.

The GMT will enable astronomers to characterize planets orbiting other stars, witness early formation of galaxies and stars, and gain insight into dark matter and dark energy. GMT's findings will also likely give rise to new questions and lead to new and unforeseen discoveries.

GMTI ..... Ground Moving Target Indication

GMV ..... GMV Aerospace and Defence S. A. is a subsidiary of the holding group Grupo Tecnológico e Industrial GMV S. A. (Grupo GMV). Grupo GMV is a fully Spanish, privately owned company established in 1984 (HQ in Madrid).

GMVA ..... Global Millimeter VLBI Array. GMVA is the highest angular resolution imaging interferometer currently available as a common user facility. It is capable of angular resolutions on the order of 40 microarcseconds (mas). Currently 14 stations in the United States and Europe participate in global 3 mm VLBI observations. The GMVA is used for continuum and spectroscopic imaging, probing the central regions of active galaxies and the origin of jets as these regions are typically not observable at longer wavelengths due to synchrotron self−absorption. [7195)]

GMW ..... GeoMetWatch, Las Vegas, Nevada (US commercial company)

GNB ..... Generic Nanosatellite Bus (a bus developed at UTIAS/SFL, Toronto, Canada.

GN&C ..... Guidance Navigation and Control

GNET ..... Greenland GPS Network (a network of GPS stations (∼ 50) stationed around the Greenland ice sheet on bedrock to detect changes in uplift along most of the Greenland coast). [7196)]

GNSS ..... Global Navigation Satellite System (a future civil satellite navigation system)

GNSS−R ..... GNSS−Reflections. Refers to reflected GNSS (signals) observables from the open ocean or land surface (to be measured by an airborne or spaceborne instrument). The GNSS−R signals may be used in a wide field of applications (altimetry, soil moisture, sea state monitoring, etc.).

GNSS−RO ..... GNSS−Radio Occultation. GNSS−RO is a satellite remote sensing technique that uses GNSS (e.g. GPS, Galileo, etc.) measurements re-

7193) "Giant Magellan Telescope," URL: http://www.gmto.org/overview/

7194) Evan Gough, "Rise of the Super Telescopes: The Giant Magellan Telescope," Universe Today, 27 Feb. 2017, URL: http://www.universetoday.com/133648/rise−super−telescopes−giant−magellan−telescope/

7195) Jeffrey A. Hodgson, Thomas P. Krichbaum, Alan P. Marscher , Svetlana G. Jorstad, Ivan Marti−Vidal, Michael Bremer, Michael Lindqvist, Pablo de Vicente, Anton Zensus, "The latest results from the Global mm−VLBI Array," Proceedings of Science, 2012, URL: https://arxiv.org/ftp/arxiv/papers/1407/1407.8112.pdf

7196) Pam Frost Gorder, "GPS Can Now Measure Ice Melt, Change In Greenland Over Months Rather Than Years," Space Daily, July 26, 2012, URL: http://www.spacedaily.com/reports/GPS_Can_Now_Measure_Ice_Melt_Change_In_Greenland_Over_Months_Rather_Than_Years_999.html

ceived by a low−Earth orbiting satellites to profile the Earth's atmosphere and ionosphere with high vertical resolution and global coverage.

GNU Radio .... GNU Radio is a free software toolkit for learning about, building, and deploying SDRs (Software Defined Radios). [7197]

GOALS ..... Global Ocean−Atmosphere−Land System (CLIVAR subprogram)

GOBEX ..... Gotland Basin Experiment (campaign)

GOCE ..... Gravity Field and Steady−State Ocean Circulation Experiment (core mission in ESA's Earth Explorer Program)

GOCINA ..... Geoid and Ocean Circulation In the North Atlantic [GOCINA is an EU FP5 project with the objectives: a) determination of the geoid, b) determination of the mean sea surface, and c) determination of the mean dynamic topography. Use of Envisat and GOCE data]

GODAE ..... Global Ocean Data Assimilation Experiment (since 1997) GODAE aims at to demonstrate the benefits and utility of operational ocean products for a wide range of applications. GODAE requires high spatial and temporal resolution SST (Sea Surface Temperature) data in real−time to properly constrain the upper ocean circulation and thermal structure. The GHRSST−PP (Group for High−Resolution SST−Pilot Project) of GODAE was established to address this need.

GOES ..... Geostationary Operational Environmental Satellite (NOAA Series), H.4

GOFS ..... Global Ocean Flux Study (program)

GOIN ..... Global Information Network (a cooperative project between the USA and Japan for the exchange of observational data, initiated in 1993)

GOLD ..... Gossamer Orbit Lowering Device

GoLIVE ..... Global Land Ice Velocity Extraction. The GoLIVE project of NASA is a collaboration between scientists from the University of Colorado, the University of Alaska, and NASA's Jet Propulsion Laboratory in Pasadena, California. It aims to better understand how ice flow is changing worldwide — and its impact on sea level. [7198]

GOMAS ..... Geostationary Observatory for Microwave Atmospheric Sounding (a proposed project of ESA)

GOMS ..... Geostationary Operational Environmental Satellite (Russian geostationary meteorological satellite series (at longitude 76 deg. East), H.5

GomSpace ..... GomSpace Group AB is a Sweden−based company. It operates as a parent of GomSpace ApS, which is a Denmark−based company in Aalborg. GomSpace develops high−tech nanosatellites for its customer base. — As of Sept. 2017, the Government of Luxembourg signed a MoU with GomSpace to develop a company in the Grand Duchy, owned by GomSpace. By 2021, the company intends to employ up to 50 full time employees in the Grand Duchy. [7199]

Goonhilly ..... Goonhilly EarthStation is a commercial tracking station in Cornwall, UK. As of 2018, the tracking station will be upgraded to provide Europe's first deep−space services on a commercial basis. Under the project, the station's GHY−6 antenna, built in 1985 and featuring a 32 m diameter dish, will be upgraded to provide high bit−rate data links for missions far from Earth – typically exceeding 2 million km. These include not only missions to our somewhat closer Moon, but also to the asteroids and planetary destinations such as Mars. [7200]

GOOS ..... Global Ocean Observing System [a joint program of IOC (Intergovernmental Oceanographic Commission), WMO (World Meteorological Organization), UNEP (United Nations Environmental Program), and

7197) http://gnuradio.org/redmine/wiki/gnuradio

7198) Kate Ramsayer, "NASA/USGS Provide Global View of Speed of Ice," NASA/JPL, Dec. 12, 2016, URL: http://www.jpl.nasa.gov/news/news.php?feature=6698

7199) "New Space Activities Will Come to Luxembourg ... MOU With GomSpace," Satnews Daily, Sept. 27, 2017, URL: http://www.satnews.com/story.php?number=1965621751

7200) "Goonhilly," ESA, 22 Feb. 2018, URL: http://m.esa.int/spaceinimages/Images/2018/02/Goonhilly2

the International Council for Science]. GOOS integrates real−time in−situ and satellite observations with numerical model to form model−based information products for a variety of applications. The initial GOOS was formed in 1991. European GOOS (EuroGOOS) was formed in 1994 as one of several regional GOOS activities.

GOP . . . . . Groups of Pictures. In MPEG encoding, a GOP specifies the order in which intra−frames and inter frames are arranged. The GOP is a group of successive pictures within an MPEG−coded video stream.

GOPS . . . . . Giga Operations Per Second

GORC . . . . . Global Ocean Carbon Research Program

. . . . . General Organization of Remote Sensing (since 1986, Damascus, Syria), Space Agency of Syria

GOS . . . . . Global Observing System (WWW)

GOSAMR−1 . . . Gelatin of Sols: Applied Microgravity Research−1 (Shuttle experiment)

GOSIP . . . . . Government Open System Interconnection Profile (US Government Standard, GOSIP is a subset of OSI)

GOSNIIAS . . . . . State Research Institute of Aviation Systems (Moscow, Russia)

GP−B . . . . . Gravity Probe−B Relativity Mission (G.12)

GPCC . . . . . Global Precipitation Climatology Center, (since 1988, located at the German Weather Service (DWD) in Offenbach, Germany, collection of raingage−measured monthly precipitation data, worldwide)

GPCP . . . . . Global Precipitation Climatology Project (by ICSU and WMO)

GPM . . . . . Global Precipitation Measurement (a NASA/NASDA follow−on multi−satellite constellation mission to TRMM with international cooperation, in planning stage as of 2001)

GPRS . . . . . General Packet Radio Services [A packet−based wireless communication service that promises data rates from 56 − 114 kbit/s and continuous connection to the Internet for mobile phone and computer users. The higher data rates permit users to take part in video conferences and interact with multimedia Web sites and similar applications using mobile handheld devices as well as notebook computers. GPRS is based on Global System for Mobile (GSM) communication and will complement existing services such circuit−switched cellular phone connections and the Short Message Service (SMS)].Phase 1 of GPRS became commercially available in 2000/1.

GPS . . . . . Global Positioning System, J.5

GPS DTO . . . . . GPS Development Test Objective (Shuttle payload)

GRACE . . . . . Government Rideshare Advanced Concepts Experiment. GRACE is an auxiliary payload aboard the NROL−55 mission.

GRACE . . . . . Gravity Recovery and Climate Experiment

GRAS . . . . . Ground Regional Augmentation System (of Australia)

GRAS . . . . . GNSS Receiver for Atmospheric Sounding (receiver on MetOp, etc.)

GRB . . . . . Gamma Ray Burst (GRBs represent the strongest radiative energy phenomena in the universe known to astronomers)

GreDom Insert . . GreDom Insert is an invention in the area of satellite construction by the University of Applied Sciences and Arts Northwestern Switzerland FHNW, with support from its industrial partner RUAG Space. The invention has been awarded the 2016 YPSOMED Innovation Prize—the automation process subsequently developed on the basis of this invention contributed to RUAG Space acquiring a major project. [7201)]
Based on the “GreDom insert”, RUAG Space then designed and built the “Automated Potting Machine.” This automatically cuts panels to size, drills holes, applies adhesive and places the inserts into the panel with a high degree of precision. The manufacturing time for satellite

7201) ”GreDeom−Insert From RUAG Space Is A Real Winner,” Satnews Daily, Jan. 13, 2017, URL: http://www.satnews.com/story.php?number=990440514

structures can thus be significantly reduced, enabling considerable cost savings.
As a consequence, RUAG Space was a awarded a contract by Airbus DS to construct the OneWeb satellite structure. For this major project, a total of 900 satellites should provide blanket broadband Internet by the end of 2020 and this is the largest series production in the history of satellite construction.

GRDC ..... Global Runoff Data Center (Bundesanstalt für Gewässerkunde – Federal Institute of Hydrology, Koblenz, Germany). GRDC operates under the auspices of WMO with funding provided by Germany.

GRGS ..... Groupe de Recherches de Géodésie Spatiale (Grasse and Toulouse, France)

GRID ..... (UNEP) Global Resources Information Database (at EDC) for the purpose of analyzing environmental data

GRIP ..... Greenland Icecore Project

GRO ..... Global Radio Occultation (technique)

GRSS ..... Geoscience and Remote Sensing Society

GS4EO ..... Ground Segment for Earth Observation (Deimos), suite of state–of–the–art products. These products are the result of the know–how gathered for more than a decade of work for ESA.

GSA ..... GNSS Supervisory Agency (Europe). GSA is a legal entity to sign Galileo contracts and oversee the Galileo infrastructure and operations on behalf of the public interest. Also management of signal certification and system security. GSA is headquartered in Prague, Czech Republic.

GSC ..... Geological Survey of Canada

GSCB ..... Ground Segment Coordination Body (an ESA group established in 2005 and composed of member–state agencies managing EO data ground segments). A first task of GSCB is to coordinate the ground segment and data management of the most important European and Canadian EO missions during the lifetime of Copernicus (formerly GMES). A main objective is the harmonization of the ground segments at the European level (joint interoperability standards for seamless and harmonized access to heterogeneous EO datasets).

GSCDA ..... GMES Space Component Data Access (also spelling of GSC–DA). GSCDA is an ESA project started in 2007 to provide standard interface services to data archives.

GSD ..... Ground–Sampling Distance (spatial resolution).

GSE ..... GMES Services Element (ESA)

GSFC ..... Goddard Space Flight Center in Greenbelt, MD, USA. GSFC was named in honor of the US physicist Robert H. Goddard (1882–1945), a pioneer of modern rocket propulsion (along with Konstantin Eduordovich Tsiolkovsky of Russia and Hermann Oberth of Germany)

GSI ..... Geological Survey Institute (Japan)

GSICS ..... Global Space–based Inter–Calibration System. GSICS is an international collaborative effort initiated in 2005 by WMO and the CGMS to monitor and harmonize data quality from operational weather and environmental satellites of the Global Observing System (GOS). [7202)]

GSLV ..... Geosynchronous Satellite Launch Vehicle (a three–stage ISRO launcher, since 1999, of PSLV heritage)

GSM ..... Global System for Mobiles (digital cellular standard of ETSI, 2nd generation). The GSM network is terrestrial and practically global in its coverage. In 1989, GSM responsibility was transferred to ETSI (European Telecommunication Standards Institute).

GSO ..... Geosynchronous Orbit [refers to a S/C with an orbital period matching the rotation rate of the Earth (sidereal day), the orbital plane and shape are of general nature)

7202) http://gsics.wmo.int/

GSOC ..... German Space Operations Center (DLR facility in Oberpfaffenhofen, Germany)
GSS ..... Gatineau Satellite Station (since October 1985). GSS is owned by NRCan (Natural Resources Canada) and operated by CCRS (Canada Centre for Remote Sensing).
GSSAC ..... German Space Situational Awareness Center (since 2009)
GSSAP ..... Geosynchronous Space Situational Awareness Program (U.S. Air Force Space Command (AFSPC)
GSTB ..... Galileo System Test Bed – a ground segment and a space segment (with regard to the space segment, it refers to 2 satellites of the European Galileo navigation system). One test satellite, GSTB–V2/A, is being built by SSTL, UK; the other S/C, GSTB–V2/B, is being built by the Galileo Industries consortium. The GSTB is subdivided into two main development steps, Version 1 (V1) and Version 2 (V2). The V2 part deals with the satellites, while the V1 part deals with such issues as integrity, orbit determination and time synchronization, algorithms, etc.
GSTDN ..... Ground–Station Tracking and Data Network (old NASA network)
GSTP ..... General Support Technology Program (ESA)
G/T ..... (receiver) Gain / (noise) Temperature
GTCP ..... Global Tropospheric Chemistry Program (NSF program)
GTE ..... Global Tropospheric Experiment (a NASA program)
GTE/CITE ..... Global Tropospheric Experiment/Chemical Instrumentation Test and Evaluation (campaigns)
GTO ..... Geosynchronous Transfer Orbit
GTOS ..... Global Terrestrial Observing System (WMO, UNESCO, IOC, FAO, ICSU)
GTRF ..... Galileo Terrestrial Reference Frame (coordinate system of the European radionavigation system)
GTRI ..... Georgia Tech Research Institute, Atlanta, GA
GTS ..... Global Telecommunications System (of the World Meteorological Organization (WMO)
GUI ..... Graphical User Interface
GULFEX ..... Gulf Experiment (campaign)

H

H_2O ..... Water
H_2O_2 ..... Hydrogen peroxide
HAALDM ..... High Accuracy Absolute Long Distance Metrology
HALCA ..... Highly Advanced Laboratory for Communications and Astronomy (a SVLBI satellite of ISAS, Japan, Launch Feb. 12, 1997)
HALE ..... High Altitude Long Endurance (aircraft, also campaign)
HALE–UAV ... High Altitude Long Endurance – Unmanned Aerial Vehicle
HALO ..... High Altitude and LOng Range Research Aircraft (of DLR, Germany). HALO is based on a Gulfstream G 550 ultra–long range business jet.
HAPEX ..... Hydrologic and Atmospheric Pilot Experiment (campaign)
HAPS ..... High Altitude Pseudo–Satellites. HAPS are platforms that float or fly at high altitude like conventional aircraft but operate more like satellites – except that rather than working from space they can remain in position inside the atmosphere for weeks or even months, offering continuous coverage of the territory below.
HaRP ..... Hawaiian Rainbow Project (campaign)
Harris Corp. .... HQs in Melbourne FL., USA. In 2015, acquisition of Exelis Inc. Harris today is a proven leader in tactical communications, electronic warfare, avionics, air traffic management, space and intelligence, and weather systems. – In April 2019, Harris Corp. and L3 Technologies announced a merger. The name of the merged company will be '**L3 Harris Technologies, Inc.**' The merger is expected to close in mid–calendar year

2019. [7203]
On 1 July 2019, **L3Harris Technologies** announced the successful completion of the all−stock merger between Harris Corporation and L3 Technologies on June 29, 2019. Headquartered in Melbourne, Florida, L3Harris is the sixth largest defense company in the U.S., and a top 10 defense company worldwide – with approximately $17 billion in revenue and 50,000 employees, including 20,000 engineers and scientists. [7204]

HBr ..... Hydrogen bromide
HBT ..... Heflex Bioengineering Test (Shuttle)
HBT ..... Heterojunction Bipolar Transistor
HCMM ..... Heat Capacity Mapping Mission (NASA sensor), C.21
HCHO ..... (CH_2O) Formaldehyde
HCl ..... Hydrogen chloride
HCT ..... HgCdTe (detector type, see also MCT)
HDDT ..... High Density Digital Tape
HDP ..... Human Dimensions Programme (of ISSC)
HDT ..... High Density Tape
HDTV ..... High−Definition Television (a standard)
HDLC ..... High−Level Data Link Control (bit−oriented protocol)
HEASARC ..... High Energy Astrophysics Science Archive Center (NASA)
HEB ..... Hot Electron Bolometer (receiver type used in microwave spectrometers, etc.)
HEIC ..... Hubble European Space Agency Information Center. HEIC is a science communication office, established at the Space Telescope − European Coordinating Facility (ST−ECF) in Munich, Germany.
HELCOM ..... Helsinki Commission (since 1974, an intergovernmental organization of all countries surrounding the Baltic Sea to protect the Baltic Sea)
HELIOS−I ..... A European military optical reconnaissance satellite project (Earth observation) sponsored by France (78.9%), Italy (14.1%) and Spain (7%). Helios−IA was launched July 7, 1995. Helios−IB was launched Dec. 3, 1999 on an Ariane 4 vehicle from Kourou. Both satellites were built by MMS of Toulouse. Helios−IB, nearly an identical twin of Helios−IA, has a launch mass of 2544 kg (design life of 5 years, power = 2.2 kW). The Helios S/C bus is almost identical to the SPOT−4 platform. Attitude is measured by star sensors and two−axis gyros, actuators are reaction wheels and magnetic torquers. Both S/C are in a sun−synchronous orbit (altitude = 680 km, inclination =98°, period = 98 minutes), 180° apart to optimize coverage. The optical imaging system is referred to as **EPV** (Ensemble de Prise de Vues), built by Alcatel Space, it uses CCD line array detectors and provides a spatial resolution of about 1 m. On−board storage is provided by two digital tape recorders for each S/C, each with a capacity of 120 Gbit. Helios−IB has in addition a solid state memory of 9 Gbit. All imagery is encrypted and downlinked in X−band at 50 Mbit/s (TT&C encrypted in S−band at 2 kbit/s). CNES provides S/C operations from Toulouse. The Helios ground segment comprises three user centers at Creil (Italy), Madrid (Spain), and CPFH (Main Helios Center France). Imagery is received at ground stations of the three partner countries [Maspalomas (Spain), Colmar (France), and Lecce (Italy)]. [7205]
HELIOS−II .... Second generation of European military reconnaissance satellites (successor to Helios−1B) sponsored by France (DGA), Italy, Spain and

7203) Harris Corporation and L3 Technologies Stockholders Approve Merger," Satnews Daily, 4 April 2019, URL: http://www.satnews.com/story.php?number=632406790
7204) "L3Harris Technologies Merger Successfully Completed," 1 July 2019, URL: https://www.wescam.com/blog/l3harris−technologies−merger−successfully−completed/?gclid=EAIaIQobChMIorfSr5Lx5gIVyuR3Ch3G3g0JEAAYASAAEgIGPfD_BwE
7205) "Helios, Europe's eye in the sky," CNES Magazine, No 7, Nov. 1999

Belgium (S/C built by Astrium). As of 2002 two new Helios S/C are under construction, Helios−IIA and −IIB, with the first to be ready for launch in late 2004, if needed (each S/C has a mass of 4200 kg, EADS Astrium as prime contractor). The new EVP optical instrument of Alcatel features a higher spatial resolution and a higher spectral range (including an IR band) than the first generation instrument.

Helios ..... A NASA−sponsored aircraft, a prototype ultra−lightweight solar−electric flying wing. First test flight in Aug. 2001. Helios has a capability to serve as a platform for high−altitude environmental monitoring.

Helios−1 ..... A German space probe of DFVLR, launched Dec. 10, 1974 into a solar orbit.

Helios−2 ..... A German space probe of DFVLR, launched Jan. 15, 1976 into a solar orbit.

HELSTF ..... High Energy Laser Systems Test Facility [a US DoD national test facility at WSMR (White Sands Missile Range), NM, supporting laser research, development, test and evaluation. HELSTF was established in 1985 as a tri−service test and evaluation facility for all high energy laser work. MIRACL (Mid−Infrared Advanced Chemical Laser) is located at WSMR]

HEMT ..... High Electron Mobility Transistor (receiver type for microwave spectrometers)

HEO ..... Highly−elliptical Earth Orbit

HERCULES .... Hand−held, Earth−oriented, Real−time, Cooperative, User−friendly, Location−targeting and Environmental System (Shuttle experiment)

HES ..... Hitchhiker Ejection System. HES provides a capability to eject a payload from a GAS (Get Away Special) canister on Shuttle.

HES ..... Hyperspectral Environmental Suite (GOES−R instrument in study/planning phase by NOAA and NASA) Note: the former name of HES was ABS (Advanced Baseline Sounder)

HESS ..... High−Latitude Ecosystems as Sources and Sinks of Trace Gases (IGBP/IGAC)

HETE ..... High Energy Transient Experiment (MIT payload, built by AeroAstro of Herndon, VA)

HEVC ..... High Efficiency Video Coding. HEVC is a video compression standard, under development by the ISO/IEC Moving Picture Experts Group (MPEG) and ITU−T Video Coding Experts Group (VCEG).

HEW ..... Half Energy Width (of the point response), an angular resolution measurement in X−ray observations.

HF ..... High Frequency (3 − 30 MHz band)

HF ..... Hydrogen fluoride

HgCdTe ..... Mercury Cadmium Telluride (mercadtelluride, a detector material) also referred to as MCT and HCT

HgI_2 ..... Mercury Iodine (a detector material)

HGF ..... Hermann von Helmholtz−Gemeinschaft Deutscher Forschungszentren, Bonn (named after Hermann von Helmholtz, 1821 − 1894). Sixteen German research centers are members of HGF, an association with the objective to coordinate and foster interdisciplinary research, to share expensive technical equipment of their infrastructure, to cooperate on long−term system solutions, and to transfer new technology for industrial applications. All HGF centers are government−funded, they employ a total of about 23,000 persons with a budget of 3.6 billion DM in 1996. The following institutions are members of HGF:
AWI (Alfred−Wegener−Institut für Polar− und Meeresforschung, since 1980, Bremerhaven and Potsdam)
DESY (Deutsches Elektronen Synchrotron), Hamburg, since 1959
DKFZ (Deutsches Krebsforschungszentrum), Heidelberg, since 1964
DLR (Deutsche Forschungsanstalt für Luft− und Raumfahrt)

FZK (Forschungszentrum Karlsruhe)
GBF (Gesellschaft für Biotechnologische Forschung, Braunschweig)
GFZ (GeoForschungsZentrum Potsdam, since 1992)
GKSS (Gesellschaft für Kernergieverwertung in Schiffbau und Schiffahrt, Geesthacht)
GMD (Gesellschaft für Mathematik und Datenverarbeitung, since 1968, German National Research Center of Information Technology, St. Augustin, and Darmstadt)
GSF (Forschungszentrum für Umwelt und Gesundheit, Neuherberg)
GSI (Gesellschaft für Schwerionenforschung, Darmstadt)
HMI (Hahn–Meitner–Institut, Berlin)
IPP (Max–Planck–Institut für Plasmaphysik, Garching)
KFA (Forschungszentrum Jülich)
MDC (Max–Delbrück–Zentrum für Molekulare Medizin, Berlin)
UFZ (Umweltforschungszentrum Leipzig–Halle)

HH ..... Hitchhiker (a Shuttle flight carrier system offered by NASA for small payloads, offering the provision of extended functional features) HH–S stands for 'sidewall mounting,' HH–C stands for 'cross bay mounting'

HH ..... Horizontal transmit – Horizontal receive polarization

HILAT ..... High Latitude Satellite (a US military satellite of the USAF with a launch date of Jun. 27, 1983 from VAFB, 754 km perigee, 818 km apogee, inclination = 82°). HILAT was a space technology mission. AIM (Auroral Ionospheric Mapper) built by APL was one of its sensors.

HIP ..... Heterojunction Internal Photoemission (detector technology)

HiPER ..... High Power Electric propulsion: a Roadmap for the future (a project co–funded by the EU within the FP7 program). Three different EP concepts are considered as the candidates with the highest application potential: Hall Effect Thruster (HET), Gridded Ion Engines (GIE) and MagnetoPlasmaDynamic Thrusters (MPDT)

HIVAC ..... Highly Integrated Video Acquisition Chain. An ESA project with the objective to develop on the same die and based on a commercial technology: a) Front–end functions to accommodate CCD and APS detectors; b) Analog–to–Digital Conversion function; c) Digital Interfaces to a SpaceWire network. Within the framework of HIVAC, an ASIC is developed called VASP (Video Acquisition Signal Processor).

HMA ..... Heterogeneous Mission Access (a technique which is being implemented for the ground segment of the Copernicus (formerly GMES) program in Europe to accomplish coherent access to archives to support scientific exploitation like the Climate Change Initiative). HMA is being implemented by ESA, DLR, CNES, EUMETSAT, MDA (RADARSAT), INTA, etc.

HMI ..... Human Machine Interface

HNO_3 ..... Nitric acid

HO_x (HOx) ..... Odd hydrogen (OH, HO_2, H_2O_2)

HOCl ..... Hypochlorous acid

HOLOP ..... Holographic Optics Laboratory (Shuttle D2 mission)

HOST ..... HST Orbital Systems Test Platform (Shuttle payload)

HPA ..... Hosted Payload Alliance (since 2011, USA). The HPA is a satellite industry alliance whose purpose is to increase awareness of the benefits of hosted government payloads on commercial satellites.

HPBW ..... Half Power Beam Width

HPCG ..... Hand–held Protein Crystal Growth (Shuttle payload)

HPFW ..... Half Power Full Width

HPGP ..... High Performance Green Propulsion. A 1N thruster, developed by ECAPS of Sweden, was successfully flight–proven in orbit for more than 3 years on the SNSB–funded PRISMA satellite mission.

HPP ..... Heat Pipe Performance (Shuttle experiment)

HPT ..... Heterojunction Phototransistor (optoelectronic component which combines both optical detection and electrical gain in a single element)
HPTE ..... High Precision Tracking Experiment (Shuttle payload)
HRG ..... Hemispherical Resonant Gyroscope (an inertial pointing device of Northrop Grumman). HRG is part of the scalable SIRU (Space Inertial Reference Unit). HRG is flown on the Messenger and Deep Impact missions. HRG technology has been used in commercial, government and civil space missions for domestic and international customers and has been launched aboard more than 125 spacecraft.
HRIT ..... High Rate Information Transmission (a standard digital broadcast service used in meteorological satellites)
HRPT ..... High Resolution Picture Transmission (NOAA broadcast technique in S−band at frequencies of 1698.0 and 1707.0 MHz; data from all AVHRR channels (plus TOVS and SEM) is provided at full 1.1 km resolution)
HRSGS−A ..... High Resolution Shuttle Glow Spectroscopy (Shuttle payload)
HRTI−3 ..... High Resolution Terrain. Information−3 [a high−precision DEM (Digital Elevation Model)]
HRTS ..... High Resolution Telescope and Spectrograph (Shuttle, Spacelab−2, a 30 cm, f/15 Gregorian telescope, spectrograph in UV range 1170−1700 Å, and a spectroheliograph observing at 1550 Å)
HRWS ..... High−azimuth Resolution and Wide−swath SAR (a new SAR concept under definition in 2007 to obtain wide swath observations as well as high resolution SAR imagery)
HSC ..... Hughes Space & Communications Company (since 1961), an operating unit of Hughes Electronics Corporation, Los Angeles, CA. HSC is a manufacturer (world leader) of communication satellites (over 40% of market share). Provider of several standard platforms like HS 376 for spin−stabilized satellites, the HS 601 series is body−stabilized; in 1995 HSC introduced the body−stabilized HS 702 platform. Manufacturer of Syncom (first communications satellite, launch 1963), ATS−1 (first GEO weather satellite, launch in 1966), Pioneer (Venus Probe, 1978), Galileo (Jupiter Probe, launch 1989). Military satellite builder. − In January 2000, the HSC along with subsidiaries Hughes Electron Dynamics and Spectrolab were sold to the Boeing Company. They were reorganized into a business unit called "Boeing Satellite Systems (BSS)."
HSCT ..... High−Speed Civil Transport (USA)
HSFL ..... Hawaii Space Flight Laboratory (since 2007) at the University of Hawaii, Manoa
HSO ..... Herschel Space Observatory [an ESA astrophysics mission with a planned launch in 2007, formerly known as FIRST (Far Infrared Submillimeter Telescope), operational orbit at Lagrangian point L2]
HSSS ..... Hamilton Sundstand Sensor Systems, Pomona, CA (the parent company of HSSS is United Technologies Corporation)
HST ..... Hubble Space Telescope, a NASA/ESA mission with a launch April 24, 1990 (Shuttle launch). HST features a primary mirror of 2.4 m in diameter, able to observe over infrared, visible and ultra violet wavelengths.
HSRP ..... High−Speed Research Program (NASA)
HTML ..... HyperText Markup Language
HTS ..... High−(Tc) Temperature Superconductivity, refers to material temperature Tc levels above those of liquid helium [the technology is employed in sensor design, thin−film applications, MRI (Magnetic Resonance Imaging), wireless communication filters, and ultra−fast computer chips]
HTSQUID ..... High−(Tc) Temperature SQUID (Superconducting Quantum Interference Device)

HTS ..... High−Throughput Satellite. HTS is a classification for communications satellites that provide at least twice, though usually by a factor of 20 or more, the total throughput of a classic FSS (Fixed Satellite Service).

HTTP ..... HyperText Transfer Protocol

HTV ..... H−II Transfer Vehicle of JAXA. HTV is an ISS transfer vehicle, a Japanese−built automated, unmanned cargo vehicle to deliver supplies to ISS. HTV does not provide an automated docking system. Hence, on arrival at ISS, HTV requires docking assistance from the ISS using the SSRMS (Space Station Remote Manipulator System). The first flight of HTV is planned for 2009.

Hughes ..... Hughes Electronics Corporation, a worldwide operating company with HQ in Los Angeles, CA (a wholly owned subsidiary of General Motors Corporation founded in 1985). The conglomerate consists of: Hughes Aircraft Company, Hughes Telecommunications & Space (largest manufacturer in the world of telecommunication satellites), Hughes Network Systems, DIRECTV Inc., and Delco Electronics Corporation. HSC is part of Hughes Telecommunications & Space. In 2000, Hughes Electronics Corporation sold its satellite manufacturing business to Boeing Company.

Hughes (HAC) .. Hughes Aircraft Company, (since 1932, founded by Howard Hughes), part of Hughes Electronics Corporation, with HQ in Arlington, VA, a technology company with three major operating units: Information Systems (Reston, VA), Sensor & Communications Systems, and Weapons Systems. SBRC (as of 1996 SBRS, builder of Landsat instruments, MSS, TM, monolithic infrared focal plane arrays, etc.) is part of Sensor & Communications Systems

HUT ..... Helsinki University of Technology (Helsinki, Finland); note: as of 2007 there is also the abbreviation TKK (Teknillinen Korkea Koulu), the Finish name of the university

HUT ..... Hopkins Ultraviolet Telescope (part of Shuttle ASTRO observatory)

HV ..... Horizontal transmit − Vertical receive polarization

HYDROMET .. Committee for Hydrometeorology (USSR/CIS agency in the field of Meteorology)

HypSEO ..... HyperSpectral Earth Observer (an ASI mission in preparation, planned flight in 2003)

HWRP ..... Hydrology and Water Resources Programme (WMO)

I

I&T ..... Integration and Test

IAA ..... International Academy of Astronautics (Paris, France). A non−governmental organization established in Stockholm (Sweden) on August 16, 1960 (Theodore von Karman was the Founder & 1st President of IAA). The membership is based on a highly competitive election process. [7206)]

IAASS ..... International Association for the Advancement of Space Safety. The IAASS was legally established in April 2004 in the aftermath of the Shuttle Columbia accident (Feb. 1, 2003) by a group of safety engineers involved in the International Space Station Program. [7207) 7208)]

7206) J. M. Contant, O. Ventskovsky, "The International Academy of Astronautics," Proceedings of the 50th Session of Scientific & Technical Subcommittee of UNCOPUOS, Vienna, Austria, Feb. 11−22, 2013, URL: http://www.oosa.unvienna.org/pdf/pres/stsc2013/tech−54E.pdf

7207) Carmen Victoria Felix, "IAASS − Goals and Initiates," Proceedings of the 50th Session of Scientific & Technical Subcommittee of UN−COPUOS, Vienna, Austria, Feb. 11−22, 2013, URL: http://www.oosa.unvienna.org/pdf/pres/stsc2013/tech−05E.pdf

7208) Tommaso Sgobba, "Commercial Human Spaceflight Safety," Proceedings of the 51st Session of Scientific & Technical Subcommittee of UNCOPUOS, Vienna, Austria, Feb. 11−22, 2014, URL: http://www.unoosa.org/pdf/pres/stsc2014/tech−35E.pdf

IABG ..... IABG (Industrieanlagen–Betriebsgesellschaft mbH). IABG operates the national space test center for satellites, etc. in Ottobrunn, Germany (near Munich). All test facilities (space simulation/thermal vacuum, vibration and shock, model testing, acoustics, magnetics, EMC, etc.) at IABG's Space Division are combined under one roof.

IAC ..... Information Analytical navigation Center, Russia, established by Roskosmos in 1995. IAC (MCC in Russian) provides GLONASS and GPS satellite ranging services. IAC supports GLONASS data archiving and distribution for the Russian and world community.

IAC ..... International Astronautical Congress (of IAF, IAA, AIAA, etc.)

I2C (I^2C) ..... Inter–Integrated Communication [a low–speed data (up to 400 kbit/s) and control bus in consumer, telecommunications and industrial electronics]

IACG ..... Inter–Agency Consultative Group [an international forum of the Space Agencies (NASA, ESA, ISAS, Rosaviakosmos, etc.) in particular for the planning and coordination of space science missions], since 1981

IAE ..... Inflatable Antenna Experiment (Shuttle)

IAEA ..... International Atomic Energy Agency (a UN organization to promote the peaceful use of nuclear energy, since July 1957, HQs in Vienna, Austria)

IADC ..... Inter–Agency Space Debris Coordination Committee

IAF ..... International Astronautical Federation (Paris)

IAFE ..... Institute of Astronomy and Space Physics (Argentina)

IAG ..... International Association of Geodesy

IAGA ..... International Association of Geomagnetism and Aeronomy

IAHS ..... International Association of Hydrological Sciences

IAI ..... Israel Aerospace Industries Ltd., formerly Israel Aircraft Industries Ltd. (government–owned company, of Lod, Israel, manufacturer of Israel's Ofeq reconnaissance satellite series, Amos communication satellites, EROS, TecSAR, etc.)

IAI/MBT ..... IAI/Mifal Beth. MBT stands for the Hebrew translation of MIFAL BETH (or its abbreviation of MABAT) which means 'the second plant,' since it was the second plant established by IAI in the 1960s. The Hebrew name of MABAT remained with the corresponding English acronym of MBT. MBT–Space is the space division of IAI. MBT–Space designs, builds and operates LEO observation satellites for IAI.

IAIN ..... International Association of Institutes of Navigation (since 1975)

IALA ..... International Association of Marine Aids to Navigation and Lighthouse Authorities

IALA–NET .... IALA–NET demonstrator is a near real time AIS data exchange service, provided via the Internet, with a capacity for storage of AIS data for statistical purposes. It is a worldwide service only open to national Authorities who provide the AIS data from their own country. The service is intended to assist these Authorities to fulfill their duties regarding safety, security, protection of marine environment and efficiency of navigation.

IAMAP ..... International Association of Meteorology and Atmospheric Physics

IAMAS ..... International Association of Meteorology and Atmospheric Sciences

IAP ..... Institute of Atmospheric Physics, Moscow

IAPSO ..... International Association for the Physical Sciences of the Oceans (one of seven associations of IUGG, which in turn is a union of ICSU)

IARU ..... International Amateur Radio Union (since 1925, the federation of National Amateur Radio Societies)

IAS ..... Institut d'Astrophysique Spatiale (Verrières–le–Buisson, France, lab is part of CNRS)

IASC ..... International Arctic Science Committee (Arctic Centre, University of Lapland, Finland)

IASIS . . . . . Interbranch Association Sovinformsputnik (commercial distributor of imagery from Russian defense satellites, Moscow)
IAPRS . . . . . International Archives of Photogrammetry and Remote Sensing (of ISPRS)
IARU . . . . . International Amateur Radio Union (a federation of national amateur radio societies)
IAU . . . . . International Astronomical Union
IBAMA . . . . . Instituto Brasileiro do Meio Ambientes Dos Recursos Naturais Renovaveis (Brazil)
IBC . . . . . Impurity Band Conduction (detector technology)
IBDM . . . . . International Berthing Docking Mechanism. IBDM is an androgynous, contact force−sensing, low−impact docking system, capable of docking and berthing large and small vehicles. The IBDM is fully compatible with the IDSS (International Docking System Standard) defined by the Station partner agencies and with the new docking ports being made available at the Station. ESA developed the docking system in cooperation with NASA, with the goal of building a modern docking system for space vehicles visiting the Station after the Space Shuttle's retirement. [7209)]
IBFRA . . . . . International Boreal Forest Research Association (since 1991)
IBFRA−SRF . . . IBFRA − Stand Replacement Fire (working group)
IBSE . . . . . Initial Blood Storage Experiment (Shuttle payload)
IBSFC . . . . . International Baltic Sea Fishery Commission
IBSS . . . . . Infrared Background Signature Survey (satellite of the USAF deployed on STS−39) IBSS was retrieved by the Shuttle on May 2, 1991.
ICA . . . . . International Cartographic Association
ICAE . . . . . International Conference on Atmospheric Electricity
ICARE . . . . . Data Processing and Management Center hosted at USTL (Université des Sciences et Techniques de Lille), Lille, France. Note: ICARE is a research structure set up in 2003 on a national level and consisting of CNES, INSU, USTL, etc. (all research laboratories) − to study aerosol−cloud−radiation interactions and the water cycle (cloud properties, atmospheric chemistry) and using data from various missions (PARASOL, Calipso, Megha−Tropiques, etc.).
ICAO . . . . . International Civil Aviation Organization
ICAP . . . . . International Cooperative for Aerosol Prediction
ICAT . . . . . Incubator−Cell Attachment Test (Shuttle)
ICBC . . . . . IMAX Cargo Bay Camera (Shuttle), a 65 mm color motion picture camera
ICBM . . . . . Intercontinental Ballistic Missile. Russia offers commercially four types of converted ICBMs for satellite launches. The types "Rockot" and "Strela" are based on the SS−19 Stiletto missile; "Dnepr" is based on the SS−18 Satan missile; "Start" is a converted SS−20 missile. The Rockot launch vehicle Rockot is a joint venture of Eurockot Launch Services GmbH, Bremen, Germany and of KhSC (Khrunichev Space Center), Moscow. ISC Kosmotras of Moscow markets the Dnepr vehicle. The Start (Start−1) vehicle is marketed by Puscovie Uslugi of Moscow.
ICC . . . . . Instrument Control Center (EOSDIS Facility)
ICC . . . . . Integrated Cargo Carrier (Shuttle payload, first flown on STS−96). ICC is an unpressurized flat bed pallet and keel yoke assembly. Constructed of aluminum, it is 2.5 m long, 4.5 m wide and 25 cm thick and has the capability to carry cargo (up to about 1350 kg) on both faces of the pallet, both atop and below. The ICC is used by astronauts through-

7209) "Dream Chaser to use Europe's next−generation docking system," ESA, April 6, 2017, URL: http://m.esa.int/Our_Activities/Human_Spaceflight/Dream_Chaser_to_use_Europe_s_next−generation_docking_system

out the construction of the Space Station as it transports hardware from locations on the station's exterior to work sites on the truss assemblies.

ICCT ..... International Council on Clean Transportation. ICCT is an independent nonprofit organization founded to provide first−rate, unbiased research and technical and scientific analysis to environmental regulators. Its mission is to improve the environmental performance and energy efficiency of road, marine, and air transportation, in order to benefit public health and mitigate climate change.

ICDP ..... International Continental Scientific Drilling Program

ICE ..... International Cirrus Experiment (campaign)

ICE ..... International Cometary Explorer (renamed ISEE−3 mission), M.21.2

ICE ..... Institut de Ciències de L'Espai (Bellaterra, Spain); there is also a campus in Barcelona, Spain with: Institut de Ciencies de L'Espai (IEEC−CSIC).

IceBridge ..... IceBridge, a six−year NASA mission (2009−2015), is the largest airborne survey of Earth's polar ice ever flown. NASA's Operation IceBridge images Earth's polar ice in unprecedented detail to better understand processes that connect the polar regions with the global climate system.

After the IceBridge − Arctic 2013 (Greenland) campaign in the spring of 2013, evidence of a large and previously unknown **canyon** hidden under a mile of Greenland ice was analyzed. The canyon has the characteristics of a winding river channel and is at least 750 km long, making it longer than the Grand Canyon. In some places, it is as deep as 800 m, on scale with segments of the Grand Canyon. This immense feature is thought to predate the ice sheet that has covered Greenland for the last few million years. −The scientists used thousands km of airborne radar data, collected by NASA and researchers from the United Kingdom and Germany over several decades, to piece together the landscape lying beneath the Greenland ice sheet. [7210)]

In Nov. 2013, NASA's Operation IceBridge has begun its 2013 Antarctic field campaign with the arrival of the agency's aircraft and scientists at the National Science Foundation's McMurdo Station in Antarctica.

ICES ..... International Council for the Exploration of the Sea

ICESCAPE ..... Impacts of Climate on Ecosystems and Chemistry of the Arctic Pacific Environment (NASA's first dedicated oceanographic field campaign starting in June 2010 and in 2011). ICESCAPE takes to the sea on the U.S. Coast Guard Cutter Healy, the United States' newest and most technologically advanced polar icebreaker. A key focus of the mission is how changes in the Arctic may be altering the ocean's ability to absorb carbon from the atmosphere. The greenhouse gas carbon dioxide is a leading cause of global warming. − In 2012, the unexpected findings are a "rainforest" of phytoplankton growth in the Arctic Ocean. [7211) 7212)]

ICES ..... International Conference on Environmental Systems

ICES ..... ISS CubeSat Ejection System

ICET ..... International Center for Earth Tides

ICG ..... International Committee on GNSS (Global Navigation Satellite Systems); ICG was created in 1999. The ICG Members are: China, Euro-

7210) "NASA Data Reveals Mega−Canyon under Greenland Ice Sheet," NASA, Aug. 29. 2013, URL: http://www.nasa.gov/content/goddard/nasa−data−reveals−mega−canyon−under−greenland−ice/#.UiBE53_OWWI

7211) Kevin R. Arrigo1,Donald K. Perovich, Robert S. Pickart, Zachary W. Brown, Gert L. van Dijken, Kate E. Lowry, Matthew M. Mills, Molly A. Palmer, William M. Balch, Frank Bahr, Nicholas R. Bates, Claudia Benitez−Nelson, Bruce Bowler, Emily Brownlee, Jens K. Ehn, Karen E. Frey, Rebecca Garley, Samuel R. Laney, Laura Lubelczyk, Jeremy Mathis, Atsushi Matsuoka, B. Greg Mitchell, G. W. K. Moore, Eva Ortega−Retuerta, Sharmila Pal, Chris M. Polashenski, Rick A. Reynolds, Brian Schieber, Heidi M. Sosik, Michael Stephens, James H. Swift, "Massive Phytoplankton Blooms Under Arctic Sea Ice," Science 15 June 2012, Vol. 336, No. 6087, p. 1408, DOI: 10.1126/science.1215065

7212) Tony Phillips, "Unprecedented blooms of ocean plant life," NASA, June 8, 2012, URL: http://science.nasa.gov/science−news/science−at−nasa/2012/08jun_arcticbloom/

pean Union, United States, India, Italy, Japan, Russia, Nigeria, Malaysia, UAE (United Arab Emirates) and international organizations such as: ESA, BIPM, UPS, EUREF (European Reference Frame – IAG Reference Frame Sub–Commission for Europe), FIG, IAG, IAIN, IGS, NU OOSA and URSI. The United Nation Office OOSA provide Secretariat for the ICG, supporting meetings preparation and conduction and planning activities.
ICG convenes annually with its GNSS providers and observers to discuss how to best move forward in ensuring GNSS is not only accessible, but also interoperable and compatible.

ICIC . . . . . Intercalibrations/Intercomparisons (IGBP/IGAC focus 7 activity)

ICOS . . . . . Integrated Carbon Observation System. ICOS is a European Research Infrastructure recognized by the ESFRI (European Strategy Forum on Research Infrastructures) gathering institutes from 17 countries across Europe. ICOS aims at quantifying and understanding long–lived greenhouse gas fluxes over regions of the European continent and adjacent areas.

ICPMSE . . . . . International Space Conference on Protection of Materials and Structures from the Space Environment

ICRF . . . . . International Celestial Reference Frame (first realization was adopted by the IAU in 1997; ICRF is maintained by the IAU, IERS and IVS). The coordinate system of the ICRF is based on the coordinates of several hundred "defining" extragalactic sources. Quasars and distant galaxies are ideal reference points for determining the celestial reference frame, as their angular movement is very small – around one–hundredth of a milliarcsecond (marsec, compared to the diameter of the Moon for example, which is a little more than 31 arcminutes).

ICRF2 . . . . . International Celestial Reference Frame 2 (an improved realization of ICRF and adopted by the IAU General Assembly in August 2009; effective use started on January 1, 2010). ICRF2 uses observations of approximately 3,000 quasars. The ICRF maps are useful for navigation on Earth and in space.

ICRSS . . . . . International Commercial Remote Sensing Symposium (of the United States Geospatial Intelligence Foundation, Inc.)

ICSU . . . . . International Council of Scientific Unions (HQs in Paris, France. ICSU is a non–governmental body created in 1931 to promote international science and its applications. It has a membership of international organizations (Scientific Unions), national science academies and research councils, and Scientific Associates. Some committees of ICSU are: IGBP, SCOPE, SCAR, COSPAR, etc.)

ICT . . . . . Information and Communications Technology. ICT is an extensional term for information technology (IT) that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage and audiovisual, that enable users to access, store, transmit, understand and manipulate information. — ICT is also used to refer to the convergence of audiovisual and telephone networks with computer networks through a single cabling or link system.

ICWG–EO . . . . . International Coordination Working Group for Earth Observation

IDA . . . . . Institute of Defense Analysis (since 1957, a DoD nonprofit corporation)

IDA . . . . . International Dark–Sky Association. A US based non–profit organization incorporated in 1988. The mission of the IDA is "to preserve and protect the night time environment and our heritage of dark skies through quality outdoor lighting."

IDEA . . . . . Intelligent Distributed Execution Architecture (an onboard software package of NASA/ARC for onboard planning support)

IDEAL ..... International Decade of of East African Lakes (campaign)
IDHT ..... Instrument Data Handling and Transmission (ERS−1 S−band antenna)
IDN ..... International Directory Network (CEOS−defined for databases, former designation 'PID')
IDRS ..... Intersatellite Data Relay System (of Addvalue, Singapore), a commercial terminal on LEO satellites to communicate with GEO satellites of Inmarsat.
IDS ..... International DORIS Service
IDSS ..... International Docking System Standard [7213)]
i.e. ..... abbreviation (Latin: id est) that is
IEA ..... International Energy Agency (Paris, France, since 1974)
IECM ..... Induced Environment Contamination Monitor (Shuttle)
IEE ..... Institution of Electrical Engineers (London, UK)
IEE ..... Instituto Espacial Ecuatoriano (Ecuadorian Space Institute)
IEEC ..... Institut D'Estudis Espacials de Catalunya (Institute for Space Studies of Catalonia, Barcelona, Spain)
IEEE ..... Institute of Electrical and Electronics Engineers (USA)
IEF ..... Isoelectric Focusing (Shuttle payload)
IEH ..... International EUV Hitchhiker (Shuttle payload)
IEICE ..... Institute of Electronics, Information and Communication Engineers, Tokyo, Japan
IELV ..... Intermediate Expendable Launch Vehicle (EOS program)
IEM ..... Integrated Electronics Module
IEOS ..... International Earth Observing System (Committee dealing with the policies, principles of data exchange, etc.; partner agencies are: CSA (Canada), ESA (Europe), NASA (USA), and STA (Japan). Delegations from agencies with operational environmental monitoring satellites: NASDA, MITI, JMA (Japan), EUMETSAT (Europe), NOAA (USA), AES (Canada). Typical IEOS missions are: ENVISAT (ESA), EOS/AM−1 (NASA), NOAA−N (NOAA), ADEOS (NASDA), and TRMM (NASA/NASDA).
IEPC ..... International Electric Propulsion Conference
IERS ..... International Earth Rotation Service (Central Bureau in Paris, since 1988)
IERS ..... International Earth Reference System
IETF ..... Internet Engineering Task Force. IETF develops and promotes Internet standards, in particular dealing with the TCP/IP and Internet protocol suite.
I/F ..... Interface
IF ..... Intermediate Frequency
IFAC ..... International Federation of Automatic Control (since 1957). TC (Technical Committee) on Atomatic Control in Aerospace (since 1963)
IFAG ..... Institut für Angewandte Geodäsie [Institute of Applied Geodesy − a federal agency under the jurisdiction of the German Ministry of the Interior (BMI) with research in the fields of geodesy, cartography and photogrammetry]. IFAG maintains a central office in Frankfurt/Main and branch offices in Leipzig, Potsdam, and Berlin. Note: In the late 1990s, IFAG was renamed to **BKG** (Bundesamt für Kartographie und Geodäsie.
IFARS ..... Institute for Applied Remote Sensing (Wedel, Germany)
IFE ..... Isoelectric Focusing Experiment (Shuttle payload)
IFEOS ..... International Forum on Earth Observations Using Space Station Elements (since 1986)
IFOV ..... Instantaneous Field of View

7213) International Docking System Standard (IDSS), Interface Definition Document (IDD), Revision E, October 2016, URL: http://www.internationaldockingstandard.com/download/IDSS_IDD_Revision_E_TAGGED.pdf

IFREE ..... Institute for Frontier Research on Earth Evolution, Tokyo, Japan (since 2002, subduction zone research, etc.)

IFREMER ..... Institut Francais de Recherche pour L'Exploration de la Mer (French Ocean Agency in Brest, France). IFREMER/CERSAT (Centre ERS d'Archivage et de Traitement) is the French ERS Processing and Archiving Facility (PDF) for satellite data and is part of the "Département d'Océanographie Spatiale" at IFREMER.

IFSAR ..... Interferometric SAR (measurement technique using two antennas, sometimes also referred to as 'InSAR')

IFTI ..... Ioffe Physical Technical Institute (St. Petersburg)

IGAC ..... International Global Atmosphere Chemistry (IGBP core program)

IGACO ..... Integrated Global Atmospheric Chemistry Observations (IGOS standard)

IGAP ..... International Global Programme on Atmospheric Particles

IGARSS ..... International Geoscience and Remote Sensing Symposium – since 1981, sponsored by GRSS (Geoscience and Remote Sensing Society)

IGBP ..... International Geosphere–Biosphere Programme of ICSU (IGBP is closely linked, directly or through ICSU, to other international organizations involved in global change research, including: GCOS, IOC, IPCC, ISSC, SCOPE, UNEP, WCRP, WMO. Over 50 countries have national IGBP committees and supporting bodies. The IGBP Secretariat is in Stockholm, Sweden)

IGC ..... Intelsat General Corporation, McLean, VA, USA. IGC is a wholly owned subsidiary of Intelsat, operator of the world's first Globalized Network. IGC provides its government and commercial customers with high–quality, cost–effective, communications solutions via Intelsat's leading satellite backbone and terrestrial infrastructure.

IGDDS ..... Integrated Global Data Dissemination Service (a component of the WMO Information System)

IGDG ..... Internet–based Global Differential GPS (a NASA/JPL software package that provides a complete end–to–end system capability for GPS–based real–time positioning and orbit determination)

IGEB ..... Interagency GPS Executive Board [IGEB (Presidential Decision Directive as of March 1996) offers some formal civil agency participation in the GPS program. It is jointly chaired by the DoD and DoT, with oversight and management of the dual use component of the GPS]

IGEX ..... International GLONASS Experiment, a campaign under the auspices of IAG (International Association of Geodesy)

IGFOV ..... Instantaneous Geometric Field of View

IGGOS ..... Integrated Global Geodetic Observing System (of IAG). In geodesy, the Earth system is composed of solid geosphere, cryosphere, hydrosphere and atmosphere.

iGMAS ..... international GNSS Monitoring & Assessment Service [a subgroup established in ICG6 (Sixth Meeting of the International Committee on GNSS)Tokyo Meeting (Sept. 2011) with the following goals: 1) to setup a global tracking network; 2) to monitor the Multi–GNSS open signal and service performance with not only Multi–GNSS geodetic receivers but also high gain omni–directional antennas, multi–beam antennas]

IGMASS ..... International Global Monitoring Aerospace System (an initiative to monitor the environment and to provide disaster warnings on a global scale – organized by IAA, the Russian Academy of Cosmonautics,

etc.).[7214) 7215) 7216)] IGMASS is supported by the UN organizations, space agencies, and participants of the First International Specialized Symposium «Space and global security of Humanity», Nov. 2–4, 2009, Limassol, Cyprus. Scientists, engineers, managers from 18 countries including Belarus, Canada, Cameroon, France, Georgia, Germany, Italy, Kazakhstan, Kenya, Kyrgyzstan, Latvia, Myanmar, Pakistan, Romania, Russia, Slovenia, USA, and Ukraine have taken part in the Symposium.

IGN ..... Institut Géographique National (French National Geographic Institute, Paris)

IGO ..... Intergovernmental Organization. "IGO" means, solely and exclusively for purposes of this License, an organization established by a treaty or other instrument governed by international law and possessing its own international legal personality. Other organizations established to carry out activities across national borders and that accordingly enjoy immunity from legal process are also IGOs for the sole and exclusive purposes of this License. IGOs may include as members, in addition to states, other entities.

IGOS ..... Integrated Global Observing Strategy (for synergetic effects, since 1998). IGOS is a partnership by the UNESCO, ICSU. CEOS, etc.

IGOS–P ..... IGOS Partnership (an international effort aimed to globally monitor quantitative information on carbon sources, set up in 1999 under IGOS–P). The TCO (Terrestrial Carbon Observation) initiative is an effort by space and international organizations within IGOS–P to employ the best current observation tools and models to build up a global observing system for tracking carbon fluxes.

IGRF ..... International Geomagnetic Reference Field

IGS ..... International GNSS Service (since 1993, prior to 2005: "International GPS Service"), as of 2006 IGS comprises 200 agencies worldwide and 350 ground stations

IGS ..... Information Gathering Satellite [a classified Japanese high–resolution imagery reconnaissance program of four spacecraft (two S/C are furnished with SAR instruments and two S/C with optical instruments), a launch of the first two IGS satellites took place on March 28, 2003]. The IGS–1a S/C (optical imaging) has a mass of 850 kg at launch, the IGS–1b S/C (SAR imaging) has a mass of 1200 kg. The IGS S/C were built by Mitsubishi and are being operated by JIDF (Japan Inter–Design Forum). The IGS program was approved by the Japanese government Dec. 22, 1998 in response to a missile launch by North Korea on Aug. 31, 1998. Optical imagery has a resolution of 1 m while the SAR data have a ground resolution of 1–3 m.

IGSO ..... Inclined Geosynchronous Orbit (a subclass of GSO)

IGU ..... International Geographical Union

IGY ..... International Geophysical Year [created in 1952 by the ICSU plenary meeting; the first IGY took place in 1957/58 (a year of expected maximum solar activity), it coincided also with the start of the space age, the launch Sputnik–1 on Oct. 4, 1957]. The IGY was inspired by the realization that much better and more complete information about the Earth and geospace was needed to understand and manage the complete terrestrial environment on which we depend.

7214) Resolution of the First International Specialized Symposium "Space & Global Security of Humanity," Limassol, Cyprus, Nov. 2–4, 2009, URL: http://iaaweb.org/iaa/Scientific%20Activity/Study%20Groups/SG%20Commission%204/sg49/sg49cyprusresolution.pdf

7215) Anatoly N. Perminov, Valery A. Menshikov, "Realization of the Common Socio Natural Strategy of the Space Exploration on the Base of the Global Multifunctional Aerospace Systems," 2nd International Symposium 'Space and Global Securityof Humanity,' Riga, Latvia, July 5–9, 2010, URL: http://spacesystems.ru/index.php?option=com_content&task=view&id=48&Itemid=75

7216) ftp://130.206.92.88/Espacio/Mesa%20Redonda%204%20–%20R2%20–%20KRUNICHEV%20Sapce%20Center%20–%20S%20V%20CHERKAS.pdf

IHO ..... International Hydrographic Organization
IHP ..... International Hydrology Programme (UNESCO)
IHY ..... International Heliophysical Year (2007)
IICWG ..... International Ice Charting Working Group (since Oct. 1999)
IIoT ..... Industrial Internet of Things. The IIoT is set to revolutionize how businesses function in the next few years. There will be significantly increased automation and operational efficiency through the use of real time data and Machine–to–Machine (M2M) communication directly across the planet. [7217)]
IIP ..... Instrument Incubator Program of NASA. The objective is to foster the development of innovative remote–sensing concepts and the assessment of these concepts in ground, aircraft, or engineering model demonstrations.
IIP ..... International Ice Patrol
IIST ..... Indian Institute of Space Science and Technology. IIST is India's national institute for the study and development of space science. It was inaugurated on 14 September, 2007. IIST is located on the VSSC (Vikram Sarabhai Space Centre) campus, Trivandrum, Kerala.
IJDE ..... International Journal of Digital Earth
IJSSE ..... International Journal of Small Satellite Engineering (electronic journal on internet, edited at the University of Surrey, UK)
IKF ..... Institut für Kosmosforschung, Berlin–Adlershof, in former East Germany. Note: as of Jan. 1992 the IKF was renamed 'Institute of Space Sensor Technology (ISST),' it is part of DLR)
IKI RAN ..... Space Research Institute (of the Russian Academy of Sciences, RAN (or RAS, depending on the alphabet), Moscow, Russia; extraterrestrial physics and remote sensing, since 1965)
IKI–BAN ..... Space Research Institute, Bulgarian Academy of Sciences (Sofia, Bulgaria)
ILEWG ..... International Lunar Exploration Working Group
ILL ..... Institut Laue–Langevin (Grenoble, France), leading facility in neutron science and technology
ILIS ..... Ionic Liquid Ion Source (porous ILIS is a thruster technology)
ILN ..... International Lunar Network. A proposed network of landed stations on the moon in the 2nd decade of the 21 century by: Canada, France, Germany, India, Italy, Japan, Korea, UK and the USA. Each of these stations will act as a node in a lunar geophysical network. Each station will be equipped with set of instruments: seismic, heat flow, electro–magnetic sounding and laser ranging.
ILRC ..... International Laser Radar Conference (a conference held biennially under the auspices of ICLAS (International Coordination–group for Laer Atmospheric Studies).
ILRN ..... International Laser Ranging Network
ILRS ..... International Laser Ranging Service was founded in 1998 [a network of SLR (Satellite Laser Ranging) stations]. The ILRS Tracking Stations provide ranging to a constellation of artificial satellites (LAGEOS, Etalon, EGS, Starlette, Stella, etc.). Each Tracking Station is typically associated with one of the three regional subnetworks: NASA (National Aeronautics and Space Administration), EUROLAS (EUROpean LASer Network), or the WPTLN (Western Pacific Laser Tracking Network).
ILS ..... Instrument Landing System
ILS ..... International Launch Services [a joint commercial venture between Lockheed Martin Corp. (USA), Khrunichev Space Center (KhSC) and RKK Energia (Russia), offering of Atlas and Proton launch systems.

7217) "Inmarsat Releases Their Global IIoT Study," Satnews Daily, 24 July 2018, URL: http://www.satnews.com/story.php?number=45466993

The first ILS launch occurred in Sept. 1996 (Inmarsat−3 from Baikonur); since April 15, 1993 all commercial contracts, involving the Proton launch vehicle, are handled by ILS.
In April 2019, ILS is inaugurating a new era in the firm's 25−plus−year history. ILS will now operate under the auspices of **Glavkosmos**, a long−standing commercial subsidiary of Roscosmos State Corporation. Under the Glavkosmos umbrella, ILS will offer Proton in parallel with GK Launch Services, which provides the famed Soyuz−2 vehicle. [7218]

ILS provides launch services for satellite operators and offers a complete array of services and support, from contract arrangements, mission management and on−orbit delivery. ILS markets the Proton Breeze M and Angara 1.2 launch services to commercial and government satellite operators worldwide and is a U.S. company headquartered in Reston, Virginia, near Washington, D.C.

ILWS ..... International Living With a Star (initiative of space agencies on a global scale, since 2000) see also LWS. The main objective is to stimulate and facilittate the study of the Sun−Earth connected system and the effects which influence life and society.

IMAGES ..... International Marine Global Change Study (IGBP project)

IMAU ..... Institute for Marine and Atmospheric Research Utrecht (University of Utrecht, The Netherlands)

IMAX ..... Image Maximum (a large screen motion picture camera/format used by the NASA/Smithsonian project to document significant space activities)

IMBIE ..... Ice−Sheet Mass Balance Intercomparison Exercise. IMBIE was established in 2011 as a community effort to reconcile satellite measurements of ice sheet mass balance. IMBIE is a collaboration between scientists supported by the ESA and NASA and contributes to assessment reports of the Intergovernmental Panel on Climate Change (IPCC). IMBIE has led to improved confidence in the measurement of ice sheet mass balance and the associated global sea−level contribution.

IMD ..... India Meteorological Department (HQ in New Delhi). IMD is an agency of the Ministry of Earth Sciences of the Government of India.

IMEC ..... Inter−university MicroElectronics Center, Leuven, Belgium. IMEC is a Flemish government initiative to bundle all microelectronics−related efforts of the three scientific universities into one independent non−profit super−lab.

IMET ..... Improved Meteorological Instrumentation (WHOI buoy type)

IMEX ..... Inner Magnetosphere Explorer, a mission of UMM (University of Minnesota at Minneapolis)

IMF ..... Interplanetary Magnetic Field

IMGEOS ..... Integrated Multi−mission Ground Segment for EO Satellites (ISRO ground segment established at Shadnagar (NRSC) in 2011)

IMINT ..... Imagery Intelligence (IMINT satellites use optical and/or microwave imagers to produce high resolution images of objects in the ground degment)

IMK ..... Institute für Meteorologie und Klimaforschung (Institute for Meteorology and Climate Research − a cooperative institute of the Nuclear Research Center Karlsruhe (KfK) and of the University of Karlsruhe, Germany)

IML ..... International Microgravity Laboratory (Shuttle payload)

IMM ..... Inverted Metamorphic Multijunction (solar cell technology). The III−V multijunction cells, which address both space and terrestrial power

7218) "International Launch Services Offers New Launch Pricing and Opens a New Era for the Company," Satnews Daily, 12 April 2019, URL: http://www.satnews.com/story.php?number=1015071546

needs, have achieved the highest energy conversion efficiencies of all PV cells, with the current (2012) record exceeding 40%.

IMO . . . . . International Maritime Organization

IMP . . . . . International Monitoring Platform, M.19

IMS . . . . . Information Management System at GSFC (The top−level function of EOS DAACs)

IMTA . . . . . Instituto Mexicano de Tecnologica del Agua (Cuernavaca, Mexico)

IMU . . . . . Inertial Measurement Unit (navigation instrument on aircraft)

INCA . . . . . Indian National Cartographic Association

INDEX . . . . . Indian Ocean Experiment (campaign)

INDEX . . . . . Innovative Technology Demonstration Experiment (of ISAS, Japan)

INDOEX . . . . . Indian Ocean Experiment (campaign)

INDREX . . . . . Indonesian Radar Experiment (campaign)

INFN . . . . . Istituto Nazionale Fisica Nucleare (Italian National Institute of Nuclear Physics), Rome, Italy

Infoterra GmbH . Infoterra is a subsidiary of EADS Astrium GmbH, Friedrichshafen, Germany

ING . . . . . Istituto Nazionale di Geofisica (Rome Italy)

InAs . . . . . Indium Arsenide (detector type for IR spectrum)

InGaAs . . . . . Indium Gallium Arsenide (a detector type for IR spectrum)

InGaP/GaAs . . . . Indium Gallium Phosphorus/Gallium Arsenide (solar cell type)

INLSE . . . . . Israel Network for Lunar Science and Exploration

INM . . . . . Instituto Nacional de Meteorologica (Spanish Weather Service)

Inmarsat . . . . . International Maritime Satellite Organization (London, UK). Inmarsat was chartered as IGO (Intergovernmental Organization) in 1979 to exploit the emerging satellite technology for mobile communications and to improve maritime communications (safety at sea). Inmarsat communication services started in 1982. On April 15, 1999, Inmarsat became the first IGO to privatize, maintaining its public service. In 2014, Inmarsat has 10 satellites in GEO.
In January 2019, London−based Inmarsat is moving their European Aviation Network (EAN) division out of London and will relocate to satellite−friendly Luxembourg — this shift will occur before April and this decision was made due to the threat of Brexit to Inmarsat. [7219)]

7219) "Forrester Reports: Inmarsat Moving Their European Aviation Network to Luxembourg," Satnews Daily, 13 January, 2019, URL: http://www.satnews.com/story.php?number=97605329

Figure 1623: Inmarsat's London headquarters (photo credit: Inmarsat)

Inmarsat ..... June 22, 2022:Viasat said June 21 that its shareholders voted to approve its $7.3 billion plan to acquire British satellite operator Inmarsat. [7220] The acquisition is subject to a long list of regulatory approvals on both sides of the Atlantic Ocean, including new national security procedures in the United Kingdom.

November 8, 2021: **Viasat** of Carlsbad, CA,a global communications company, and Inmarsat, has agreed to buy British satellite fleet operator Inmarsat in a $7.3 billion deal to expand its broadband network globally in multiple orbits and spectrum bands. [7221]
The combination will create a leading global communications innovator with enhanced scale and scope to affordably, securely and reliably connect the world. The complementary assets and resources of the new organization will enable the availability of advanced new services in mobile and fixed segments, driving greater customer choice in broadband communications and narrowband services, including IoT (Internet of Things).
The combined company intends to integrate the spectrum, satellite and terrestrial assets of both companies into a global high−capacity hybrid space and terrestrial network, capable of delivering superior services in fast−growing commercial and government sectors. This advanced architecture will create a framework incorporating the most favorable characteristics of multi−band, multi−orbit satellites and terrestrial air−to−ground systems that can deliver higher speeds, more bandwidth, greater density of bandwidth at high demand locations like air-

7220) "Viasat shareholders approve Inmarsatacquisition," SpaceNews, 22 June 2022, URL: https://spacenews.com/viasat−shareholders−approve−inmarsat−acquisition/

7221) "Viasat and Inmarsat to Combine, Creating a New Leading Global Communications Innovator," Viasat Press Release, 8 November 2021, URL: https://www.viasat.com/about/newsroom/press−releases/viasat−and−inmarsat−combine−creating−new−leading−global/

port and shipping hubs and lower latency at lower cost than either company could provide alone.
This communication is being made in respect of the proposed business combination transaction between Viasat and Inmarsat pursuant to the terms of that certain Share Purchase Agreement, dated as of November 8, 2021, by and among Viasat and the shareholders of Inmarsat. Viasat intends to file with the Securities and Exchange Commission (the "SEC") a proxy statement and other relevant documents in respect of a stockholder meeting to obtain stockholder approval in connection with the transaction.

INNOVA ..... IN−orbit and Networked Optical Ground Stations Experimental Verification Advanced Testbed (of NICT, Japan)

INO ..... Institut National d'Optique, Quebec City, Quebec, Canada

InP ..... Indium Phosphide (semiconductor material and solar cell type). InP offers in particular higher communication frequencies, hence data rates.

INPE ..... Instituto de Pesquisas Espaciais (National Institute of Space Research, Sao José dos Campos, S.P., Brazil, since 1971)

INQUA ..... International Union for Quaternary Research (of ICSU)

INR ..... Image Navigation and Registration (GOES Second Generation S/C, MTG S/C, etc.)

INRA ..... Institut National de la Recherche Agronomique (Grignon and Montfavet, France)

In−RIMT ..... Indian Resources Information and Management Technologies Pvt. Ltd, Hyderabad, India

INRS ..... Institut National de la Recherche Scientifique, Quebec City, Canada

INS ..... Inertial Navigation System (for aircraft/spacecraft navigation)

INS ..... Institute of Nuclear Physics, (New Zealand)

INSA ..... Ingenieria y Servicios Aeroespaciales, Madrid, Spain (Fuego mission coordinator, etc.); INSA was created in 1992 and is owned by INTA, the Space Agency of Spain. INSA is one of the main companies providing technical support and services for the ESA astronomy and solar missions at ESAC (European Space Astronomy Center), located at Villafranca del Castillo near Madrid.

InSAR ..... Interferometric SAR

INSAT ..... Indian National Satellite (series, employed for meteorology and communication), H.6

INSITU−OCR .. International Network for Sensor Inter−comparison and Uncertainty assessment for Ocean Color Radiometry

INSPIRE ..... Infrastructure for Spatial Information in Europe [EU framework, started in 2007, of interoperability is being developed to share data for Copernicus (GMES), etc.]

IN−STEP ..... In−Space Technology Experiments Program (NASA, initiated in 1992)

INSU ..... Institut National des Sciences de l'Univers (Paris, part of CNRS)

InSb ..... Indium antimonide (detector type material for infrared region)

INTA ..... Instituto National de Técnica Aeroespacial, Madrid, Spain (INTA was created in 1942). INTA is also the Space Agency of Spain and has ESA membership since 1980.

Intelsat ..... International Telecommunications Satellite Organization (Washington, DC). Intelsat, a government−owned satellite operator (of the Intelsat series), became a private company in July 2001. In 2005, Intelsat bought PanAmSat to create the world's largest provider of fixed satellite services (FSS). — In May 2020, global satellite operator Intelsat filed for bankruptcy protection, citing disruption from to its business from the virus pandemic, in a move aimed at restructuring its operations. [7222)]

7222) "Intelsat files for bankruptcy, seeks to restructure," Space Daily, 14 May 2020, URL: https://www.spacedaily.com/reports/Intelsat_files_for_bankruptcy_seeks_to_restructure_999.html

INTERBALL ... IKI mission program (solar−terrestrial interaction) within ISTP, M.20

Intercosmos ..... USSR/CIS space program for collaborative science projects among its nine members and with other nations. Intercosmos was created in 1967 inviting the former Soviet−affiliated countries (like, East−Germany, Hungary, Bulgaria, Poland, etc.) to participate in the Soviet space program with their own national contributions (one area of participation was in remote sensing, building sensors for specific missions, dissemination and scientific interpretation of data, etc.). Activities in international manned space flight missions were also under the label of Intercosmos. Satellites in the Intercosmos program are named 'Intercosmos−n', like Intercosmos−19 (launched Feb. 27, 1979).

INVAP S.E. ..... Argentine high−technology company dedicated to the design, integration, construction and delivery of high complexity equipment, plants and devices. INVAP developed the SAC satellite family (SAC−A, SAC−B, SAC−C, SAC−D) for CONAE. INVAP (Investigaciones Aplicadas) with HQs in San Carlos de Bariloche, Rio Negro, Patagonia, Argentina (since 1976).

InVEST ..... In−Space Validation of Earth Science Technologies. A NASA Science Technologies Program in support of the Earth Science Division (ESD).

IOAG ..... Interagency Operations Advisory Group. In 1999, the IOAG was chartered to be the main international body to oversee the development of collaborative, interoperable space communications and navigation services for the benefit of all members' spaceflight missions and it has already concluded the first decade of leadership in International Space Cooperation. − In 2014, SECSWG (Spacecraft Emergency Cross Support Working Groups) have been installed. The objective is to establish a common, standard process, agreed upon by the IOAG member agencies, for providing spacecraft emergency cross support (SECS).

IOC ..... Initial Operating Capability (GPS, GLONASS,)

IOC ..... Intergovernmental Oceanographic Commission (of UNESCO)

IOCCG ..... International Ocean−Color Coordinating Group (an international group of experts)

IOCM ..... Interim Operational Contamination Monitor (Shuttle payload)

IOD ..... In−Orbit Demonstration (mission)

ION ..... Institute of Navigation (Washington, DC, since 1945)

ION ..... Interplanetary Overlay Network. A NASA version of DTN (Disruption−Tolerant Networking) protocols known as the Interplanetary Overlay Network (ION) has been flight−tested on the EPOXI spacecraft and ION is currently (2014) being tested on the International Space Station. [7223)]

IOOS ..... Integrated Ocean Observing System (USA, NOAA is managing the IOOS)

IOP ..... Intensive Observation Period (within a campaign)

IOS ..... Institute for Ocean Sciences (Sydney, British Columbia, Canada)

IOT ..... In−Orbit Test

IoT ..... Internet of Things. IoT refers is the inter−networking of physical devices, vehicles (also referred to as "connected devices" and "smart devices").

IIoT ..... Industrial IoT (Internet of Things). Industrial IoT (IIoT, − as opposed to consumer oriented IoT − is the application of IoT principles to industrial applications. There is a broad range of potential use, spanning from tracking of vehicles to monitoring or even controlling industrial installations.

IOVWST ..... International Ocean Vector Wind Science Team (since 2010)

7223) J. Leigh Torgerson, "Network Monitor and Control of Disruption−Tolerant Networks," SpaceOps 2014, 13th International Conference on Space Operations, Pasadena, CA, USA, May 5−9, 2014, paper: AIAA 2014−1740, URL: http://arc.aiaa.org/doi/pdf/10.2514/6.2014−1740

IOW ..... Institut für Ostseeforschung Warnemünde (Institute for Baltic Sea Research, Warnemünde, Germany)
IP ..... Internet Protocol
IPACS ..... Integrated Power and Attitude Control Subsystem (NASA development of a CMG/energy system)
IPCC ..... Inter–Governmental Panel for Climate Change (set up by WMO and UNEP in 1988), an international panel to advise policy makers. IPCC is the United Nations body for assessing the science related to climate change.
IPDA ..... Integrated Path Differential Absorption (lidar measurement technique)
IPG ..... Institute of Applied Geophysics (Moscow, Russia)
IPG–Paris ..... Institut de Physique du Globe de Paris
IPGP ..... Institut de Physique du Globe de Paris (both acronyms are being used)
IPMP ..... Investigations into Polymer Membrane Processing (Shuttle experiment)
IPO ..... Integrated Program Office (Silver Spring, MD), consisting of a team made up of NOAA, NASA and DoD representatives for the development of the NPOESS spacecraft series
IPOMS ..... International Polar–Orbiting Meteorological Satellite
IPoS ..... Internet Protocol over Satellite (industry standard, as of 2005 global standard)
IPS ..... Instrument Pointing System (Spacelab–2, built by ESA, structure for mounting telescopes)
IPS ..... Ion Propulsion System
IPSL ..... L'Institut Pierre Simon Laplace pour les Sciences de l'Environnement (LMD/IPSL, Paris)
IPv4 ..... Internet Protocol version 4. IPv4 is a data–oriented protocol to be used on a packet switched inter–network (e.g., Ethernet).
IPv6 ..... Internet Protocol version 6. A network layer protocol for packet–switched inter–networks. IPv6 is an extension of IPv4 with a much larger address space (next generation standard).
IPY 2007–8 .... International Polar Year (initiative by ICSU – from March 2007 to March 2009). IPY is an internationally coordinated suite of scientific field campaigns to study climatic and environmental change in the polar regions and the connections linking the polar regions to the rest of the globe.
IPWG ..... International Precipitation Working Group (promotes standards for operational procedures and common software for deriving precipitation measurements from satellites)
IRAM ..... Institut de radioastronomie millimétrique. IRAM is a 30 m radio telescope for astronomical observations in the millimeter wavelength range. IRAM is operated by Institute for Radio Astronomy in Grenoble, France, it is located on the Sierra Nevada, in Spain, close to the Pico Veleta peak. IRAM is the second largest millimeter–wave telescope in the world after the LMT (Large Millimeter Telescope, 50 m ∅), located in theSierra Negra, Mexico and operated by the National Institute of Astrophysics University of Massachusetts Amherst.
IRAS ..... InfraRed Astronomical Satellite (an astronomy mission of the Netherlands, the USA, and the UK; launch of IRAS Jan. 25, 1983; IRAS mapped over 250,000 cosmic infrared sources and large areas of extended emission)
IRCFE ..... Infrared Communications Flight Experiment (Shuttle)
IR&D ..... Independent Research & Development (company internal funding)
IRD ..... Institut de Recherche pour le Développement (Paris, France, successor organization to ORSTOM)
IRDT ..... Inflatable Reentry and Descent Technology (ESA reentry vehicle)

IRED . . . . . Infrared Emitting Diode
IRENA . . . . . International Renewable Energy Agency [since 2009, Bonn, Germany, as of September 2012, IRENA participants include 158 States and the European Union (EU)] [7224)]
IRE RAN . . . . . Institute of Radioengineering and Electronics (of the Russian Academy of Sciences, RAN, in Moscow; founded in 1953, IRE is involved in remote sensing, etc., also providing general management services)
IRF . . . . . Swedish Institute of Space Physics [(Institutet för rymdfysik), a governmental research institute with the following divisions: IRF–K (Kiruna), IRF–Um (Umea) with a Laboratory of Mechanical Waves and a Space Physics Group at Umea University, IRF–U (Upsalla), IRF–STL (Solar Terrestrial Physics) Lund Division]
IR–IE . . . . . Infrared Imaging Experiment (Shuttle payload)
Iris program . . . . A European initiative (ESA, EC, Eurocontrol, DLR, airport operators, air navigation providers and aerospace companies) to modernize the communication system for air traffic management within the EC project ANASTASIA (Airborne New Advanced Satellite Techniques and Technologies in A System Integrated Approach). An Iris precursor service is planned for 2018 providing air–ground communications for initial 4D flight path control, pinpointing an aircraft in four dimensions: latitude, longitude, altitude and time. – By 2028, the Iris long–term service will enable full 4D management over airspaces across the globe and the data link will be the primary means of communications between controllers and cockpit crews.[7225)]
IRIS . . . . . Incorporated Research Institutions for Seismology (US)
IRIS . . . . . International Radio Interferometric Surveying (Subcommittee of the International Association of Geodesy)
IRIS . . . . . Internet Routing in Space (Cisco payload architecture on the Intelsat–14 S/C)
IRIS . . . . . Italian Research Interim Stage (upper stage used in conjunction with NASA's Shuttle to place payloads up to 900 kg into geo–transfer orbit)
IRLS . . . . . Interrogation, Recording and Location Subsystem (French–US Eole experiment flown on Nimbus–3 in 1969)
IRM . . . . . Ion Release Module (S/C of the AMPTE mission, M.4.1)
IRMB . . . . . Institut Royal de Météorologie Belgique (Royal Meteorological Institute of Belgium, Brussels) also referred to as KMI/IRM and RMIB
IRNSS . . . . . Indian Regional Navigation Satellite System consisting of 7 satellites – developed by ISRO (a navigation system in GEO – 3 satellites will be placed in geostationary orbit and the four others in geosynchronous orbit)
iROC . . . . . Integrated Radio and Optical Communications (a NASA/GRC project)
IROE – CNR . . . Istituto Ricerca Onde Elettromagnetiche – Consiglio Nazionale delle Ricerche (Florence, Italy)
IROWG . . . . . International Radio Occultation Working Group (Coordination Group for Meteorological Satellites, since October 2009). The IROWG serves as a forum for operational and research users of radio occultation data.
IRS . . . . . Information Retrieval System (ESA data system)
IRS . . . . . Indian Remote Sensing Satellites (ISRO), F.24 (IRS–1A, 1B, 1C, 1D, 1E, etc.)
IRS . . . . . Inertial Reference System
IRS . . . . . Institut für Raumflugsysteme (University of Stuttgart, Germany)
IRSA . . . . . Institute for Remote Sensing Applications (of JRC, Ispra, Italy. In 1996 IRSA was renamed to SAI = Space Applications Institute)

7224) http://www.irena.org/menu/index.aspx?mnu=Pri&PriMenuID=13
7225) "Iris for safer air travel," ESA, May 9, 2014, URL: http://www.esa.int/Our_Activities/Telecommunications_Integrated_Applications/Iris_for_safer_air_travel

IRSA ..... Institute for Remote Sensing Applications, since 1980 (Beijing, Chinese Academy of Sciences)
IRSC ..... Iranian Remote Secing Center, Tehran, Iran (funded by the Ministry of Posts and Telecommunications)
IRSI ..... Infrared Space Interferometer (ESA mission under definition)
IRT ..... Infrared Telescope (Spacelab−2 instrument, a 15 cm f/4 Herschelian telescope)
IRU ..... Inertial Reference Unit
ISA ..... Institute of Space Aeronomy (Brussels, Belgium)
ISA ..... Israel Space Agency (since 1983 −within the framework of the Ministry of Science and Technology)
ISAC ..... Intelsat Solar Array Coupon (Shuttle experiment)
ISAC ..... ISRO Satellite Center (Bangalore, India)
ISAC − CNR ... Istituto Scienze dell'Atmosfera e del Clima, Rome, Italy
ISAIAH ..... Israeli Space Agency Investigation about Hornets (Shuttle experiment)
ISAL ..... Investigation of STS Atmospheric Luminosities (Shuttle)
ISAM ..... Interferometric Synthetic Aperture Microscopy
ISAR ..... Inflatable SAR (a SAR antenna design to reduce mass)
ISAR ..... Inverse Synthetic Aperture Radar (a technique used for target identification)
ISAS ..... Institute for Space and Astronomical Science (University of Tokyo, Japan), since 1981
ISAT ..... Information Science and Technology (a study title and program of DARPA to develop new radar technology). For 2009, an ISAT flight demonstration is planned, namely a SAR spacecraft in MEO.
ISC Kosmotras .. International Space Company Kosmotras. ISC is a joint venture space launch company of Russia, Ukraine and Kazakhstan with HQ in Moscow (since 1997). Commercial operation of the Dnepr Space Launch System based on SS−18 ICBM technology. Launches are conducted at Baikonur as well as at the Yasny launch base in Dombarovsky, Russia.
ISCCP ..... International Satellite Cloud Climatology Project (by ICSU & WMO)
ISDE ..... Institute for Space and Defense Electronics (a research facility at Vanderbilt University, Nashville Tennessee, USA)
ISDE (RNII KP) Institute of Space Device Engineering, Moscow; a leading Russian company in the design and development of sensors; participation in programs: Venera, Vega, Phobos, Luna, Mars, Prognoz, Granat, Resurs, Okean, Glonass, etc.
ISDE ..... International Society for Digital Earth (founded in Beijing in 2006)
ISDMA ..... International Space Debris Management Authority
ISDN ..... Integrated Services Digital Network
ISECG ..... International Space Exploration Coordination Group (since 2006). The participating agencies are: ASI (Italy), CNES (France), CNSA (China), CSA (Canada), CSIRO (Australia), DLR (Germany), ESA (European Space Agency), ISRO (India), JAXA (Japan), KARI (Republic of Korea), NASA (United States of America), NSAU (Ukraine), Roscosmos (Russia), UAESA (United Arab Emirates), UKSA (United Kingdom). [7226)]
ISECG was established in response to "The Global Exploration Strategy: The Framework for Coordination."
ISEE ..... International Sun Earth Explorer (3 S/C missions)
ISEF ..... International Space Exploration Forum
ISET ..... Integrated Systems Engineering Team (a US working group drawn from industry, academia, and the national laboratories. The objective is

7226) Junichiro Kawaguchi, Kathleen C. Laurini, Bernhard Hufenbach, Jean−Claude Piedboeuf, Andrea Lorenzoni, Britta Schade, Francois Spiero, "Global Space Exploration Policies and Plans: Insights from Developing ISECG roadmap," Proceedings of IAC 2011 (62nd International Astronautical Congress), Cape Town, South Africa, Oct. 3−7, 2011, paper: IAC−11−E3.2−6

to develop interface standards for ORS (Operationally Responsive Space) satellite bus/payloads)

ISI ..... ImageSat International, N.V., formerly WIS (West Indian Space) Ltd., Cayman Islands (a Netherlands Antilles−registered joint venture). Operator of EROS spacecraft (commercial imagery)

ISIC ..... International Space Innovation Centre (Harwell, Oxfordshire, UK, since 2011). ISIC will track the satellites as they orbit Earth, automatically managing each satellite as it passes.
ISIC is part of a wider space cluster at Harwell which includes RAL Space, the UK ESA Centre, the ESA/STFC (Science and Technology Facilities Council) Business Incubation Centre and a growing number of commercial organisations. ISIC is a PPP facility. [7227)]

ISIDE ..... Innovative Satellite Interactive Digital Entertainment. ISIDE was developed through ESA's ARTES applications program.

ISIPOD ..... ISIS Payload Orbital Dispenser (a deployment system of CubeSats/nanosatellites from ISIS (Innovative Solutions in Space), Delft, The Netherlands)

ISIR ..... Infrared Spectral Imaging Radiometer (Shuttle payload)

ISIS ..... Initiative for Space Innovative Standards. ISIS is a project lead by CNES, and two of its industrial partners (namely Airbus Defense & Space and Thales Alenia Space France), with the intention of rationalizing space housekeeping services, from onboard equipment to in−orbit operations, the ultimate objective being to decrease overall mission costs. [7228)]

ISIS ..... Intelligent Satellite−Data Information System (a DLR/DFD archival system and service)

ISIS ..... Innovative Solutions In Space BV (Delft, The Netherlands, since 2006), provider of CubeSat launch services and CubeSat development kits. Note: ISL (Innovative Space Logistics) is a subsidiary of ISIS.

ISLR ..... Integrated Side Lobe Ratio

ISLSCP ..... International Satellite Land−Surface Climatology Project (by ICSU and WMO)

ISM ..... Industrial, Scientific and Medical (standard radio bands in the 2.4 GHz range). Bluetooth is a radio technology operating in the 2.4 GHz ISM frequency band, that is emerging as a low−level and low−power wireless communication protocol used for wireless personal area networks (WPANs).

ISMSE ..... International Symposium on Materials in a Space Environment

ISN ..... Institute of Satellite Navigation at the University of Leeds, UK

ISO ..... International Standards Organization (one of three bodies responsible for the definition of OSI)

ISO ..... Infrared Space Observatory [ESA space science mission (4 instruments) with a launch Nov. 19, 1995, S/C operation until May, 16, 1998]

ISON ..... International Scientific Optical Network (ISON is providing space debris research/detection in GEO, MEO, and HEO orbits). ISON is coordinated by KIAM (Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences) that maintains space objects database and also provides conjunction analysis for GEO satellites.
The ISON project is continuously upgrading and integrating — new observatories are joining, new telescope subsystems are forming, and KIAM database is upgrading: 38 observation facilities in 16 countries

7227) Peter M. Allan, Ian Raper, Jolyon Reburn, "The International Space Innovation Centre: Earth Observation Hub," Proceedings of IAC 2011 (62nd International Astronautical Congress), Cape Town, South Africa, Oct. 3−7, 2011, paper: IAC−11−B4.3.7

7228) Elise Aitier, Laurent Arnaud, "Operational Data Management within the LdP ISIS CCC (Upcoming CNES CCC)," SpaceOps 2014, 13th International Conference on Space Operations, Pasadena, CA, USA, May 5−9, 2014, paper: AIAA 2014−1706, URL: http://arc.aiaa.org/doi/pdf/10.2514/6.2014−1706

comprising 90 telescopes from 12.5 cm up to 2.6 m aperture are involved in the ISON project. [7229)]

ISOPS ..... International Space Conference of Pacific–Basin Societies

Isp ..... Specific Impulse

iSpace ..... Intelligent Space (iSpace) is a relatively new concept to effectively use distributed sensors, actuators, robots, computing processors, and information technology over communication networks. iSpace is a large scale Mechatronics System by integrating sensors, actuators, and control algorithms in a communication system using knowledge from various engineering disciplines such as automation, control, hardware and software design, image processing, communication and networking.– iSpace enables proactive management of space events. [7230)]

ISP ..... Internet Service Provider

ISPR ..... International Standard Payload Rack (a standard research module of ISS). ISPR has a volume of 1.571 m^3 and a net mass of 104 kg. It can hold up to 700 kg of equipment.

ISPRS ..... International Society for Photogrammetry and Remote Sensing. [7231)] ISPRS was founded on July 4, 1910 in Vienna, Austria, on the initiative of Prof. Eduard Doležal. [7232)]

ISPR ..... International Standard Payload Rack (adopted by the ISS program), each ISPR provides 1.6 m^3 of space, the rack has a mass of 104 kg and can accommodate up to 700 kg of payload mass

ISPT ..... In–Space Propulsion Technology, a NASA program since 2001

ISR ..... Intelligence, Surveillance, and Reconnaissance (missions)

ISRO ..... Indian Space Research Organization (HQ at Bangalore, since 1969). ISRO is is India's national space agency.

ISRO/IISU ..... ISRO Inertial Systems Unit

ISRO/ISAC ..... ISRO Satellite Center (Bangalore, India)

ISRO/ISTRAC .. ISRO Telemetry, Tracking and Command Network

ISRO/LPSC .... ISRO Liquid Propulsion Systems Center

ISRO/MCF ..... ISRO INSAT Master Control Facility

ISRO/NRSC .... ISRO National Remote Sensing Center, (Hyderabad, India)

ISRO/SAC ..... ISRO Space Applications Center (Ahmedabad, India)

ISRO/SHAR .... ISRO Sriharikota Range (ISRO launch site, East Coast of India)

ISRO/VSSC .... ISRO Vikram Sarabhai Space Center (launch vehicle development), located on the south/west coast of India near Trivandrum in Kerela State.

ISRS ..... International Symposium on Remote Sensing (of the Korean Society of Remote Sensing)

ISRSE ..... International Symposium on Remote Sensing of Environment

ISS ..... International Space Station

ISSC ..... International Social Science Council (UN)

ISSDC ..... Indian Space Science Data Center, Bangalore, India. ISSDC (since 2008) is the primary center for payload data of ISRO missions.

ISSF ..... Inuvik Satellite Station Facility (since Aug. 2010). NRCan (Natural Resources Canada) is the licensee for the facility.

7229) A. Mokhnatkin, I. Molotov, V. Voropaev, G. Borovin, S. Andrievsky, N. Dorokhov, V. Agletdinov, "Performance analysis of the large space debris tracking telescope in the North Caucasus after the second first light," Proceedings of the 7th European Conference on Space Debris, ESA/ESOC, Darmstadt/Germany, 18 – 21 April 2017, published by the ESA Space Debris Office, SDC7, paper 299, MEAS–1, URL: https://conference.sdo.esoc.esa.int/proceedings/list

7230) "iSpace – Intelligent Space at NC State," URL: https://research.ece.ncsu.edu/adac/ispace–intelligent–space–at–nc–state/

7231) O. Altan, "ISPRS – International Society for Photogrammetry and Remote Sensing," Proceedings of the 50th Session of Scientific & Technical Subcommittee of UN–COPUOS, Vienna, Austria, Feb. 11–22, 2013, URL: http://www.oosa.unvienna.org/pdf/pres/stsc2013/tech–16E.pdf

7232) Orhan Altan, Lena Halounova, "ISPRS is Serving society with information from images," 52nd session of the Scientific and Technical Subcommittee, UNOOSA (United Nations Office for Outer Affairs), Vienna, Austria, Feb. 2–13, 2015, URL: http://www.unoosa.org/pdf/pres/stsc2015/tech–09E.pdf

ISSI ..... International Space Science Institute, Bern, Switzerland
ISSL ..... Intelligent Space Systems Laboratory, University of Tokyo, Japan
IST ..... Instrument Support Terminal (EOSDIS Facility)
ISTARC ..... International Space Time Analysis Research Center (Rome Italy)
ISTC ..... International Science and Technology Center. ISTC is an intergovernmental organization connecting scientists from Russia, Georgia and other countries of the Commonwealth of Independent States (CIS).
ISTP ..... International Solar–Terrestrial Physics Program [involves a total of 12 satellites provided by ESA (SOHO, CLUSTER), NASA [GGS (POLAR, WIND), IMP–8, FAST], IKI (Interball, ECOS–A), ISAS (Geotail)]
ISTRAC ..... ISRO Telemetry and Command Center (Bangalore, India)
ISTS ..... Institute for Space and Terrestrial Science (North York, Ontario, Canada) Note: A name change to CREST (Center for Research in Earth and Space Technology) took place on Sept. 24, 1997
ISTS ..... Institute of Space and Astronautical Science (Tokyo, Japan)
ISTS ..... International Symposium on Space Technology and Science
ISY ..... International Space Year (1992)
ISWI ..... International Space Weather Initiative (a follow–on program to the IHY (International Heliophysical Year))
ITAR ..... International Traffic in Arms Regulation (US regulations related to the export of satellite and rocket technology). The ITAR rules were designed to protect military–sensitive US–dveloped technologies from falling into the hands of US adversaries. However, US allies are also subject to them, even in cases in which the law's applications seem to have escaped the bounds of its intent.
ITC ..... International Institute for Geo–Information Science and Earth Observation, Enschede, The Netherlands (since 1950). Note: the former name was: International Training Centre for Aerial Survey (hence ITC). ITC is an agency of the Ministry of Education, Culture and Science.
ITCZ ..... Inter Tropical Conversion Zone
ITEX ..... Island Thunderstorm Experiment (campaign)
ITIR[7233)] ..... Intermediate Thermal Infrared Radiation (EOS sensor); ITIR was renamed in 1990 ASTER = Advanced Spaceborne Thermal Emission and Reflection Radiometer
ITO ..... Indium Tin Oxide (a light sensitive sensor type)
ITOS ..... Improved TIROS Operational System (NOAA S/C)
ITRF ..... International Terrestrial Reference Frame (established by IERS)
ITSC ..... International TOVS Study Conference (a yearly event on sounding technology)
I–TSP ..... Ionosphere–Thermosphere Storm Probes (NASA Geospace mission)
ITT ..... Invitation To Tender (an ESA praxis for satellite procurement, etc.)
ITT ..... In 2011, the ITT Corporation split into three companies: ITT, Xylem, and ITT Exelis.
ITT Exelis ..... Exelis is an ITT company as of Oct. 31, 2011. Exelis is involved in C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) related products and systems and information and technical services. ITT Exelis is located in Fort Wayne, IN, USA. **– In May 2015, Harris Corp. of Melbourne, FL. acquired Exelis Inc. of Fort Wayne, IN.** [7234)]
ITT Industries ... Headquarters in White Plains, NY, USA. ITT builds navigation and meteorological satellites; ground station design and development; payload processing, launch integration and services; range engineering and

7233) "The Earth Observer," Vol. 2 No. 10, Dec. 1990, pp. 3
7234) "Harris Corporation Completes Acquisition of Exelis," Press Release, May 29, 2015, URL: http://www.exelisinc.com/news/pressreleases/Pages/Harris–Corporation–Completes–Acquisition–of–Exelis.aspx

technical support; simulation, mission planning and on−board processing software development. In Feb. 2004, ITT acquired the RSS (Remote Sensing Systems) division of Eastman Kodak Co.

ITT−A/CD ..... ITT Industries Inc. Aerospace/Communications Division (Fort Wayne, IN), builder of remote sensing instruments (AVHRR, HIRS, GOES−series instruments, etc.).

ITT−AES ..... ITT Industries Inc. Advanced Engineering & Sciences with HQ in Reston, VA. AES (defense, telecommunication, information technology) is in turn part of ITT's Defense Electronics & Services division.

ITU ..... International Telecommunication Union (since 1865, founded as International Telegraphy Union, since 1934 as ITU, since 1947 ITU is a UN agency to cover standards for a wide range of telecommunication services, including frequency allocations standards for fax, ISDN, JPEG, MPEG, ATM, AIS, etc., Geneva, Switzerland). In 2013, ITU has a membership of 193 countries and over 700 private−sector entities and academic institutions.

ITU−R ..... ITU−Radiocommunication standardization sector (formerly known as CCIR − responsible for managing efficient use of the radio−frequency spectrum)

ITU−T ..... ITU−Telecommunication standardization sector (formerly CCITT)

IUGG ..... International Union of Geodesy and Geophysics (since 1919, a union of ICSU). The international associations of IUGG are: 1) IAG (International Association of Geodesy); 2) IAGA (International Association of Geomagnetism and Aeronomy); 3) IAHS (International Association of Hydrological Sciences); 4) IAMAS (International Associacition of Meteorology and Atmospheric Sciences); 5) IAPSO (International Association for the Physical Sciences of the Oceans); 6) IASPEI (International Association of Seismology and Physics of the Earth's Interior); 7) IAVCEI (International Association of Volcanology and Chemistry of the Earth's Interior).

IVHM ..... Integrated Vehicle Health Monitoring (Shuttle payload, terchnology demonstration)

IVHS ..... Intelligent Vehicle/Highway Systems

IVS ..... International VLBI Service for Geodesy and Astrometry

IWF ..... Institut für Weltraumforschung, Graz, Austria

IWGGMS ..... International Workshop on Greenhouse Gas Measurements from Space

IWSCFF ..... International Workshop on Satellite Constellation and Formation Flying

IWV ..... Integrated Water Vapor (a term used for GPS meteorology for total column integrated water vapor monitoring)

IYA ..... International Year of Astronomy (2009) declared by the UN General Assembly in collaboration with the IAU (International Astronomical Union)

IZMIRAN ..... Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation (of Russian Academy of Sciences, Troitsk, Moscow region)

J

JACIE ..... Joint Agency Civil Commercial Imagery Evaluation (annual workshop series of NASA, NGA, USGS, USDA, NOAA, etc.). The JACIE team was formed in 2000.

JAMIC ..... Japan Microgravity Center (Kamisunagawa, Hokkaido)

JAMSS ..... Japan Manned Space Systems Corporation, (Tokyo, Tsukuba, Operation and utilization support of JEM)

JAMSTEC ..... Japan Marine Science and Technology Center (Tokyo)

JAROS ..... Japan Resources Observation System Organization

JAFIC ..... Japan Fisheries Information Center

JAXA . . . . . Japan Aerospace Exploration Agency, Tokyo; – JAXA is the new name (merger) of the three former Japanese space organizations into a single national agency, namely: NASDA (National Space Development Agency of Japan), ISAS (Institute of Space and Astronautical Science), and NAL (National Aerospace Laboratory of Japan). The merger is effective as of Oct. 1, 2003
In April 2015, the goal of JAXA is to become a National Research and Development Agency. [7235)]

JAXA/EORC . . . JAXA/Earth Observation Research Center

JAXA/IAT . . . . . JAXA/Institute of Aerospace Technology

JAXA/ISAS . . . . . JAXA/Institute of Space and Astronautical Science

JAXA/JSPEC . . . JAXA Space Exploration Center (a new directorate of JAXA established on April, 1 2007)

JAXA/SDRC . . . . JAXA/Space–technology Demonstration Research Center (conducts the small satellite program)

JCAB . . . . . Japanese Civil Aviation Bureau (JCAB is an agency/organization within the Japanese Ministry of Transport)

JCET . . . . . Joint Center for Earth Systems Technology (since 1995) at UMBC (University of Maryland, Baltimore County) . JCET operates under a cooperative agreement between UMBC and NASA/GSFC to develop new technology for environmental remote sensing.

JCOMM . . . . . Joint Technical Commission on Oceanography and Marine Meteorology (since 1999 of WMO/IOC of UNESCO). An intergovernmental body of technical experts that provides a mechanism for international coordination of oceanographic and marine meteorological observing, data management and services, combining the expertise, technologies and Capacity Development capabilities of the meteorological and oceanographic communities. [7236)]

JCSDA . . . . . Joint Center for Satellite Data Assimilation (a NOAA and NASA research center, created in 2001, to improve the use of satellite data for analyzing and predicting the weather, the ocean, the climate and the environment)

JEA . . . . . Japan Environmental Agency

JEM . . . . . Japanese Experiment Module (Japan's pressurized module directly attached to the Space Station Freedom). JEM (Kibo, meaning Hope).

JEM–EF . . . . . JEM–External Facility

JEMRMS . . . . . JEM Remote Manipulator System (NASDA contribution to ISS; JEMRMS is planned to be installaed in 2006)

Jena–Optronik . Jena–Optronik GmbH (Jena, Germany) was founded in 1992 by Daimler–Benz Aerospace and Jenoptik AG as a successor company of the former VEB Carl Zeiss Jena. Jena–Optronik is a builder of AOCS (Attitude Orbit and Control System) sensors (ASTRO family) for the satellite industry. Shareholders of Jena–Optronik GmbH are EADS NV and Jenoptik AG. As of January 2005, Jena–OptroniK GmbH became a 100% subsidiary of the Jenoptik Group.

Jenoptik AG . . . . Jena, Germany, Jenoptik grew out of Jenoptik Carl Zeiss Jena GmbH in 1991.

JEOS . . . . . Japanese Earth Observation System

JERS . . . . . Japanese Earth Resources Satellite, F.25

JFCC SPACE . . . Joint Functional Component Command for SPACE. JFCC SPACE is a component of US Strategic Command (established in July 2006), located at VAFB. As of 2016, JFCC SPACE tracks approximately 23,000 objects in orbit, including 4,000 payloads, of which approximately 1300 are active. The DOD, through the U.S. Strategic Command (JFCC SPACE/JSpOC), is responsible for tracking orbital debris while main-

7235) "Message from president of JAXA," JAXA, April 2015, URL: http://global.jaxa.jp/about/president/index.html

7236) http://www.wmo.int/pages/prog/amp/mmop/jcomm_partnership_en.html#History

taining and conducting space situational awareness (SSA) for domestic and international operators. JFCC SPACE, through the JSpOC, is the world's premier provider of space situational awareness data and products.

JFET ..... Junction Field−Effect Transistor

JGOFS ..... Joint Global Ocean Flux Study (IGBP program)

JGR ..... Journal of Geophysical Research (a publication of AGU)

JGPSC ..... Japan GPS Council (over 80 manufacturers, major users, research institutes, etc.)

JHU ..... Johns Hopkins University (Baltimore, MD, USA)

JHU/APL ..... JHU/Applied Physics Laboratory, Laurel, MD, USA, since 1942; APL is a major space research institute (staff of 2700) and the designer and builder of satellites (Transit series, ACE, AMPTE/CCE, MSX, NEAR, TIMED, etc.), instruments, S/C engineering, technical innovations, etc.

JHU/PhA ..... Johns Hopkins University/Physics & Astronomy Department (Baltimore, MD, USA)

JICA ..... Japan International Cooperation Agency (since 1954)

JILA ..... Joint Institute for Laboratory Astrophysics. JILA is a physical science research institute in the United States. JILA is located on the University of Colorado Boulder campus. JILA is jointly operated by the University of Colorado (CU) and the National Institute of Standards and Technology (NIST). − JILA was founded in 1962 as a joint institute of CU Boulder and NIST. [7237)]

JJ−FAST ..... JICA−JAXA Forest Early Warning System in the Tropics [7238)]

JMA ..... Japan Meteorological Agency (JMA is an agency/organization within the Japanese Ministry of Transport)

JODC ..... Japan Oceanographic Data Center

JOWIP ..... Joint Canada−US Ocean Wave Investigation Project (campaign)

JPALS ..... Joint Precision Approach and Landing System (developed by Raytheon for DoD). JPALS is an all−weather, all−mission, all−user landing system based on local area differential Global Positioning System (GPS). Note: JPALS is the military counterpart to LAAS (Local Area Augmentation System). JPALS is a landing system for ceilings of 100 feet (30 m, category II) down to zero feet that works in all weather conditions, including zero visibility, without allowing its signal to be jammed or otherwise tampered with.

JPEG (JPG) .... Joint Photographic Experts Group (a compressed image format standard, 24−bit color; note: JPEG is a lossy compression technique based on DCT)

JPEG−LS ..... JPEG lossless − use of a 2−D edge−detection predictor. JPEG−LS is the new (1998/9) lossless/near−lossless compression standard for continuous−tone images, ISO−14495−1/ITU−T.87. The standard is based on the LOCO−I algorithm (LOw COmplexity LOssless COmpression for Images) developed at Hewlett−Packard Laboratories.

JPL ..... Jet Propulsion Laboratory, Pasadena, CA, since 1944 (DAAC of NASA EOS Program). JPL is the only NASA center that is managed by a university, namely the California Institute of Technology

JPO ..... Joint Program Office (GPS)

J−POD ..... JAXA−Picosatellite Orbital Deployer

JPOP ..... Japanese Polar Platform

JPSS ..... Joint Polar Satellite System. In Feb. 2010, the NPOESS program was terminated by the US government due to severe cost overruns and program delays. NOAA's new satellite program, JPSS, was created in the aftermath of the White House's Feb. 2010 decision to canel NPOESS.

7237) Julie Phi"JILA: The First 50 Years," CU Boulder, NIST, URL: https://jila.colorado.edu/sites/default/files/assets/files/publications/jila_at_50.pdf

7238) "JJ−FAST," JAXA, URL: https://www.eorc.jaxa.jp/jjfast/

The development of the new JPSS will be managed by NASA/GSFC while the spacecraft will be owned and operated by NOAA.. The launch of JPSS−1 is planned for 2016.

JRC ..... Joint Research Centre (umbrella agency of CEU coordinating eight research institutes at five sites (Geel, Belgium; Karlsruhe, Germany; Petten, Netherlands; Ispra, Italy; Seville, Spain). IRMM (Institute for Reference Materials and Measurements) is located in Geel; ITU (Institute of Transuranium Elements) is in Karlsruhe; IAM (Institute of Advanced Materials) is in Petten; IPS (Institute for Prospective Technological Studies) in Seville. The following institutes are located in Ispra: ISIS (Institute for Systems, Informatics and Safety), EI (Environment Institute), SAI (Space Applications Institute), IHCP (Institute for Health and Consumer Protection). − The JRC Program Directorate is located in Brussels.

JSASS ..... Japan Society for Aeronautical and Space Sciences

J−spacesystems . Japan Space Systems. On march 30, 2012, Institute for Unmanned Space Experiments Free Flyer (USEF), Japan Resources Observation System and Space Utilization Organization (JAROS), and Earth Remote Sensing Data Analysis Center (ERSDAC) merged and started newly as Japan Space Systems (J−spacesystems). On April 1, 2013, J−spacesystems (also known as JSS) was approved by the Cabinet Office of Japan to become the general foundation from non−profit organization. [7239)]

JSC ..... Johnson Space Center of NASA(Houston, TX, USA)

JSC ..... Joint Scientific Committee (of WCRP)

JSLC ..... Jiuquan Satellite Launch Center, China (since 1970)

JSpOC ..... Joint Space Operations Center of the US Air Force, located at VAFB, CA USA. The JSpOC's Space Situational Awareness (SSA) Operations Cell maintains the US space catalog for all Earth orbiting man−made objects (tracking routinely tens of thousands of objects in Earth orbit. After the first collision of an operational satellite in February 2009, JSpOC started to predict close approaches for all the operational satellites and to send information messages describing close approach risks to operators worldwide.
In July 2010, Conjunction Summary Messages (CSM) which are complete information to assess a collision alert, were made available for all by USSTRATCOM with a secured access on the Space Track website. Between April and August 2014, JSpOC transitioned from CSM to the standardized format CDM (Conjunction Data Message), as defined by the CCSDS (Consultative Committee for Space Data Systems).

Note: On 18 July 2018, U.S. Air Force Gen. Jay Raymond, commander of Air Force Space Command and Joint Force Space Component, U.S. Strategic Command (right) presided over the ceremony marking the transition of the **JSpOC** (Joint Space Operations Center) to the **CSpOC** (Combined Space Operations Center). The change is designed to enhance coordination and cooperation between the U.S. and its allies in safeguarding the space domain. [7240)]
Air Force Gen. Jay Raymond, Joint Force Space Component Commander and commander of Air Force Space Command, presided over the ceremony. The CSpOC ensures the combined space enterprise meets and outpaces emerging and advancing space threats. Conducting operations with allies and partners will improve space mission assurance, resilience and mutual security, broaden military relationships by leverag-

7239) J−spacesystems Japan Space Systems, URL: http://www.jspacesystems.or.jp/en_/

7240) "Combined Space Operations Center established at Vandenberg AFB," AFSC (Air Force Space Command), 19 July 2018, URL: https://www.afspc.af.mil/News/Article−Display/Article/1579285/combined−space−operations−center−established−at−vandenberg−afb/

ing capabilities, maximize effectiveness across all mission areas, and expand international partnerships in support of combined objectives. The CSpOC will provide input to develop and improve the ability to rapidly detect, warn, characterize, attribute, and defend against disturbances to space systems. The center will help to increase the resilience of the combined space enterprise and support the delivery of space–based capabilities for allies, partners and other responsible space–faring nations. These space capabilities allow decision makers to see the battlespace with clarity, strike with precision, navigate with accuracy, communicate with certainty, and operate with assurance over global distances.

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J–SSOD . . . . . JEM–Small Satellite Orbital Deployer. JEM is the Japanese Experimental Module of the International Space Station (ISS). J–SSOD is a CubeSat deployer that was launched to the ISS on July 21 on HTV–3 of JAXA.

JST . . . . . Japan Science and Technology Corporation (Tokyo, a Japanese government corporation promoting new technologies and basic research)

JTRS . . . . . Joint Tactical Radio System – a DoD program which started in 2005 to come up eventually with an advanced architecture for SDR (Software Defined Radio).

JTWC . . . . . Joint Typhoon Warning Center. JTWC is a joint United States Navy – United States Air Force task force located in Pearl Harbor, Hawaii. The JTWC is responsible for the issuing of tropical cyclone warnings in the North West Pacific Ocean, South Pacific Ocean and Indian Ocean for United States DoD interests, as well as U.S. and Micronesian civilian interests within the command's area of responsibility (AOR).

JUSREX . . . . . Joint US/Russian Internal Wave Remote Sensing Experiment (campaign)

JWGA . . . . . Joint Working Group ATMOS

JWST . . . . . James Webb Space Telescope (of NASA). Note: The NGST (Next Generation Sapce Telescope) mission was renamed to JWST in Sept. 2002.

K

KACST . . . . . King Abdulaziz City for Science and Technology (Riyadh, Saudi Arabia, since 1977), home of SRISA (Space Research Institute of Saudi Arabia) also referred to as RSRI (Riyadh Space Research Institute)

KAIST . . . . . Korean Advanced Institute of Science and Technology (Seoul, Korea, since 1989). KAIST is a university based research center for science satellite development

KAIST/SaTReC . KAIST/ Satellite Technology Research Center (Daejeon, Korea, since 1989, SaTReC is a university based research center)

KAO . . . . . Kuiper Airborne Observatory (C–141 aircraft of NASA/ARC). Named after US astromoner Gerard P. Kuiper (1905–1973) of Dutch descent.

KAPEX . . . . . Cape of Good Hope Experiments (campaign)

KARI . . . . . Korea Aerospace Research Institute (Daejeon, Korea, since 1989). KARI is the key space development center in Korea under MOST (Ministry of Science and Technology) for space development (600 employees as of 2005, over 700 engineers/scientists in 2012). Missions: KitSat–3 (1999), KOMPSAT–1, STSAT–1, KOMPSAT–2 (2006), COMS (2010), KOMPSAT–3 (2012), etc.

KASI . . . . . Korea Astronomy and Space Science Institute – as of January 2005, formerly the institute was named **KAO** (Korea Astronomy Observatory). KASI is the national astronomy research institute of Korea established in 1974.

KASS . . . . . Korea Augmentation Satellite System. The Korean regional system KASS will enhance the positioning performance provided by the cur-

rent GPS satellite navigation system and will also address Glonass and Galileo in the future. — KASS will be provided by TAS (Thales Alenia Space) and is based on EGNOS (European Geostationary Navigation Overlay System). [7241)]

KAUST ..... King Abdullah University of Science and Technology, a private research university located in Thuwal (on the Red Sea), Saudi Arabia.

Kazkosmos ..... Kazkosmos (also spelling of **Kazcosmos**) is the national space agency of the Republic of Kazakhstan, established in March 2007. Kazkosmos is located in Astana, Kazakhstan.

KCWI ..... Keck Cosmic Web Imager. An instrument (~4000 kg) designed to image the vast web of gas that connects galaxies in the universe. KCWI will be integrated into the W. M. Keck Observatory on Hawaii. [7242)]

KEEO ..... Kamal Ewida Earth Observatory, Egypt (an early warning facility of natural disasters). KEEO is in planning as of 2010.

KEOC ..... Korean Earth Observation Center, Seoul, Korea

KfA ..... Kernforschungsanlage Jülich (Nuclear Research Center, Jülich, Germany)

KfK ..... Kernforschungszentrum Karlsruhe (Nuclear Research Center, Karlsruhe, Germany; KfK was renamed to FZK (Forschungszentrum Karlsruhe as of 1995)

KFKI ..... Hungarian Research Institute for Particle and Nuclear Physics

KH ..... Keyhole (a code name designating a DoD reconnaissance satellite series as well as the principal camera system of the S/C)

KhSC ..... Khrunichev Space Center, Moscow. Leading company in the development, production, testing, and operation of launch vehicles and spacecraft, utilization of Proton. Participation in programs: Venera, Mars, Luna, Kosmos, Phobos, Vega, Gorizont, Salyut, MIR, Almaz, Energia–Buran, Zond, etc.

KIAM ..... Keldysh Institute of Applied Mathematics, Moscow, Russia

KID ..... Kinetic Inductance Detector (a type of superconducting photon detector first developed by scientists at the California Institute of Technology and the Jet Propulsion Laboratory in 2003). KIDs are highly sensitive radiation detectors that function at extremely low temperatures of 0.1 K. These detectors have been specifically developed for use in a new generation of far–infrared space telescopes, for which all of the optical equipment is actively cooled. Such a telescope is so sensitive that it can measure radiation from the darkest corners of the universe.

KidSat ..... A NASA–sponsored program (start in 1995, the first Shuttle flight of Kidsat was on STS–76 in March 1996) to encourage the student and educator community in space technology involvement, to bring space exploration into the classrooms. Activities may encounter interpretation of remotely–sensed images, the development of imaging instruments as well as their on–orbit operation. Further Shuttle flights of KidSat on STS–81 (Jan. 12–22, 1997) and on STS–86 (Sept. 25 – Oct. 6, 1997). Access to the program is via Internet. KidSat observation missions are carried out on Space Shuttle flights and on the future Space Station.

KIOST ..... Korea Institute of Ocean Science and Technology (as of July 2012, formerly KORDI). KIOST is an entity established by Korea Ministry of Land, Transportation and Maritime Affairs, with expanded functions from KORDI.

KITSAT ..... Korea Institute of Technology Satellite (F.26, F.62.6, F.62.10,)

KMA ..... Korean Meteorological Administration, Seoul, Korea

7241) "Heightening South Korea's Satellite System Will Be Thales Alenia Space," Satnews Daily, Oct. 26, 2016, URL: http://www.satnews.com/story.php?number=225402174

7242) "Keck Cosmic Web Imager Ships from Caltech to Keck Observatory," Space Daily, Jan. 13, 2017, URL: http://www.spacedaily.com/reports/Keck_Cosmic_Web_Imager_Ships_from_Caltech_to_Keck_Observatory_999.html

KNMI ..... Koninklijk Nederlands Meteorologisch Instituut (Royal Netherlands Meteorological Institute) De Bilt, Netherlands, the Dutch Weather Service.

KOMPSAT ..... Korea Multi−Purpose Satellite, F.27

KORDI ..... Korea Ocean Research and Development Institute, Seoul, Korea, (since 1973) − Note: As of July 2012, KORDI was reorganized and renamed; it is now known under: **KIOST** (Korea Institute of Ocean Science and Technology).

KOSC ..... Korean Ocean Satellite Center (a facility of KIOST)

KSAS ..... Korean Society for Aeronautical and Space Sciences, Seoul, Korea

KSAT ..... Kongsberg Satellite Services AS. KSAT is the largest global commercial provider of EO ground station services (TT&C, launch support, etc.) with HQ in Tromsø, Norway. The ground stations are located in Tromsø (69° 39' N, 18° 56' E), Svalbard (Spitsbergen, 78° 15' N, 15° 80' E, Svalbard is also referred to as SvalSat), Grimstad (in the south of Norway located at 58° 20' N, 8° 21' E), the TrollSat ground station in Antarctica (72° S, 2° E, since 2007, TrollSat has 3 full motion S/X−band 7.3 m antennas), and the Alaska ground station at 70° N. The Pole to Pole network can be accessed through TNOC (Tromsø Network Operations Center). The antennas are remotely controlled from TNOC. All major space agencies and commercial mission operators are using the KSAT station services for maximum coverage of their missions. Further mid−latitude ground stations are located in Hartebeesthoek (South Africa, 25°S, 27°E), Dubai (22°N, 55°E), Singapore (1°N, 102°E), and Mauritius (20°S 57°E). [7243)]

7243) Martin Krynitz, Arild José Jensen, "Minimizing latency by investing in multiple processors in a multi−mission environment," Proceedings of the 64th International Astronautical Congress (IAC 2013), Beijing, China, Sept. 23−27, 2013, paper: IAC−13−B1.1.9

Figure 1624: KSAT ground station complex on Svalbard, SvalSat (image credit: KSAT)

KSC . . . . . Kennedy Space Center (NASA facility at Cape Canaveral, FL, USA)
KSEA . . . . . Korean–American Scientists and Engineers Association (since 1971)
KSLV . . . . . Korean Satellite Launch Vehicle (first launch planned in 2007)
KTH . . . . . Kungliga Tekniska Högskolan (Royal Institute of Technology) Stockholm, Sweden
Kvant GNPP . . . . Kvant State Science and Production Enterprise, Moscow (since 1987, its predecessor was Kvant NPO). Manufacturer of primary power systems (solar cells and solar arrays). Kvant is/was involved in all, or nearly all the Soviet/Russian spacecraft, featuring solar arrays. In 1992, Kvant formed Sovlux joint ventures with Sunflex Inc. USA.

L

L3 . . . . . Latitude/Longitude Locator (Shuttle experiment)
L3/IS . . . . . L–3 Communications Integrated Systems (HQ in Greenville, TX, USA)
LAAS . . . . . Local Area Augmentation System (GPS). LAAS is FAA's ground–based augmentation system for local area DGPS.
LABEN S.p.A. . . Laboratori Elettronici Nucleari, of Vimodrone (Milano, Italy), Lab of Alenia Spazio (a Finmeccanica company). LABEN was founded in 1958, it produces electronic systems, transducers, LAGRANGE (LABEN GNSS Receiver for Advanced Navigation), etc.
LABOCA . . . . . Large APEX Bolometer Camera – a ground–based facility instrument of ESO in the Atacama desert of Chile installed in the APEX (Atacama Pathfinder EXperiment) Telescope. LABOCA is a first generation bolometer array. It was installed in 2006, representing the most sensitive camera for microwave radiation detection. LABOCA consists of 295 channels operating in the 870 μm (345 GHz) atmospheric window. LABOCA is cooled to cryogenic temperatures. The instrument

was built by MPIfR (Max–Planck–Institut für Radioastronomie), Bonn.

LAC ..... Local Area Coverage (NOAA downlink mode)

Lacrosse/Vega ... A DoD/NRO radar imaging satellite reconnaissance program. Lacrosse–1 was launched Dec. 2, 1988 by Shuttle (STS–27) and went into a 57° orbit with an altitude of 680 km. Lacrosse–2 was launched from VAFB on March 8, 1991. Lacrosse–3 was launched from VAFB on Oct. 24, 1997. Lacrosse–4 was launched from VAFB on Aug. 17, 2000.

LADAR ..... Laser Detection and Ranging

LAEFF ..... Laboratorio de Astrofisica Espacial Fisica Fundamental (Villafranca, Spain, Laboratory for Space Astrophysics and Theoretical Physics, since 1990)

LAGEOS–I,II .. Laser Geodynamics Satellite (NASA/ASI), G.15

LAMBADA .... Large–scale Atmospheric Moisture Balance of Amazonia using Data Assimilation (campaign)

LAN ..... Local Area Network

LandSat ..... Land (Remote Sensing) Satellite, US EO program, F.28

LANL ..... Los Alamos National Laboratory (Los Alamos NM, DOE facility, operated by the University of California). Builder of satellites (ALEXIS, FORTE, MTI, etc) and instruments for space research (solar wind, lightning detection). Los Alamos played (and plays) a key role in monitoring treaty compliance with satellite sensors (detecting atmospheric nuclear tests).

LAPAN ..... Lembaga Penerbangan dan Antariksa Nasional (Indonesian National Institute of Aeronautics and Space, Jakarta)

LAP–B ..... Link Access Protocol (for B Channels)

LaRC ..... Langley Research Center (Hampton VA, DAAC of NASA EOS Program)

LASP ..... Laboratory for Atmospheric and Space Physics at the University of Colorado, Boulder, CO

LASER ..... Light Amplification by Stimulated Emission of Radiation

LASSO ..... Laser Synchronization from (Geo)Stationary Orbit (ESA, Meteosat)

LAT ..... Laboratoire d'Astrophysique de Toulouse (France)

LATOR ..... Laser Astrometric Test Of Relativity (a proposed fundamental physics mission of NASA and ESA)

Lavochkin ..... Lavochkina Scientific Production Association, Khimky, Russia

LBH ..... Lyman–Birge–Hopefield (spectral bands in the 140–180 nm range)

LCD ..... Liquid Crystal Display (a device acting as a valve through which polarized light passes unless blocked by the application of a low voltage)

LCOS ..... Liquid Crystal on Silicon (technology)

LCRD ..... Laser Communications Relay Demonstration (a hosted NASA payload)

LCROSS ..... Lunar CRater Observation and Sensing Satellite (mission of NASA)

LCT ..... Laser Communication Terminal

LCTF ..... Liquid Crystal Tunable Filter

LDACS ..... L–band Digital Aeronautical Communications System

LDA ..... Laser Diode Array

LDC ..... Large Diameter Centrifuge (a world–class facility at ESA/ESTEC). LDC can simulate gravitational fields up to 20 times the pull of gravity at Earth's surface.

LDCE ..... Limited Duration Space Environment Candidate Materials Exposure (Shuttle experiment)

LDCM ..... Landsat Data Continuity Mission (of NASA, an LDCM launch is considered for the 2005/6 time frame)

LDEF ..... Long Duration Exposure Facility, NASA S/C, L.9

LDEO ..... Lamont−Doherty Earth Observatory (Columbia University, New York, NY, USA, since 1949)
LDG ..... Laboratoire de Détection et de Géophysique, Bruyères−le−Châtel, France
LDGPS ..... Local−Area Differential GPS (generic term for local ground augmentation systems of GPS, like LAAS, JPALS, etc.). LDGPS is a real−time DGPS system that is made available over a relatively small area (in the order of 100 km radius). Two or more GPS receivers are used to create a local reference to each other.
LDR ..... Large−scale Deployable Reflector [advanced antenna design of ESA within the LDA (Large Deployable Antenna) program]
LDR ..... Linear Depolarization Ratio
LE90 ..... Linear Error of 90% − a measure of positional accuracy of observed imagery
LEADEX ..... Arctic Leads Experiment (campaign)
LED ..... Light−Emitting Diode (a semiconductor device which becomes luminescent on application of a low voltage). Red and green LEDs were already available by the late 1960s. The advent of the first luminous blue LED, which took place in 1993, completed the visual spectrum. A wide range of potential applications, from domestic lighting to optical storage, opened up.
LEDA ..... Landsat On−Line Earthnet Data Availability (ESA database file)
LEED ..... Low−Energy Electron Diffraction
LEEM ..... Laboratory for Space and Microgravity Research. LEEM is a Spanish student and young professionals association, involving more than 200 members from eleven universities, with local offices in six Spanish major cities and collaboration agreements with students from three continents.
LEGOS ..... Laboratoire d'Études en Géophysique et Océanographie Spatiale (Toulouse, France, affiliated with CNES, CNRS and the Université Paul Sabatier in Toulouse; research in geophysics, oceanography and glaciology)
LEMNOS ..... Laser−Enhanced Mission and Navigation Operational Services. NASA plans to install laser communications on future Orion missions.
LEO ..... Low Earth Orbit (usually for all satellite orbits up to 1000 or 2000 km altitude; in contrast to geostationary (GEO) orbits at altitudes of about 36000 km)
LEON−FT ..... LEON−FT (Fault Tolerant) microprocessor family. The LEON project was started by ESA/ESTEC in 1997 with the goal to develop high−performance microprocessors for space applications.
LEON2−FT .... The design of the microproceesor based on the SPARC−V8 RISC architecture and instruction set (developed by Aeroflex Gaisler under ESA contract) includes techniques of radiation hardening by design with full triple modular redundancy. Example: The AT7913E SpaceWire Remote Terminal Controller (SpW−RTC) provides a bridge between a SpaceWire network and a CAN bus, and includes a LEON2−FT processor. The LEON2−FT (AT697) is manufactured by Atmel.
LEON3−FT .... LEON3−FT based SCOC3 (Spacecraft Controller On−a− Chip), a 32−bit SPARC V8 architecture microprocessor. SCOC3 has been developed at EADS Astrium SAS. Examples: the SIR−2 (Near Infrared Spectrometer) of Chandrayaan−1 mission flew LEON3−FT. The SCOC3 has been selected for the SEOSAT and SPOT−6/−7) missions.
LEON4−FT .... LEON4−FT is a next generation microprocessor (64−bit or 128−bit SPARC V8 architecture) under development (2011) by Aeroflex Gaisler, Göteburg, Sweden.
LEOP ..... Launch and Early Orbit Phase
LEOS&R ..... LEO Search and Rescue (system flown on LEO S/C)

LeRC ..... NASA Lewis Research Center (Cleveland, OH, USA). Note: On March 1, 1999, LeRC was renamed to NASA's John H. Glenn Research Center (GRC) at Lewis Field, OH.
LERTS ..... Laboratoire d'Etudes et de Recherches en Télédétection Spatiale (Toulouse, France, belongs to CNES/CNRS, renamed to CESBIO as of 1995)
LES ..... Lincoln (Laboratory) Experimental Satellite. A DoD microsatellite series (up to LES−4) and minisatellite series (LES−5 to LES−9) designed and built at MIT/LL (test of communication technologies). Launch of LES−1 on Feb. 11, 1965; launch of the LES−8/9 pair on March 15, 1976
LET ..... Light Emitting Transistor (invented in 2003 at the University of Illinois at Urbana−Champaign) [7244)]
LET ..... Linear Energy Transfer. Refers to the rate at which energy is deposited in matter as an ionizing particle travels through. Typical units are MeV/cm or scaled by material density as MeV cm^2/mg
LETI ..... Laboratoire d'Electronique de Technologie et d'Instrumentation (at Grenoble, France)
LEWEX ..... Labrador Extreme Wave Experiment (campaign)
LF ..... Low Frequency (30 − 300 kHz band)
LFC ..... Large Format Camera, L.10
LFM ..... Linear Frequency Modulated (chirp signal of a radar system)
LFM−CW ..... Linear Frequency Modulated−Continuous Wave (radar). Note: The LFM−CW operation requires less power than a comparable pulsed SAR and enables hardware which is less complicated, and thus easier to fabricate.
LFSAH ..... Light Weight Flexible Solar Array Hinge (Shuttle payload)
LGA ..... Low Gain Antenna
LHCP ..... Left Hand Circural Polarization
LHP ..... Loop Heat Pipe (Shuttle Experiment)
LH Systems ..... LH Systems LLC, with company HQ in San Diego, CA (airborne cameras). In 1997, Leica AG of Heerbrugg (photogrammetry and aerial camera systems), Switzerland, formed a joint venture with BAE SYSTEMS, Inc. of San Diego, CA, and with Helava Associates Inc. a subsidiary of GDE Systems. The new company is called "LH Systems LLC" in San Diego and LH Systems GmbH in Heerbrugg, Switzerland
LIC ..... Lithium−Ion Capacitor
Li−Ion (or LI) .. Lithium−Ion (battery type)
Li−Po ..... Lithium−Polymer (battery type)
LIDAR ..... Light Detection and Ranging
LIF ..... Laser−Induced Fluorescence (active remote sensing method)
LIFT ..... Laser Induced Fluorescence Transient (a method to measure photosynthetic properties in terrestrial plants)
LIGA ..... LIthographie, Galvanoformung und Abformung (lithography, electroplating and moulding)
LIGO ..... Laser Interferometric Gravitational−wave Observatory. LIGO is a research facility designed to listen for gravitational waves from the depths of space with the aid of a laser interferometer. LI GO is comprised of four distinct facilities across the United States: two gravitational wave detectors (the interferometers) and two university research centers. The interferometers are located in fairly isolated areas of Washington (LIGO Hanford) and Louisiana (LIGO Livingston), and separated by 3,002 km. — The LIGO Scientific Collaboration is a group of more than 1000 scientists worldwide who have joined together in the search for gravitational waves.

7244) M. Feng, N. Holoyak, W. Hafez, "Light−emitting transistor: Light emission from InGaP/GaAs heterojunction bipolar transistors," Applied Physics Letters, Vol. 84, No 1, Jan. 5, 2004, pp. 151−153

On Feb. 11, 2016, LIGO scientists announced the **detection of gravitational waves**, which were predicted in Einstein's general theory of relativity of 1915. The new LIGO discovery is the first observation of gravitational waves themselves, made by measuring the tiny disturbances the waves make to space and time as they pass through the Earth. [7245)]

LIMEX ..... Labrador Ice Margin Experiment (campaign)

LISA ..... Laser Interferometer Space Antenna (a three S/C cooperative mission of ESA and NASA, with a proposed launch in 2011). The objective is to study low−frequency gravitational waves from galactic and extra−galactic binary systems. The three S/C are separated some 5,000,000 km apart, forming an equilateral triangle (a giant interferometer). Plans call for LISA's trio of identical S/C to orbit the sun at the same distance as Earth, but trailing about 50 million km in orbit behind our planet.

LISS ..... Linear Imaging Self−Scanning Sensor (ISRO sensor series)

LITE ..... Lidar In−space Technology Experiment, Shuttle mission, L.11

LLCD ..... Lunar Laser Communication Demonstration (payload of NASA's LADEE mission)

LLNL ..... Lawrence Livermore National Laboratory (Livermore, CA, a DOE lab managed by the University of California)

LLRP ..... Lunar Laser Ranging Program (NASA). LLRP was started by the Apollo−11 mission (July 21, 1969) which installed a retroreflector array on the moon. Two more retroreflector arrays were left by the Apollo 14 and Apollo 15 missions − referred to as the Apollo CCRs (Corner Cube Reflector) arrays.

LLRRA−21 .... Lunar Laser Ranging Retroreflector Array for the 21st century. (2nd generation LLR)

LLV1 (or 2) ..... Lockheed Launch Vehicle 1 (or 2)

LM ..... Lockheed Martin Corporation, HQ at Bethesda, MD. The world's largest space company resulted in 1995 as a merger of the former Lockheed Missiles and Space Co. with the former Martin Marietta Astronautics and Martin Marietta Astro Space (which itself is based on former GE Astro Space). The new LM structure has five sectors, each with operating units and subsidiaries. The sectors are: Aeronautics, Electronics, Energy, Information & Services, and Space & Strategic Missiles. LMMS (see below), LMSS Space Systems−Astronautics (Denver, CO), LM Telecommunications (Sunnyvale, CA) are units of the Space & Strategic Missiles sector. Total LM employment is about 170,000.

On December 20, 2020, Lockheed Martin Corporation announced it has entered into a definitive agreement to acquire Aerojet Rocketdyne Holdings, Inc. [7246)] — The transaction is expected to close in the second half of 2021 and is subject to the satisfaction of customary closing conditions, including regulatory approvals and approval by Aerojet Rocketdyne's stockholders. Lockheed Martin has a history of successful integrations and will work to efficiently deliver the many strategic and financial benefits of this transaction. A transition team will be formed to allow for a seamless integration and ensure continuity for customers, employees and other stakeholders.

On 25 January 2022, the FTC (Federal Trade Commission) blocked Lockheed Martin's proposed $4.4 billion acquisition of rocket engine

7245) "Gravitational Waves Detected 100 Years After Einstein's Prediction," LIGO News Release, Feb. 11, 2016, URL: https://www.ligo.caltech.edu/news/ligo20160211

7246) "Lockheed Martin to Acquire Aerojet Rocketdyne, Strengthening Position as Leading Provider of Technologies to Deter Threats and Help Secure the United States and its Allies," Lockheed Martin, 20 December 2020, URL: https://news.lockheedmartin.com/2020−12−20−Lockheed−Martin−to−Acquire−Aerojet−Rocketdyne−Strengthening−Position−as−Leading−Provider−of−Technologies−to−Deter−Threats−and−Help−Secure−the−United−States−and−its−Allies

manufacturer Aerojet Rocketdyne. [7247] — The FTS said it will sue to block the deal, arguing that if the acquisition is allowed to proceed, "Lockheed will use its control of Aerojet to harm rival defense contractors and further consolidate multiple markets critical to national security and defense." Aerojet supplies power, propulsion and armament systems used in missiles made by Lockheed and other defense prime contractors. — "Without competitive pressure, Lockheed can jack up the price the U.S. government has to pay, while delivering lower quality and less innovation. We cannot afford to allow further concentration in markets critical to our national security and defense," FTC Bureau of Competition Director Holly Vedova said in a statement.
On February 13, 2022, Lockheed Martin has decided to terminate a $4.4 billion deal to acquire rocket engine manufacturer Aerojet Rocketdyne. The decision comes less than three weeks after the Federal Trade Commission filed a lawsuit to block the acquisition. [7248]

LMC ..... Lightweight Mission Peculiar Support Structure Carrier (Shuttle structure)

LMD ..... Laboratoire de Météorologie Dynamique, Palaiseau (Lab of CNRS, France)

LMI ..... Lockheed Martin Intersputnik, a joint venture company (since 1997) of Lockheed Martin Corporation and the Intersputnik International Organization of Space Communications

LMLV ..... Lockheed Martin Launch Vehicle [after its first successful flight, Aug. 23, 1997 (Lewis S/C), LMLV was renamed to Athena the Greek goddess of wisdom)]

LMMS ..... Lockheed Martin Missile & Space Company (HQ at Sunnyvale, CA). LMMS is a major builder of satellites and sensors for civil (TIROS, AM−1, ISS, HST, Gravity Probe−B, Wind, Polar, Landsat−7, TRACE, etc.) and military (DMSP, GPS, etc.) US space programs as well as for commercial Earth observation programs (CRSS, etc.). LMMS has a workforce of about 19,000 employees and maintains facilities at the following locations: Huntsville, AL; Cape Canaveral, FL; Kings Bay, GA; East Windsor, NJ; Valley Forge, PA; Charleston, SC; Magna, UT; Bangor, WA; and Sunnyvale, Santa Cruz, Palo Alto and VAFB, all in CA. LMMS is also the manufacturer of the following standard platform series (communication satellite buses): S3000, S4000, S5000, S7000, and A2100; and the manufacturer of Motorola's Iridium system (now Iridium Satellite LLC).

LMS ..... Life and Microgravity Spacelab (Shuttle mission)

LMT ..... Liquid Mirror Telescope

LNA ..... Low Noise Amplifier

LNETI ..... Laboratorio Nacional de Engenhario e Technologia Industrial (PoSAT consortium, Portugal)

LO ..... Local Oscillator

LOA ..... Laboratoire d'Optique Atmosphérique, (of CNRS, at the University of Sciences and Technology, Lille, France)

LOFAR ..... Low Frequency Array (in the 10−240 MHz range, in operation since 2010; an international project, located near the town of Exloo in the Netherlands, built and designed by ASTRON). LOFAR is an interferometric phased array of 25,000 antennas with an effective collection area of 300,000 m^2. The dipole antenna stations are distributed throughout

7247) Sandra Erwin, "Federal Trade Commission blocks Lockheed Martin's acquisition of Aerojet Rocketdyne," SpaceNews, 25 January 2022, URL: https://spacenews.com/federal−trade−commission−likely−to−block−lockheed−martins−acquisition−of−aerojet−rocketdyne/

7248) Sandra Erwin, "Lockheed Martin terminates agreement to acquire Aerojet Rocketdyne," SpaceNews, 13 February 2022, URL: https://spacenews.com/lockheed−martin−terminates−agreement−to−acquire−aerojet−rocketdyne/

the Netherlands and in several countries in Europe. This makes LOFAR one of the largest single connected radio telescopes in existence.

LOICZ ..... Land–Ocean Interactions in the Coastal Zone (core program of IGBP)

LOMO ..... Leningrad Optical–Mechanical Enterprise (telescope provider, St. Petersburg, Russia)

LORAN ..... Long Range Aid to Navigation (a radionavigation system as well as an instrument name). LORAN–C operates on 100 kHz and is a maritime and aeronautical radionavigation system.

LOS ..... Loss of Signal

LOS ..... Line of Sight

LOTREX ..... Landoberflächen–Traversen Experiment (campaign)

LoWPAN ..... Internet Protocol 'Low power Wireless Personal Area Network'. Actually 6LoWPAN of IPv6 technology.

LOWS ..... Lake Ontario Winter Storms (campaign)

LOWTRAN .... LOW–resolution TRANsmittance a computer code (model of USAF Geophysics Laboratory), see Glossary.

LPCE ..... Laboratoire de Physique et de Chimie de l'Environment (CNRS), Orleans, France

LPCM ..... Laboratoire de Physique et Chimie Marines (CNRS), Villefranche–sur–mer, France

LPI ..... Lunar and Planetary Institute, Houston, TX, USA

LQR ..... Linear Quadratic Regulator (controller device)

LRA ..... Laser Retroreflector Assembly (the LRA is an array of mirrors aboard a spacecraft, usually corner cubes, that provide a target for laser tracking)

LRIT ..... Long–Range Identification and Tracking [a standard being introduced in the shipborne AIS (Automatic Identification System) transponder system as a means of enhancing maritime security]. AIS is desined to transmit information such as vessel identification, position, heading, destination, nature of cargo, etc. Ships send reports every 2–10 seconds. AIS is a new mandatory element under the UN SOLAS (Safety of Life at Sea) convention, adopted by the SOLAS Conference in 2002 – and entered into force July 1, 2004.

LRIT ..... Low Rate Information Transmission [a standard digital broadcast service used in meteorological satellites such as MSG series of EUMETSAT, MTSAT of JAXA, also starting with GOES–12 (2005) of NOAA, etc.]. LRIT replaced the older WEFAX transmission standard.

LRO ..... Lunar Reconnaissance Orbiter (NASA)

LRPT ..... Low Resolution Picture Transmission (NOAA downlink technique in S–band, LRPT is a successor to APT)

LRR ..... Laser Retro–Reflector

LS ..... Landsat Satellite Series of NOAA

LSA ..... Luxembourg Space Agency (since 2018). The Agency is a 'one stop shop' for everything space–related in Luxembourg. Implementing the national economic development strategy, it manages the national space research and development programs, leads the SpaceResources.lu initiative and represents the Grand Duchy within the ESA and space–related programs of the EU and UN. [7249)]

LSM ..... Land Surface Model

LSP ..... Launch Services Program (of NASA)

LSPIM ..... Land Surface Processes and Interactions Mission (in ESA's Earth Explorer Program), see SPECTRA

7249) "The Luxembourg Space Agency turns one," Government–Press release by the Ministry of the Economy , 12 September 2019, URL: https://gouvernement.lu/en/actualites/toutes_actualites/communiques/2019/09–septembre/12–luxembourg–space–agency.html

LSRC ..... Land Systems Reference Centre. LSRC, located at Blandford Camp in Dorset, is UK MOD's centre of excellence for advice and test, ensuring that MOD networks can accommodate new applications, hardware and services. The LSRC provides the MOD with a through life 'Systems of Systems' Test and Reference service. It provides an appropriate test, integration and transition capability that assures release packages for introduction onto the Defence Network and in support of operations and exercises.

LSST ..... Large Synoptic Survey Telescope. The U.S. DOE/SLAC (Department of Energy/Stanford Linear Accelerator Center) plans to install the world's most powerful digital camera (with 3,200 Mpixel) in Chile atop a mountain called Cerro Pachón. Operations are scheduled for 2022. The LSST will produce the widest, deepest and fastest views of the night sky ever observed. Funding is provided by NSF and approval from DOE. [7250)]

LST ..... Land Surface Temperature

LTAC ..... L−band Tactical Satellite (service)

LTAN ..... Local Time on Ascending Node (orbit parameter)

LTCC ..... Low−Temperature Co−fired Ceramics (a key technology for passive integration of electronic components like capacitors, inductors and varistors) − yielding highly integrated multifunction LTCC modules. LTCC technology is a low cost process for fabricating multi−layer ceramic structures. Its a versatile technology that is well suited to realizing innovative RF and microwave components and subsystems.

LTDN ..... Local Time on Descending Node (orbit parameter)

LTDP ..... Long Term Data Preservation (an archiving policy for archive maintenance and data integrity that is being adopted by several space agencies in Europe and elsewhere). ESA initiated a coordination of LTDP in 2006.

LTE ..... Long Term Evolution, LTE is a standard for wireless communication of high−speed data for mobile phones and data terminals. It is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed using a different radio interface together with core network improvements.
LTE is the natural upgrade path for carriers with both GSM/UMTS networks and CDMA2000 networks. The different LTE frequencies and bands used in different countries will mean that only multi−band phones will be able to use LTE in all countries where it is supported.
LTE is a registered trademark owned by ETSI (European Telecommunications Standards Institute) for the wireless data communications technology and a development of the GSM/UMTS standards. The LTE specification provides downlink peak rates of 300 Mbit/s, uplink peak rates of 75 Mbit/s and QoS provisions permitting a transfer latency of less than 5 ms in the radio access network. LTE has the ability to manage fast−moving mobiles and supports multi−cast and broadcast streams.

LTER ..... Long−Term Ecological Research (NFS program that started in 1981, there are 19 major sites within LTER spread throughout the US)

LTP ..... Licklider Transmission Protocol (which is used to provide a reliable deep space link transmission service)

LTS ..... Low Temperature Superconductivity (refers to conductor material levels at liquid helium temperatures, Tc = 4 K)

LULCC ..... Land−Use/Land Cover Change (IGBP program)

LUT ..... Local User Terminal (NOAA concept for S&R reception)

LUVOIR ..... Large UV Optical Infrared Surveyor Telescope (its temporary name). A proposed NASA mission under study at GSFC. LUVOIR is one of

7250) "World's Most Powerful Camera Receives Funding Approval," SLAC, Jan. 9, 2015, URL: https://www6.slac.stanford.edu/news/2015−01−09−world%E2%80%99s−most−powerful−camera−receives−funding−approval.aspx

four Decadal Survey Mission Concept Studies initiated in Jan 2016. [7251]

LuxSpace ..... LuxSpace, located in Luxembourg, is a subsidiary of OHB Technology AG, Bremen (since 204)

LVDS ..... Low Voltage Differential Signaling (a broadband signaling service). LVDS is a low−power, low−noise differential signaling technology for high speed transmission (data rates up to 1 Gbit/s). Optimized for point−to−point configurations in telecom, datacom, peripherals and displays, LVDS delivers the bandwidth necessary for driving large data rates over PCB (Printed Circuit Board) and cable. LVDS was standardized by the American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA). As of March 1996, the ANSI/TIA/EIA−644−1995 standard specifies the physical layer as an electronic interface. LVDS is used in SpaceWire.

LVPS ..... Low Voltage Power Supply

LWIR ..... Long−Wavelength Infrared (6−14 μm) same range as TIR

LWS ..... Living With a Star (an international program initiated in 1999 to advance the understanding of space weather). The following projects are within LWS: SDO (Solar Dynamics Observatory), Geospace Storm Probes, Space Environment Testbeds (SETs), Solar Sentinels, Coronas−F, Coronas−Foton, etc.

M

MAB ..... Man and Biosphere Programme (UNESCO, since 1989)

MABL ..... Marine Atmospheric Boundary Layer

MAC ..... Multiphase Atmospheric Chemistry (IGBP/IGAC program)

MACE ..... Middeck Active Control Experiment (of NASA and AFRL on Shuttle). MACE and MACE−II (AFRL) are designed to investigate modeling and control issues (high precision pointing and vibration control)

MAC−Europe .. Multisensor Airborne Campaign − Europe

MACH−1 ..... Multiple Application Customized Hitchhiker−1 (a Shuttle payload container)

MACRES ..... Malaysian Center for Remote Sensing (since 1988, Kuala Lumpur, Malaysia), also known as Pusat Remote Sensing Negara. MACRES has a ground receiving station since 2003

MACSI ..... Microwave Airborne Campaign over Snow and Ice (campaign)

MAESA ..... Measurement for Assessing the Effects of Stratospheric Aircraft (campaign)

MAESTRO ..... Mission Adaptive Environment for Spacecraft Test and Real−time Operations (a ground−based spacecraft command and control system of Orbital Sciences Corporation, Dulles, VA)

MAESTRO ..... Multiple Airborne Experiments Towards Radar Observations (campaign)

MAGE ..... Marine Aerosol and Gas Experiment (campaign)

Magnetite ..... Fe_3O_4 (oldest known magnetic mineral on Earth)

Magnolia/MFE .. (MFE = Magnetic Field Experiment) A joint French/US program (proposal status) for long−term (>5 years) monitoring of the Earth's magnetic field and its temporal variations (objectives: main field model, secular variations, core motion determination, electrical conductivity of the mantle)

MagAO ..... Magellan Adaptive Optics system of the 6.5 m Magellan telescope in the high Atacama Desert of Chile. MagAO corrects the atmospheric turbulance by using a magnetic field to float a thin (1.6 mm) curved glass mirror (85 cm across) on a magnetic field 9.2m above the big primary

7251) "Large UV/Optical/Infrared Surveyor," NASA, 2017, URL: https://asd.gsfc.nasa.gov/luvoir/

mirror of the telescope. [7252)]
This, so−called Adaptive Secondary Mirror (ASM) can change its shape at 585 points on its surface 1000 times a second. In this manner the "blurring" effects of the atmosphere can be removed, and thanks to the high density of actuators on this mirror, astronomers can see the visible sky more clearly than ever before.

MAGS ..... Mackenzie River GEWEX Study (campaign)

MAHLOVS ..... Middle and High−Latitude Oceanic Variability Study

MAIUS−1 ..... Matter−Wave Interferometry in Microgravity−1. On January 23, 2017, DLR (Germany) conducted a sounding rocket experiment at Esrange Sweden. During the approximately six−minute microgravity phase of the flight, German scientists succeeded in producing a Bose−Einstein condensate (BEC) in space for the first time and performing atom interferometry experiments with them. The successful launch of MAIUS−1 has demonstrated that the technology works perfectly under space conditions. [7253)]

MAMA ..... Multi−Anode Michrochannel Array (detector type)

MANET ..... Mobile Ad−hoc Network

MAN Technologie Maschinenfabrik Augsburg, Nürnberg − Technologie, of Augsburg (a subsidiary of the MAN Group of Munich, Germany, since 1908). MAN Technologie provides components of the Ariane−4 and −5 launch vehicles. − As of June 2005, MAN Technology was acquired by OHB Technology of Bremen, Germany.

MAP ..... Mesoscale Alpine Programme (campaign)

MAP ..... Microwave Anisotropy Probe (NASA S/C mission within the MIDEX program, measurement of the full sky cosmic microwave radiation)

MAPLD ..... Military and Aerospace Applications of Programmable Devices and Technologies (yearly International Conference)

MAPS ..... Measurement of Air Pollution from Space Radiometer (Shuttle OSTA−1 experiment during STS−2 in Nov. 1981, and STS−59), L.13

MAPS ..... Multiple Azimuth Phase Centers [a SAR DBF(Digital Beamforming) technique which allows decreasing the PRF (thus allowing a wider unambiguous swath) while maintaining the number of azimuth samples].

MARISS ..... MARitime Security Service. MARISS is a European initiative, supported by ESA within the Copernicus (GMES) Service Element (GSE)

MARS ..... Mid−Atlantic Regional Spaceport − a commercial space launch facility located at the southern tip of NASA's Wallops Flight Facility on the Delmarva Peninsula south of Chincoteague, Virginia, USA.

MARS ..... Monitoring of Agriculture with Remote Sensing (also referred to as Monitoring Agricultural ResourceS). MARS is a EUproject which started in 1988.

MARSAIS ..... Marine SAR Analysis and Interpretation Ssystem (EU−funded project with the aim to design and implement a generic Marine SAR Analysis and Interpretation System for specific application to the coastal zones)

MARSIS ..... Mars Advanced Radar for Subsurface and Ionospheric Sounding (an instrument on ESA's Mars Express mission)

MASCON ..... Mass Concentration. A NASA/JPL acronym referring to the temporal and spatial variations of Earth's gravity field for the GRACE missions

MASER ..... Microwave Amplification by Stimulated Emission of Radiation

MAST ..... Military Application of Ship Tracks (Shuttle)

MAST ..... Monterey Area Ship Tracks (campaign)

MAST ..... Marine Science and Technology (campaign)

MASTEX ..... Mediterranean Aircraft−Ship Transmission Experiment (campaign)

7252) "Highest−ever resolution photos of the night sky," Space Daily, Aug. 23, 2013, URL: http://www.spacedaily.com/reports/Highest_ever_resolution_photos_of_the_night_sky_999.html

7253) "MAIUS 1 – First Bose−Einstein condensate generated in space," DLR, Jan. 23, 2017, URL: http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid−10081/151_read−20337/year−all/#/gallery/25194

MAUS ..... Material Science Autonomous Payload (Shuttle D2 mission)

Maxar ..... Maxar Technologies Holdings Inc., headquartered in San Francisco, CA, USA, was created in 2017 as the parent company of MDA (MacDonald, Dettwiler and Associates Ltd.), SSL (Space Systems/Loral, Palo Alto, CA) MDA Holdings, Inc., DigitalGlobe of Westminster, CO, and Radiant Solutions of Herndon VA, USA. Maxar Technologies has more than 6500 empolees in over 31 locations.
The operations of DigitalGlobe, SSL and Radiant Solutions were unified under the Maxar brand in February 2019; MDA continues to operate as an independent business unit within the Maxar organization.

On 8 April 2020, the sale transaction of MDA by Maxar Technologies to a consortium led by Toronto−based investment firm Northern Private Capital (NPC) has officially closed. [7254)]
This marks the return of MDA to Canadian control as a private, independent company headquartered in Canada. Founded in 1969, MDA is Canada's largest space technology developer and manufacturer, with more than 1,900 employees across the country.

MAXIM ..... Micro−Arcsecond X−ray Imaging Mission (NASA spacecraft formation fleet of 33 S/C − representing a giant telescope directed toward the universe). The time frame for this mission launch is beyond 2015.

MBA ..... Microbolometer Array (detector type)

MBARI ..... Monterey Bay Aquarium Research Institute, Monterey, CA

MBB ..... Messerschmitt Bölkow & Blohm (Munich, Germany, since 1989 MBB was integrated into the DASA conglamorate)

MBD ..... Multimission Bus Demonstration (JHU/APL). The objective of the MBD program is to demonstrate ISR (Intelligence, Surveillance, and Reconnaissance) operational relevance in a 3U CubeSat form factor.

MBE ..... Molecular Beam Epitaxy [a technique (developed by Bell Labs of AT&T in 1968) to grow perfect crystals, atom by atom, over areas vast on an atomic scale. Applications: the production of photodiode arrays, quantum wells, heterojunction structures, etc.]

MBL ..... Marine Boundary Layer

MBRSC ..... Mohammed Bin Rashid Space Center, Dubai, UAE (United Arib Emirates). As of April 18, 2015, the former EIAST (Emirates Institution for Advanced Science and Technology) was renamed to MBRSC.

MBRW ..... Magnetic Bearing Reaction Wheels (an onboard actuator device and a technique to unload the momentum of a spacecraft)

MBOC ..... Multiplexed Binary Offset Carrier (a common modulation scheme for the civil signals of the GPS and Galileo constellations that was greed upon by US and EU delegations on July 26, 2007). MBOC permits receivers to track the GPS and/or Galileo signals.

MC2A ..... Multisensor Command and Control Aircraft (next−generation USAF surveillance platform including JSTARS)

MCC ..... Mission Control Center

MCFilght^{TM} .... MultiCore Flight [a family of customizable SOC (System−on−Chip) chips with SpaceWire links and tools], St. Petersburg and Moscow, Russia

MCHIP/s ..... CHIP stands for Yes/No sequences in data transmissions. One MCHIP/s = 1 million information sequences/s

MCM−S ..... Multi−Chip−Module on Silicon (MCM is the evolution of the PCB board)

MCP ..... Meteorological Communications Package (Meteosat). MCP permits direct data access to the operational meteorological instruments in full

7254) "MDA Purchased from Maxar," Satnews Daily, 9 April 2020, URL: http://www.satnews.com/story.php?number=823426425

resolution during a pass. MCP allows in addition the transmission of global data sets for central ground stations.

MCP . . . . . Microchannel Plate (detector)

MCSA . . . . . MIR Cooperative Solar Array (installation on MIR by STS−74 crew)

MCT . . . . . Mercury Cadmium Telluride (detector material, HgCdTe, also referred to as HCT detector)

MCTEX . . . . . Marine−Continental Thunderstorm Experiment (campaign)

MDA . . . . . MacDonald Dettwiler and Associates Ltd, Richmond, BC, Canada (since 1969, MDA is Canada's leading space company with over 2700 employees, a developer of SAR processors, operator of Radarsat−2, etc.). — In Nov. 2012, MDA acquired SS/L (Space Systems/Loral). The combination of MDA and SS/L creates a leading global communications and information company. [7255]

On October 5, 2017, MDA announced it had completed its acquisition of DigitalGlobe, Inc. ("DigitalGlobe"), the global leader in high resolution Earth imagery and information about our changing planet. The merger creates the leading integrated commercial provider of satellites, imagery and geospatial solutions to commercial and government customers worldwide. The newly combined company will offer a broader set of space−based solutions, increased scale and a more diversified revenue base. [7256] [7257]

New Corporate Name: MDA also announced,that the company name will become **Maxar Technologies Ltd.**, and its U.S.−headquartered operating company, SSL MDA Holdings, Inc., will become **Maxar Technologies Holdings Inc.** The new Maxar Technologies launches a distinctive group of leading space brands, technologies and capabilities.

Canada−based MDA and U.S.−based DigitalGlobe overcame an extended review by the Committee on Foreign Investment in the United States (CFIUS) after refiling merger paperwork in July. The inter−agency committee, which reviews potential national security risks from foreign buyers of American businesses, ultimately found no issue with the merger.

MDA Corp.'s president and chief executive Howard Lance stated: "Maxar Technologies encompasses four of the leading commercial space technology brands—SSL, MDA, DigitalGlobe and Radiant—and represents the expanded benefits and value we will offer to our customers, shareholders, partners and employees."

On 8 April 2020, the sale transaction of MDA by Maxar Technologies to a consortium led by Toronto−based investment firm Northern Private Capital (NPC) has officially closed. [7258]

This marks the return of MDA to Canadian control as a private, independent company headquartered in Canada. Founded in 1969, MDA is Canada's largest space technology developer and manufacturer, with more than 1,900 employees across the country.

MDA . . . . . Missile Defense Agency [of US DoD, since 2002, formerly known as BMDO (Ballistic Missile Defense Organization)]. The MDA mission is to develop and deploy a layered Missile Defense System to defend the United States, its deployed forces, allies, and friends from missile attacks in all phases of flight.

7255) "MDA completes acquisition of Space Systems/Loral," MDA, Nov. 2, 2012, URL: http://www.mdacorporation.com/corporate/news/

7256) "MDA Completes Acquisition of DigitalGlobe, Creates Industry Leader in Satellite Systems, Earth Imagery, Geospatial Solutions and Analytics," MDA Press Release, Oct. 5, 2017. URL: https://mdacorporation.com/news/pr/pr2017100509.html

7257) Henry Caleb, "MDA closes DigitalGlobe merger, rebrands as Maxar Technologies," Space News, Oct. 5, 2017, URL: http://spacenews.com/mda−closes−digitalglobe−merger−rebrands−as−maxar−technologies/

7258) "MDA Purchased from Maxar," Satnews Daily, 9 April 2020, URL: http://www.satnews.com/story.php?number=823426425

MDA ..... Maritime Domain Awareness. MDA is defined by the International Maritime Organization(IMO) as the effective understanding of anything associated with the maritime domain that could impact the security, safety, economy, or environment.
MDL ..... Multi−use Data Link (GOES Second Generation S/C)
MDP ..... Multicast Dissemination Protocol [an OSI application layer protocol; it operates over the UDP (User Datagram Protocol) transport layer]
MDT ..... Mean Down Time
MEDALUS ..... Mediterranean Desertification and Land Use (campaign)
MEDEA ..... Material Science Experiment Double Rack for Experiment Modules and Apparatus (Shuttle experiment)
MEDS ..... Marine Environmental Data Service (Ottawa, Ontario, Canada)
MEEP ..... MIR Environmental Effects Payload (Shuttle payload)
MeerKAT ..... MeerKAT Radio Telescope. MeerKAT, currently being built some 90 km outside the small Northern Cape town of Carnarvon, is a precursor to the SKA (Square Kilometer Array) telescope and will be integrated into the mid−frequency component of SKA Phase 1. [7259)]
The telescope was originally known as the Karoo Array Telescope (KAT) that would consist of 20 receptors. When the South African government increased the budget to allow the building of 64 receptors, the team re−named it "MeerKAT" – i.e. "more of KAT".
MEG ..... Magneto−Encephalography (medical X−ray imagery)
MEI ..... Moscow State Aviation Institute (Department of Spacecraft Electric Propulsion and Power Plants)
MELCO ..... Mitsubishi Electric Company, Tokyo, Japan
MELEO ..... Materials Exposure in Low Earth Orbit (Shuttle experiment)
MELiSSA ..... Micro−Ecological Life Support System Alternative (the ESA−led program seeks to perfect a self−sustaining life support system that could be flown in space in the future, supplying astronauts with all the oxygen, water and food they require) [7260)]
MELV ..... Medium Expendable Launch Vehicle (EOS program)
MEMS ..... Micro−Electromechanical System (sensor technology), also Shuttle payload
MEO ..... Medium Earth Orbit (altitude range of about 5000 − 25000 km)
MEOLUT ..... Medium Earth Orbit Local User Terminal
MEOSAR ..... Medium Earth Orbit Search and Rescue (a rescur service provided by COSPAS−SARSAT.
MFD ..... Manipulator Flight Demonstration (Shuttle payload, JEM flight demo)
Megha−Tropiques A CNES/ISRO minisatellite EO mission considered for launch in 2005. Note: Megha is the Hindi word for clouds.
MEPhI ..... Moscow Engineering Physics Institute
MEPSI ..... MEMS−based PicoSat Inspector (of AFRL flown on various missions like JAWSAT/OPAL, MightySat II.1, Shuttle payload, see also O.46)
MERSEA ..... Marine Environment and Security for the European Area (oceanic component of the Copernicus program)
MERIT ..... Measure Earth Rotation and Intercompare the Techniques (an International Earth Rotation Service Program)
MEST ..... Ministry of Education Science and Technology (Korea)
Meteo−France .. Meteorological agency of France (Toulouse, Brest, etc.)
METI ..... Ministry of Economy, Trade and Industry (Japan, as of Jan. 6, 2001, previously it was known as MITI (Ministry of International Trade and Industry)
METEOR ..... Russian meteorological satellite family, I.4 − I.8

7259) "MeerKAT radio telescope," SKA Africa, 2018, URL: http://www.ska.ac.za/science−engineering/meerkat/about−meerkat/

7260) "ESA's MeliSSA Life Support Program wins Academic Recognition," ESA, July 24, 2017, URL: http://www.esa.int/Our_Activities/Space_Engineering_Technology/ESA_s_MELiSSA_life−support_programme_wins_academic_recognition

METEOSAT .... European meteorological satellite series of EUMETSAT, H.8
METOC ..... Meteorology & Oceanography [a US Navy program considering everything from weather observation (instruments), operations of the system, GIS services, to oceanography applications and the combination of both functions]
MetOp ..... EUMETSAT Meteorological Operational satellite series, I.2.1
METRI ..... Meteorological Research Institute, Seoul, Korea (since 1970)
MeV ..... Mega−electron volt
MEXT ..... Ministry of Education, Culture, Sports, Science and Technology (Tokyo, Japan)
MF ..... Medium Frequency (300 − 3000 kHz band)
MFC ..... Macro−Fiber Composite (a NASA/LaRC invention − a device that can act like muscle and nerves to expand and contract surfaces)
MFLOPS ..... Million Floating Point Operations per Second (a measure of computer power)
MF−TDMA .... Multi−Frequency Time Division Multiple Access (modulation technique)
MGBX ..... Microgravity Glovebox Facility (Shuttle payload)
MGM ..... Mechanics of Granular Materials (Shuttle payload)
MDH ..... Magnetohydrodynamics (a device using MDH technology may provide the functions of actuator/sensor in an attitude control system)
MHS ..... Message Handling System (MOTIS is the ISO definition of MHS)
MHT ..... Matra Hautes Technologies, France, (MHT's parent company is the Ladardere Groupe; Matra Marconi Space (MMS) is a unit of MHT)
Microlab ..... OSC satellite renamed to OrbView−1, D.11
Microscope ..... MICROSatellite à traînée Compensée pour l'Observation du Principe d'Equivalence (a CNES microsatellite mission within Myriade), O.28.2
microSD card ... micro Secure Digital card − a kind of removable flash memory card used for storing information. It is the smallest memory card that can be bought; at 15 mm x 11 mm x 1 mm.
MIDEX ..... Medium−class Explorers (NASA program). A series of cost and schedule−capped programs, led by a PI and funded by NASA.
MIGITS ..... Miniature Integrated GPS/INS Tactical System (a family of GPS−related receiver systems of Boeing Co.)
MilliLab ..... Millimeterwave Laboratory of Finland (since 1995); a joint laboratory between VTT (Technical Research Center of Finland) and HUT (Helsinki University of Technology).
MILOX ..... Mid−Latitude Ecosystems and Photochemical Oxidants (IGBP/IGAC)
MIL−STD−1553B A communications bus standard − an LNA (Local Area Network) in aircraft or spacecraft − which defines the electrical and protocol characteristics for a data bus. The structure of the bus consists of a single bus controller connected to remote terminals (up to 31 max can be used).
MILSTAR ..... Military Strategic and Tactical Relay (heritage of STP). MILSTAR is a series of advanced US military (DoD) communication satellites. The first two Block 1 spacecraft, launched in 1995, will eventually be replaced by the Block 2 Milstar 3 through 6, which are scheduled for launch beginning in 1999.
MIMO ..... Multiple−Input Multiple−Output (antenna array or radio system technology)
MIMO radar .... Multiple−Input Multiple−Output (MIMO) radar is an emerging technology that has significant potential for advancing the state−of−the−art of modern radar (SAR). When orthogonal waveforms are transmitted, with M+N (N transmit and M receive) antennas, an MN−element filled virtual array can be obtained. To successfully utilize such an array for high−resolution MIMO radar imaging, constant−modulus trans-

mit signal synthesis and optimal receive filter design play critical roles. – The MIMO SAR is an emerging active sensing radar technology in the early 21st century – from the system implementation point of view, as well as for signal processing techniques for target detection and parameter estimation.

Minotaur ..... An OSC (Dulles, VA) launch vehicle. The Minotaur is a four–stage vehicle with the first and second stages being Minuteman–II stages; the two upper stages come from OSC's Pegasus launcher. OSC's Minotaur is also known as the "Orbital/Suborbital Program Space Launch Vehicle." The US Air Force developed the Orbital/Suborbital Program as a way to cheaply launch small military payloads. OSC integrates the Minotaur launch vehicles and conducts launch operations under an Air Force contract.

MIP ..... Mobile IP (Internet Protocol), the TCP/IP technique (satellite links) is providing such application services as SSH (Secure Shell), SCP (Secure Copy), NTP (Network Time Protocol), and MDP (Multicast Dissemination Protocol)

MIR ..... Russian Space Station, N.3

MIRAS ..... MIR Infrared Spectrometer (note: this is a modified GRILLE sensor by ISA on the Shuttle ATLAS–1 mission)

MIREX ..... MIR International amateur Radio Experiment

MIRSL ..... Microwave Remote Sensing Laboratory (U. of Massachusetts at Amherst, MA)

MIRP ..... Manipulated Information Rate Processor (NOAA S/C subsystem)

MIS–1, –B ..... Microcapsules in Space–1 (Shuttle experiment)

MISSE ..... Materials International Space Station Experiment (a NASA program on the ISS to characterize the performance, stability, and long–term survivability of materials)

MIST ..... Magnetosphere, Ionosphere and Solar Terrestrial science (a community of UK–based scientists with interests in physical processes within the Sun–Earth system, other solar system bodies and exo–planets; in particular the solar/stellar wind, moons and planetary atmospheres and magnetospheres). MIST is recognized by RAS (Royal Astronomical Society). [7261)]

MIST ..... Microbursts and Severe Thunderstorms (campaign)

MISU ..... Meteorological Institute of Stockholm University (Stockholm, Sweden)

MIT ..... Massachusetts Institute of Technology (Cambridge, MA)

MIT/ERL ..... MIT/Earth Resources Laboratory (Cambridge, MA, since 1982)

MIT/LL ..... MIT/Lincoln Laboratory (Lexington, MA, since 1951)

MITA ..... Microsatellite Italiano a Tecnologia Avanza (Italian Advanced Microsatellite platform), ASI standard platform

MITI ..... Ministry of International Trade and Industry (Japan) Note: On Jan. 6. 2001, MITI was renamed to **METI** (Ministry of Economy, Trade and Industry) as a result of governmental restructuring.

MITRE Corp. ... A non–profit US corporation comprised of two federally funded research and development centers. MITRE HQs are in Bedford, MA.

MIZ ..... Marginal Ice Zone

MIZEX ..... Marginal Ice Zone Experiment (campaign)

MKID ..... Microwave Kinetic Inductance Detector. MKID is a type of superconducting photon detector first developed by scientists at the California Institute of Technology and the Jet Propulsion Laboratory in 2003.

MLE ..... Mesoscale Lightning Experiment (Shuttle payload)

MLI ..... Multi–Layered Insulation (highly reflective blankets in a spacecraft)

MLML ..... Marine Light–Mixed Layers (campaign program and a moored site)

MLOPEX ..... Mauna Loa Observatory Photochemistry Experiment (campaign)

7261) http://www.mist.ac.uk/

MLR ..... Monodisperse Latex Reactor (Shuttle experiment)
MLRO ..... Matera Laser Ranging Observatory (Matera, Italy)
MLS ..... Microwave Landing System (cancelled by FAA in 1994)
MLST ..... Mean Local Solar Time (on ascending or descending node, orbital parameter)
MLT ..... Mach–Lorentz Thruster (a new propulsion concept under investigation)
MLTI ..... Mesosphere and Lower–Thermosphere/Ionosphere (altitude from about 60 to 180 km)
MLV–05 ..... Medium Launch Vehicle–2005 (of DoD). The MLV–05 mission represents a multi–satellite launch of EO–3 (GIFTS–IOMI) as the prime payload, and the secondary payloads: three TechSat–21 minisatellites, STPSat–1, and NPSat–1.
MMA ..... Microgravity Measurement Assembly (ESA payload on Shuttle)
MMA ..... Micro Mirror Array (a MOEMS device)
MMCS ..... McMurdo Multimission Communications System (of NOAA, since Dec. 2010). The upgrades allow added polar–orbiting environmental satellite missions to use MMCS as a 2nd downlink site. The MetOp mission of EUMETSAT uses the ADA (Antarctic Data Acquisition) service (operational since June 2011). Support to NASA MGS (McMurdo Ground Station) & EUMETSAT began in Jan 2011. The future JPSS (Joint Polar Satellite System) mission will also use the ADA service.
MMFU ..... Mass Memory and Formatting Unit
MMIC ..... Monolithic Microwave Integrated Circuit (also: Monolithic Millimeter–wave Integrated Circuit)
MMOD ..... Micrometeoroid and Orbital Debris. Micrometeoroids pose a significant threat to any spacecraft in orbit. Their velocities relative to a spacecraft in orbit average 10 km/s and resistance to micrometeoroid impact is a significant design challenge for spacecraft and space suit designers. The ISS in particular requires a multi–faceted approach to mitigate MMOD risk. MMOD risk is a function of vehicle size, mission duration (time exposed to MMOD), failure criteria, shielding, flight trajectory. Several hundred documented MMOD damage sites on the ISS have been identified through imagery from the windows of ISS modules or docked vehicles. [7262)]
MMS ..... Magnetospheric Multi–Scale (planned mission of NASA in 2008)
MMS ..... Matra Marconi Space [of France (HQ at Velizy, and major assembly plant at Toulouse) and UK (Bristol, Portsmouth, Stevenage)]. MMS was formed in 1990 by Matra Espace of France (Lagardère) and Marconi Space Systems (GEC) of UK (since 1994). MMS employs 5,000 people, 2300 in France and 2700 in the UK. MMS covers science (SOHO, Giotto, Hipparcos), Earth observation (Spot series, ERS, Polar Platform for Envisat, Metop), communications (builder of the Eurostar and Leostar platforms) launch vehicles, military reconnaissance S/C (Helios), etc. MMS is also an EO instrument builder (HRV on Spot series, ASAR, GOMOS, AASTR, SEVIRI, etc.) – As of 2000 MMS is called **Astrium SAS** in France and **Astrium Ltd**. in the UK (see Astrium)
MMU ..... Memory Management Unit (also referred to as Mass Memory Unit)
MMW ..... Millimeter Wave (spectral range of 1mm to 10 mm)
MNRAS ..... Monthly Notices of the Royal Astronomical Society
MNT ..... Micro–Nano–Technology
mobiPV ..... Mobile Procedure Viewer. The current laptop–based ISS crew information system has certain drawbacks with respect to operator mobility and user interface options. The mobiPV investigation demonstrates

7262) Eric L. Christiansen, Dana M. Lear, "Micrometeoroid and Orbital Debris Environment & Hypervelocity Shields," NASA, Feb. 2012, URL: http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20120002584.pdf

new technologies and operations concepts for ISS crew procedure execution, both for onboard crew and ground teams. mobiPV technology offers wireless operation, voice navigation and real−time video streaming of crew work activities as well as synchronization of flight and ground procedures. [7263)]

MOBILHY ..... Modélisation du Bilan Hydrique (HAPEX campaign)
MOBLAS ..... Mobile Laser System (USA)
MOCE ..... Marine Optical Characterization Experiment (campaign)
MOCVD ..... Metal Organic Chemical Vapor Deposition
MoD ..... Ministry of Defence (London, UK)
MODE ..... Middeck 0−Gravity Dynamics Experiment (Shuttle payload)
MO Disk ..... Magneto−Optical Disk
MOD ..... Metal Organic Decomposition
MODTRAN .... Moderate−resolution LOWTRAN (see glossary under LOWTRAN)
MOEMS ..... Micro Opto−Electro−Mechanical System, MOEMS derive their functionality through the miniaturization of optics, electronics and mechanics. MOEMS devices are expected to be key components in future generation of space instruments.
MOIRE ..... Membrane Optical Imager for Real−time Exploitation (a DARPA GEO demonstration mission with a 10 m optical membrane − under development in 2011)
MOMS ..... Modular Optoelectronic Multispectral Scanner (Shuttle payload of 1983 and 84), L.14 and L.15
MONEX ..... Monsoon Experiment (campaign)
MOFs ..... Metal−Organic Frameworks. MOFs are a class of crystalline materials that consist of coordination bonds between transition−metal cations and multidentate organic linkers. The structure of MOFs is characterized by an open framework that can be porous (porous materials). MOFs can be used for gas storage, purification and separation, as well catalysis and sensing applications.
MOP ..... Meteosat Operational Program (European series of weather satellites from EUMETSAT)
MOPA ..... Master Oscillator Power Amplifier
MOS ..... Marine Observation Satellite (NASDA Satellite, MOS−1 Launch: 1987, MOS−1b launch: Feb. 1989), F.34
MOS ..... Multi−Object Spectroscopy (a technique being introduced for next−generation infrared astronomical instrumentation for ground−based and space telescopes). The NIRSpec (Near Infrared Multi−Object Spectrograph) instrument on JWST features a MOS implementation.
MOS ..... Metal−Oxide Semiconductor (solid−state technology); CMOS = Complementary MOS
MOSAIC ..... Micro Satellite Applications in Collaboration (a microsatellite program of BNSC, UK which started in 2000)
MOSAIC ..... Modular Solar Array with Integrated Construction (a new solar panel technology as of 2013)
MOSFET ..... Field−Effect Transistor (FET) using MOS technology
MOSES ..... Molecules in Outer Space and Earth Stratosphere (Swedish Mission, renamed ODIN), C.23
MOSFIRE ..... Multi−Object Spectrometer For InfraRed Exploration (of the W. M. Keck Observatory, located near the summit of Mount Kea in Hawaii at an elevation of 4,145 m, first light on April 4, 2012). The telescope has

7263) Keshav Chintamani, Boris Van Lierde, Shane Maloney, Paul Kiernan, David Martinez Oliveira, Mikael Wolff, "Wearable crew support technology on the International Space Station: the mobile Procedure Viewer (mobiPV)," 2014, URL: http://www.hfes−europe.org/wp−content/uploads/2014/06/Chintamani.pdf

an aperture of 10 m (0.97–2.45 μm spectral range, cooled to 120 K) [7264]

MOST ..... Microvariability and Oscillations of Stars (a microsatellite mission of CSA, Canada)

MOST ..... Ministry of Science and Technology (China)

MOVPE ..... Metal–organic Vapor Phase Epitaxy (a growth technique)

MOZAIC ..... Measurement of Ozone by Airbus In–Service Aircraft, R.41.1

MOU ..... Memorandum of Understanding (an agreement between two or more parties)

M2P2 ..... Mini–Magnetospheric Plasma Propulsion (a new propulsion system/technique, funded by NASA. The technology creates an electromagnetic bubble around a S/C and lets the solar wind push the S/C) [7265]

MP4 ..... MPEG–4 Part 14 or **MP4** is a digital multimedia container format most commonly used to store video and audio, but it can also be used to store other data such as subtitles and still images. ... Like most modern container formats, it allows streaming over the Internet.

MPAe ..... Max–Planck–Institut für Aeronomie (Katlenburg–Lindau, Germany), since 1957, in 2004 MPAe changed its name to **MPS** (Max Plack Institute for Solar System Reseach)

MPCV ..... Multi–Purpose Crew Vehicle (NASA's next generation **Orion** crew launch vehicle built by Lockheed Martin). The MPCV will serve as the exploration vehicle that will carry the crew to space, provide emergency abort capability, sustain the crew during the space travel, and provide safe re–entry from deep space return velocities.

MPDS ..... Mobile Packet Data Service

MPE ..... Max–Planck–Institut für Extraterrestrik (Garching, Germany)

MPEG ..... Motion Pictures Experts Group [compression/decompression standard for data, MPEG–1 is a video coding standard for small images on internet (since 1993), MPEG–2 is a standard for high–quality video images (since 1996)]

MPEI ..... Moscow Power Engineering Institute, builder of EO instruments like radiometers [also known as SRB/MPEI (Special Research Bureau of MPEI)]

MPG ..... Max–Planck–Gesellschaft zur Förderung der Wissenschaften e.V. (Germany). MPG is the single largest government–funded research organization in Germany. MPG is the successor of the Kaiser–Wilhelm–Gesellschaft founded in 1911. MPG maintains 68 research centers (and extensions), referred to as MPIs (Max Planck Institutes), throughout Germany. The organization employs about 11,000 people, including some 3000 scientists. In addition to its workforce MPG hosts a large number of (more than 5000 mostly on a yearly basis) research fellows, doctoral candidates, and guest scientists from other institutions. Basic research in the natural and human sciences is emphasized in all MPIs. Major fields of research are: physics, chemistry, biology, physical chemistry, astronomy, mathematics, computer science, and medicine.

MPI ..... Max–Planck–Institut (generic)

MPIA ..... Max Planck Institut für Astronomie (Heidelberg, Germany)

MPICh ..... Max–Planck–Institut für Chemie (Mainz, Germany)

MPIfM ..... Max–Planck–Institut für Meteorologie (Hamburg, Germany)

MPIK ..... Max–Planck–Institut für Kernphysik (Heidelberg, Germany)

MPLS ..... Multi Protocol Label Switching – an architecture for fast packet switching and routing, provides the designation, routing, forwarding and switching of traffic flows through the network. MPLS has mechanisms to manage traffic flows of various granularities.

7264) "First Light of Powerful New MOSFIRE Instrument," April 6, 2012, URL: http://keckobservatory.org/news/first_light_mosfire

7265) Robert M. Winglee, B. Race Roberson, "Mini–Magnetospheric Plasma Propulsion (M2P2)," Nov. 2011, URL: http://earthweb.ess.washington.edu/space/M2P2/

MPNE ..... Microgravity Plant Nutrient Experiment (Shuttle payload)
MPPT ..... Maximum Power Point Tracker
MPS ..... Max Plack Institute for Solar System Reseach (Katlenburg–Lindau, Germany), formerly known as MPAe.
MPSE ..... Morelos Payload Specialist Experiments (Shuttle payload)
MPT ..... Ministry of Posts and Telecommunication (Tokyo, Japan)
MRAM ..... Magnetic Random Access Memory (an emerging storage technology as of 2004, combining the techniques of DRAM, SRAM and the non-volatility of flash memory)
MREFC ..... Major Research Equipment and Facilities Construction (at NSF within the framework of EarthScope)
MRF ..... Meteorological Research Flight (UK)
MRI ..... Magnetic Resonance Imaging
MRO ..... Mars Reconnaissance Orbiter (NASA mission with a launch in 2006)
MRR ..... Modulating Retroreflector (an optical MRR is a device that couples an optical retroreflector with a modulator)
MS ..... Multispectral (data)
MSA ..... Microshutter Array
MSAS ..... Multi–Transport Satellite Augmentation System (GNSS–1 element of Japan)
MSC ..... Meteorological Service of Canada
MSCI ..... Microsat Systems Canada Inc., Mississauga, Ontario, Canada (MSCI was formerly the Space Division of Dynacon Inc.)
MSFC ..... Marshall Space Flight Center (Huntsville, AL, DAAC of NASA EOS Program; Note: MSFC/DAAC closed as of March 31, 1997 due to reduced NASA budgets)
MSG ..... Meteosat Second Generation (satellite series of EUMETSAT)
MSI ..... MicroSat Systems Inc., Littleton, CO (since 2001, a daughter of ITN Energy Systems Inc.). In 2008, SNC (Sierra Nevada Corporation) acquired MSI making MicroSat Systems a wholly owned subsidiary.
MSK ..... Minimum Shift Keying
MSL ..... Material Science Laboratory (Shuttle payload)
MSL ..... Mean Sea Level
MSP ..... Millisecond Pulsar (a pulsar with a rotational period in the range of about 1–10 milliseconds). An MSP may be visible in the microwave or X–ray portions of the electromagnetic spectrum.
MSS ..... Mobile Satellite Service (commercial telecommunication services)
MSS ..... Mobile Servicing System [a robotics system consisting of the elements: SSRMS (Space Station Remote Manipulator System), SPDM (Special Purpose Dexterous Manipulator) known as **Dextre**, and MBS (Remote Mobile Server Base System), all systems are built by Canada, that will be used to assemble and maintain the ISS (International Space Station)]
MSSL ..... Mullard Space Science Laboratory (University College London, UK)
MSSS ..... Malin Space Science Systems, Inc. San Diego, CA. (since 1990, builder of space instruments)
MSTI ..... Miniature Sensor Technology Integration (a Phillips Laboratory technology demonstration program, Kirtland AFB, Albuquerque, NM)
MSU–E ..... Multispectral Scanner – Electronic Scanning
MSU–K ..... Multispectral Scanner – Circular Scanning
MSU–M ..... Multispectral Scanner – Low Resolution
MSU–S ..... Multispectral Scanner–Moderate Resolution
MSU–SK ..... Multispectral Scanner–Moderate Resolution,Conical Scanning
MSW ..... Medium and Short Wave (spectrum)
MSX ..... Midcourse Space Experiment (DoD mission, O.27, Note: MSX experiments are also performed from several Shuttle missions in conjunction with the MSX spacecraft)

MTBF ..... Mean Time Between Failure
MTF ..... Modulation Transfer Function
MTG ..... Meteosat Third Generation (satellite series of EUMETSAT, planned for launch in time frame of 2015, in study phase as of 2005)
MTI ..... Moving Target Indication [there is also the term GMTI (Ground Moving Target Indication)]
MTPE ..... Mission To Planet Earth [US program, see F.16, Note: As of January 1998 MTPE was renamed by NASA to "Earth Science Enterprise" (ESE)]
MTQ ..... Magnetic Torquer (or Magnetorquer)
MTSAT ..... Multifunction Transport Satellite [Japanese geostationary multi−purpose satellite program, procured by JMA (Japan Meteorological Agency) and JCAB (Japan Civil Aviation Bureau)]
MUOS ..... Mobile User Objective System (US Navy next generation communication satellite constellation of 4 spacecraft; (launch of MUOS−1 on Feb. 24, 2012, launch of MUOS−2 on July 19, 2013, launch of MUOS−3 on Jan. 21, 2015, launch of MUOS−4 on Sept. 2, 2015, launch of MIOS−5 on June 24, 2016).
MUOS vastly improves current secure mobile satellite communications. It links mobile users for the first time to a powerful voice and data system that delivers high speeds and streaming data, similar to consumer smartphone capabilities. The complete constellation of four spacecraft (full operational capability is expected in 2016) plus on−orbit spare will provide global coverage with prioritized voice, video and data services.
In October 2019, the MUOS narrowband SATCOM system completed a critical test and evaluation phase and was assessed as operationally effective, operational suitable and cyber survivable — the successful completion of this testing demonstrates the system's full operational capability and its readiness for forces to transition it into unrestricted operations. [7266)]
Each of the five satellites in the MUOS constellation carries two payloads. The legacy communications payload was designed to maintain DoD legacy narrowband communications during the transition to the advanced MUOS Wideband Code Division Multiple Access (WCDMA) capability. The MUOS WCDMA payload interfaces with the MUOS ground system through the MUOS WCDMA waveform that is integrated into end−user radios, adapting commercial cellular technology. This capability allows warfighters to communicate beyond line of sight more securely and reliably than ever before, with 10 times the capacity and significantly improved quality of service compared to the legacy narrowband constellation.
MUSIS ..... Multinational Space−based Imaging System (as of 2008 a European initiative for space cooperation for security and defense). Belgium, France, Germany, Greece, Italy, and Spain are the MUSIS partners. The MUSIS programs includes a common network.
MW ..... Microwave (spectral region with wavelengths from 1mm to 1 m)
MWIR ..... Mid−Wavelength Infrared (about 3 − 5 μm)
MWR ..... Microwave Radiometer

N

N_2O ..... Nitrous oxide
N_2O_5 ..... Nitrogen pentoxide
N/A ..... Not Applicable (Not Available)
NABE ..... North Atlantic Bloom Experiment (campaign within JGOFS)

7266) "U.S. Navy's MUOS SATCOM System Now Operationally Effective," Satnews Daily, 17 October 2019, URL: http://www.satnews.com/story.php?number=1814260148

NAC . . . . . Narrow−Angle Camera
NACA . . . . . National Advisory Committee on Aeronautics (USA, 1915−1958, predecessor organization of NASA)
NADC . . . . . Naval Air Development Center (Warminster, PA, USA)
NAE . . . . . National Aeronautical Establishment of NRC (National Research Council, Canada)
NAIS . . . . . Nationwide Automatic Identification System, a project of the USCG (United States Coast Guard) to test the feasibility and effectiveness of AIS message reception and reporting from space for ship tracking and other navigational activities.
NAL . . . . . National Aerospace Laboratory, Japan (since 1955), as of Oct. 1, 2003, NAL, NASDA, and ISAS were merged into JAXA
NAND . . . . . "Not AND" (Negated AND) is a Boolean logic operation that is true if any single input is false. Two−input NAND gates are often used as the sole logic element on gate array chips, because all Boolean operations can be created from NAND gates.
NAND flash memory technology Provision of non−volatile data storage capability and substantially higher storage density.
NAOJ . . . . . National Astronomy Observatory, Japan
NAPP . . . . . National Aerial Photography Program (of USGS). NAPP was initiated in 1987 with the objective to acquire and archive aerial photography (using either color or black−and−white film) on a five−year cycle at a scale of 1:40,000. NAPP is a program jointly funded by federal agencies and states that choose to participate. Data are available through the EROS Data Center in Sioux Falls, SD, USA
NARE . . . . . North Atlantic Regional Experiment (campaign)
NARI . . . . . NASA Aeronautics Research Institute (at NASA/ARC, created in 2012)
NARL . . . . . National Applied Research Laboratories (Taiwan, since June 2003). NARL (also known as **NARLabs**) is the governmental coordination/funding organization of 12 national laboratories in Taiwan, NSPO (National Space Organization) of Taiwan is one of them. NARL is a non-profit organization, solely funded by the National Science Council of Taiwan.
NARSS . . . . . National Authority for Remote Sensing and Space Sciences, (Cairo, Egypt, since 1971)
NAS . . . . . National Academy of Sciences (USA)
NAS . . . . . National Airspace System (FAA, USA)
NASA . . . . . National Aeronautics and Space Administration (USA, since July 1958 when the US Congress created the "National Aeronautics and Space Act." The legislation was signed by President Dwight Eisenhower on July 29, 1958. — NASA officially began operations on October 1, 1958).
NASA/ARC . . . . . NASA/Ames Research Center (Moffett Field, CA, since 1939)
NASA/DFRC . . . NASA/Dryden Flight Research Center (Edwards AFB, CA, since 1946). Note, on March 1, 2014, DFRC was renamed to Armstrong Flight Research Center (NASA/AFRC) [7267)]
NASA/AFRC . . . NASA/Armstrong Flight Research Center
NASA/GSFC . . . . NASA/Goddard Space Flight Center (Greenbelt, MD, since 1959)
NASA/HQ . . . . . NASA/Headquarters (Washington, DC)
NASA/JPL . . . . . NASA/Jet Propulsion Laboratory (Pasadena, CA, since Dec. 3, 1958)
NASA/JSC . . . . . NASA/Johnson Space Center (Houston, TX, since 1961)
NASA/KSC . . . . . NASA/Kennedy Space Center (Cap Canaveral, FL, since 1967)
NASA/LaRC . . . . NASA/Langley Research Center (Hampton, VA, since 1917)

7267) David Weaver, Alan Brown, "NASA Honors Astronaut Neil Armstrong with Center Renaming," NASA Release 14−061, February 28, 2014, URL: http://www.nasa.gov/press/2014/february/nasa−honors−astronaut−neil−armstrong−with−center−renaming/#.UxF45M7ihqM

NASA/LeRC .... NASA/Lewis Research Center (Cleveland, OH, since 1941). Note: LeRC was renamed to John H. Glenn Research Center (NASA/GRC) on March 1. 1999
NASA/GRC .... NASA/John H. Glenn Research Center
NASA/MSFC ... NASA/Marshall Space Flight Center (Huntsville, AL, since 1960)
NASA/SSC ..... NASA/Stennis Space Center (Pearl River, MS). Testing of rockets and engines (Shuttle); collocation of US Navy facilities, Naval Oceanographic Office, Naval Research Laboratory, National Data Buoy Center (NDBC, a NOAA/NWS facility), etc.
NASDA ..... National Space Development Agency (of Japan, since 1969)
NASDA/EOC ... NASDA/Earth Observation Center (Tokyo, Japan, since 1978)
NASDA/EOPD . NASDA/Earth Observation Planning Department
NASDA/EORC . NASDA/Earth Observation Research Center (Tokyo)
NASDA/EOSD .. NASDA/Earth Observation Satellite Department
NASRDA ..... National Space Research & Development Agency, Nigeria (since May 5, 1999)
NASS–CDL .... National Agricultural Statistics Service–Cropland Data Layer (a U.S. standard providing timely, accurate, and useful statistics in service to U.S. Agriculture).
NATAC ..... North Atlantic Chemistry Experiment (campaign)
NAVCEN ..... Navigation Center (US Coast Guard, Alexandria, VA – NAVCEN is responsible for gathering system status information on GPS, DGPS, Omega, and Loran–C)
NAVISP ..... Navigation Innovation and Support Program (a European initiative). The main goal is to generate innovative concepts, techniques, technologies and systems linked to the PNT sector, along the entire value chain. The goal is to maintain and improve the capability and competitiveness of the industry of the participating States in the global market for Satellite Navigation, and more broadly PNT technologies and services. In this context, the wider ambition towards the overall PNT sector is justified by the necessity to facilitate cross–fertilization between space–based and terrestrial positioning technologies.
NAVSAT ..... Navy Navigation Satellite System (NAVSAT, also known as Transit, was the first satellite navigation system of the USA, starting in 1958)
NAVSOC ..... Naval Satellite Operations Center (US Navy, NAVSOC HQ is at Point Mugu, CA, since 1962. NAVSOC facilities stretch across the USA)
NAVSTAR–GPS Navigation System with Time and Ranging – Global Positioning System (Precision real–time position determination system of the US Air-Force, J.5)
NAWC ..... Navy Air Warfare Center (Point Mugu, CA)
NaSBE ..... Sodium Sulfur Battery Experiment (Shuttle payload)
NBIOME ..... Northern Biosphere Observation and Modelling Experiment (campaign)
NBS ..... National Bureau of Standards (USA, since 1901, predecessor of NIST)
NbN ..... Niobium Nitride [ultra–thin films usually in connection with HEB (Hot Electron Bolometer) technique, a mixer for quasi optical THz receiver]
Nb:AlOx:Nb .... Niobium:Aluminum Oxide:Niobium (tunnel junction material)
Nd:YAG ..... A neodymium–doped yttrium aluminum garnet crystal (solid–state) laser
NCAR ..... National Center for Atmospheric Research (Boulder CO, NCAR is managed and operated by the University Corporation for Atmospheric Research (UCAR) under the sponsorship of the National Science Foundation (NSF), NCAR has two laboratory sites in Boulder: Mesa Laboratory since 1966, Foothills Laboratory since 1992)
NCAR/ATD .... NCAR / Atmospheric Technology Division
NCAR/ACD .... NCAR / Atmospheric Chemistry Division

NCAR/RAF .... NCAR / Research Aviation Facility
NCAR/MMM ... NCAR / Mesoscale & Microscale Meteorology Division
NCAR/CGD .... NCAR / Climate and Global Dynamics Division
NCAR/HAO .... NCAR / High Altitude Observatory
NCASST ..... National Center for Advanced Small Spacecraft Technology
NCC ..... National Climatic Center (USA)
NCDC ..... National Climatic Data Center (of NOAA/NESDIS, Asheville, NC)
NCDS ..... NASA Climate Data Center (at GSFC, Science data archive for atmospheric chemistry and climate (ERBE, etc.)
NCEP ..... National Centers for Environmental Prediction (USA)
NCESSE ..... National Center for Earth and Space Science Education (Ellicott City, MD, USA). NCESSE creates and oversees national programs addressing STEM (Science, Technology, Engineering, and Mathematics) education, with a focus on Earth and space.
NCIRC FOC .... NATO Computer Incident Response Full Operational Capability. NCIRC is the organization that provides NATO with the capability to respond to computer and network security threats, vulnerabilities and incidents in a rapid and effective manner.
NDACC ..... Network for the Detection of Atmospheric Composition Change. NDACC is an international research and measurement program composed of more than 70 high−quality, remote−sensing research stations. The Network conducts long−term measurements for observing and understanding the physical and chemical state of the stratosphere and upper troposphere and for assessing the impact of stratosphere changes on the underlying troposphere and on global climate. [7268)]
NDBC ..... National Data Buoy Center [a NOAA/NWS facility at Stennis Space Center (SSC), MS, since 1982; between 1970−1982 NDBO (NOAA Data Buoy Center) was the predecessor of NDBC at SSC]
NDGPS ..... Nationwide DGPS (Differential GPS), the USCG is implementing an NDGPS network across the USA − a system for continuous GPS integrity monitoring and control
NDIR ..... Non−Dispersive Infrared (Spectrometer)
NDOC ..... National Oceanographic Data Center (USA)
NDSC ..... Network for the Detection of Stratospheric Change
NDTP ..... North Dakota Thunderstorm Project (campaign)
NDVI ..... Normalized Difference Vegetation Index
NEA ..... Near Earth Asteroid (detection)
NEA ..... Noise Equivalent Angle
NEAT ..... Near Earth Asteroid Tracking (NASA/JPL ground−based program to track NEO asteroids)
NEC ..... Nippon Electric Company, Tokyo, Japan. Manufacturer of communication payloads and of Earth sensors for attitude control. NEC has also developed a number of satellites such as: GMS series, MOS−1, BS−3 series, MUSES−B, OICETS, etc.
NEC Toshiba .... Merger of NEC and Toshiba space businesses into NEC Toshiba Space Systems Ltd., Yokohama, Japan, in Oct. 2001. Manufacturer of commercial satellites.
NEDRES ..... National Environmental Data Referential Service (NOAA service)
NEIS ..... National Earthquake Information Service (USGS, Denver, CO)
NEAR ..... Near Earth Asteroid Rendezvous S/C (of NASA with a launch Feb. 17, 1996, the mission is managed and operated by JHU/APL). As of March 2000, NASA renamed the satellite to “NEAR Shoemaker” in honor of Eugene M. Shoemaker, a geologist.
NEΔR ..... Noise Equivalent Delta (or Differential) Radiance (system sensitivity)

7268) Michael J. Kurylo, Anne M. Thompson, Martine De Mazière, ”The Network for the Detection of Atmospheric Composition Change: 25 Years Old and Going Strong,” The Earth Observer, Sept.−October 2016, Volume 28, Issue 5, pp: 4−15, URL: http://eospso.nasa.gov/sites/default/files/eo_pdfs/Sept−October%202016%20color%20508.pdf

NEΔT ..... Noise Equivalent Delta (or Differential) Temperature (system sensitivity), also referred to as NEDT
NEDO ..... New Energy and Industrial Technology Development Organization – a Department of METI (Ministry of Economy, Trade and Industry) of the Government of Japan.
NEEMO ..... NASA Extreme Environment Mission Operations (NASA undersea program)
NEFD ..... Noise–Equivalent Flux Density (see Glossary)
NELS ..... Northwest European LORAN–C System (a network of nine stations)
NEMO ..... Navy EarthMap Observer [US Navy (NRL) and STDC; Note: the NEMO mission was cancelled in April 2002)
NEMS ..... Nano–Electromechanical System (sensor technology)
NEN ..... Near Earth Network (a NASA ground system for small satellites such as CubeSats, Hubble, LRO, GOES, GPM, and many more). NEN serves as a conduit for information from spacecraft in low–Earth orbits, geosynchronous orbits, and even lunar orbits to the scientists who will study and use it on the ground. NEN is comprised of NASA–owned and commercial tracking stations, the NEN is located throughout the world. Network assets owned by NASA are located at Wallops Flight Facility in Virginia, McMurdo Ground Station in Antarctica, White Sands Complex in New Mexico, and at a Fairbanks facility owned by NASA but operated by the University of Alaska Fairbanks.
NEO ..... Near Earth Object (NEOs, such as comets or asteroids, are part of the solar system with orbits that regularly bring them close to the Earth. NEOs may pose a thread to Earth, they are capable someday of striking our planet)
NEP ..... Noise–Equivalent Power
NEPP ..... NASA Electronic Parts and Packaging Program
NER ..... Noise Equivalent Radiance
NERC ..... Natural Environment Research Council (Swindon, UK)
NERSC ..... Nansen Environmental and Remote Sensing Centre (Bergen, Norway), formerly known as NRSC, a non–profit research institute affiliated with the University of Bergen.
NESR ..... Noise–Equivalent Spectral Radiance (see Glossary)
NESDIS ..... National Environmental Satellite Data and Information Service (NOAA centers at Suitland, MD, and Boulder, CO)
NESS ..... Near Earth Space Surveillance (a proposed microsatellite mission of CSA, Canada)
NESZ ..... Noise–Equivalent Sigma Zero (σ^{o} -- a measure of the sensitivity of the system to areas of low radar backscatter)
NewDISS ..... NewDISS is NASA's next generation data (over 6–10 years), information and services system for Earth science.
NEWS ..... NOAA Earth Watch Service (information system)
NEXRAD ..... Next–Generation Weather Radar (a US ground–based system with the name of WSR–88D (Weather Surveillance Radar–1988 Doppler). NOAA's NEXRAD radar program is a tri–agency effort with NOAA, the Federal Aviation Administration, and the United States Air Force. In April 2013, NOAA/NWS completed the dual–polarization technology update in Brownsville, Texas – concluding the 122 NWS radar site upgrades throughout the country. [7269)]
NEXT ..... NASA's Evolutionary Xenon Thruster (NEXT is a gridded ion propulsion system, it is a trottle–able system in the class of 0.6–7 kW)
NEXT ..... NASA Launch Services Enabling eXploration & Technology (program)

7269) "NOAA's National Weather Service completes Doppler radar upgrades," NOAA, April 25, 2013, URL: http://www.noaanews.noaa.gov/stories2013/20130425_dualpol.html

NextView ..... A program and initiative of NGA (National Geospatial−Intelligence Agency), Washington DC, designed to give US commercial imaging satellite operators the financing to build their satellites for high−resolution imagery.

NFIRE ..... Near−Field Infrared Experiment (a LEO mission of the US DoD launched in 2007). The objective is to provide multispectral imagery of potential target types.

NFOW ..... Narrow Field of View (sensor)

NGA ..... National Geospatial−Intelligence Agency, USA; NGA is providing mapping and related services for the US military and intelligence communities. Note: As of Nov. 2003, NIMA (National Intelligence Mapping Agency) changed its name to NGA.

NGAS ..... Northrop Grumman Aerospace Systems, El Segundo, CA (as of Jan. 2009)

NGC ..... New General Catalog. NGC is one of the largest comprehensive astronomical catalogs for deep space objects such as star clusters, nebulae, and galaxies. NGC was compiled by John Louis Emil Dreyer in 1888. It expands upon the cataloguing work of William and Caroline Herschel, and John Herschel's General Catalogue of Nebulae and Clusters of Stars. The NGC contains 7,840 objects, known as the NGC objects. It is one of the largest comprehensive catalogues, as it includes all types of deep space objects, including galaxies, star clusters, emission nebulae and absorption nebulae. Dreyer also published two supplements to the NGC in 1895 and 1908, known as the Index Catalogues, describing a further 5,386 astronomical objects. [7270)]

NGDC ..... National Geophysical Data Center (NOAA facility at Boulder, CO, since 1965)

NGO ..... Non−Governmental Organization

NGSI ..... Next Generation Space Internet

NGSIS ..... Next Generation Spacecraft Interconnect Standard (a standard proposed by AFRL and JPL, in collaboration with NASA and other agencies including USAF, NRL, SMC)

NGSO ..... Non−Geosynchronous Satellite Orbit

NGST ..... Next Generation Space Telescope [NASA satellite (an infrared observatory positioned at L2) with a planned launch in 2014 to replace HST (Hubble Space Telescope)]. The NGST design employs a collapsible mirror of 6 m in diameter when deployed (deployable lightweight optics technology is required). The orbital location will be at L2. The objective is to explore the early years of the universe in the infrared region. The NGST program started in 1995 (joint project of NASA, ESA and CSA). ESA is providing the launch on Ariane−5 and the Near−Infrared Spectrograph. JWST's primary instrument, the Near Infrared Camera (NIC), is NASA's responsibility.

NGST ..... Northrop Grumman Space Technologies (formerly TRW Space & Electronics; Northrop Grumman acquired TRW in Dec. 2002).
Note: In Jan. 2009 NG reorganized. The former NGIS (Northrop Grumman Integrated Systems) and NGST were combined into **NGAS** (Northrop Grumman Aerospace Systems)

NGTS ..... Next−Generation Transit Survey. NGTS is located at ESO's Paranal Observatory in Chile. NGTS is a wide−field photometric survey designed to discover transiting exoplanets of Neptune−size and smaller around bright stars (magnitude V<13). NGTS employs an array of fully−robotic small telescopes operating in the 600−900nm band, thereby maximizing sensitivity to bright but relatively small and cool host stars (K and early−M spectral type).

NH_3 ..... Ammonia

7270) "New General Catalogue," Wikipedia, URL: https://en.wikipedia.org/wiki/New_General_Catalogue

NH_4 ..... Ammonium (ammonia radical)
NIAC ..... NASA Innovative Advanced Concepts
NIC ..... National Ice Center [USA, a joint agency formed by the US Navy, NOAA, and the USCG (US Coast Guard)]
NiCd ..... Nickel Cadmium (battery)
NiH_2 ..... Nickel Hydrogen (battery)
NiMH ..... Nickel Metal Hydride (battery)
NIERSC ..... Nansen International Environmental and Remote Sensing Center (since 1992, a Scientific Foundation and a non−profit project−oriented institute located in St. Petersburg, Russia). The initial joint−venture had four co−founders: Nansen Environmental and Remote Sensing Center (Bergen, Norway), Research Centre for Ecological Safety−RAS (St.Petersburg, Russia), Max Planck Society (Munich, Germany), and Environmental Research Institute of Michigan (Ann Arbor, USA), now Altarum Institute with a contribution of the Joint Research Centre of the European Commission (Ispra, Italy).
NMR ..... Nuclear Magnetic Resonance (spectroscopy)
NNMRS ..... National Natural Resources Management System [an agency of DOS (Department of Space), India]
NO ..... Nitric oxide
NO_2 ..... Nitrogen dioxide
NO_3 ..... Nitrate radical
NO_x (NOx) ..... Nitrogen oxides (NO, NO_2, NO_3)
NO_y (NOy) ..... Total active nitrogen
NOHRSC ..... National Operational Hydrologic Remote Sensing Center (of NOAA/NWS at Chanhassen, MN, USA)
NIAC ..... NASA Institute for Advanced Concepts. NIAC is run by USRA for NASA (created in 1998 to solicit revolutionary concepts from people and organizations outside the agency that could advance NASA's missions)
NICFI ..... Norway's International Climate and Forest Initiative [7271)]
NICMOS ..... Near−Infrared Camera and Multi−Object Spectrometer (Hubble sensor installed in early 1997, built by Ball Aerospace)
NICT ..... National Institute of Information and Communications Technology, with HQs in Tokyo (since 2004). Note: NICT is a merger of CRL (Communication Research Laboratory and the Telecommunications Advancement Organization of Japan.
NIES ..... National Institute of Environmental Studies, Tsukuba, Japan
NIH−R ..... National Institute of Health (Shuttle experiment)
NIIEM ..... Scientific and Research Institute of Electromechanics, Istra (Moscow Region), Russia; NIIEM was founded in 1960 by VNIIEM. In 1992 the institute NIIEM became an independent entity. Development of LEO meteorological satellites.
NIIR ..... State Radio Scientific Research Institute, Moscow; developer/builder of communication equipment in the widest sense, participation in programs: Orbita, Ekran, Ekran−M, Moskva, Gorizont, Gals, Express, Interkosmos, Intersputnik, Apollo−Soyuz, Vega, Phobos, etc.
NIIRS ..... National Imagery Interpretability Rating Scale (a task−based scale for rating imagery acquired from imaging systems). The NIIRS defines different levels of image quality/interpretability based on the types of tasks an analyst can perform with images of a given NIIRS rating. [7272)]
NILU ..... Norwegian Institute for Air Research (Lillestrom, Norway)
NIMA ..... National Imagery and Mapping Agency (Arlington, VA, a US government agency established in Oct. 1996). NIMA incorporates the De-

7271)) "The Government of Norway's International Climate and Forest Initiative," NORAD, 18 May 2017, URL: https://norad.no/en/front/thematic−areas/climate−change−and−environment/norways−international−climate−and−forest−initiative−nicfi/norways−international−climate−and−forest−initiative/

7272) "National Image Interpretability Rating Scales," FAS, URL: https://fas.org/irp/imint/niirs.htm

fence Mapping Agency (DMA), the Central Imagery Office, and the Defense Dissemination Office as well as CIA's Photographic Interpretation Center. NIMA is also the principal buyer of commercial imagery for all DoD organizations. Note: In Nov. 2003, **NIMA was renamed to NGA (National Geospatial−Intelligence Agency)**

Ni−MH ..... Nickel−Metal Hydride cell (a type of secondary electrochemical cell similar to a nickel hydrogen cell − used in spacecraft batteries)

NIMBUS ..... NASA EO missions series, O.29

NIMS ..... Navy Ionospheric Monitoring System (J.7)

NIPR ..... Nippon Institute for Polar Research, Japan

NIR ..... Near Infrared (spectrum, from 0.75 to about 1.3 μm)

NIS ..... NEXRAD−In−Space (a NASA mission concept to provide a geostationary satellite Doppler radar observations)

NIST ..... National Institute of Standards and Technology (USA, an agency of DOC, formerly National Bureau of Standards, since 1901)

NIVR ..... Nederlands Instituut voor Vliegtuigontwikkeling en Ruimtevaart (Netherlands Institute for Air and Space Development, Delft, The Netherlands, since 1946)

NKAU ..... National Space Agency of Ukraine, Kiev or Kyiv (since 1992), also referred to as **SSAU** (State Space Agency of Ukraine)

NLAS ..... Nanosatellite Launch Adapter System (use of containerized secondary spacecraft accommodations for launch vehicles). NLAS is a NASA developed satellite deployer capable of carrying up to 24 nanosatellite units, or ~ 50 kg of secondary payloads into orbit. [7273)]

NLO ..... Nonlinear Optics (NLO is widely used in solid−state laser technology)

NLOS ..... Non−Line−of−Sight (refers to data or voice access service technology of spaceborne communications in NLOS operating environments such as within buildings, aircraft, ships, dense metropolitan areas, and remote/underground locations)

NLR ..... Nationaal Lucht− en Ruimtevaartlaboratorium (National Aerospace Laboratory, Amsterdam and Noordoostpolder, the Netherlands) since 1961. NLR is of NLL (Nationaal Luchtvaart Laboratorium) heritage which was founded in 1937. As the central institute in the Netherlands for aerospace research, NLR owns and operates several dedicated research facilities.

NLSI ..... NASA Lunar Science Institute (as of April 2008, based at the NASA AMES Research Center, Moffett Field, CA). In July 2013, NLSI was renamed to **SSERVI** (Solar System Exploration Research Virtual Institute), to reflect the broader area of research.

NMC ..... National Meteorological Center (USA)

NMEA ..... National Marine Electronics Association (also a Standard For Interfacing Marine Electronics Devices)

NMHC ..... Non−methane hydrocarbons

NMOS ..... N−channel MOS (Metal−Oxide Semiconductor)

NMP ..... New Millennium Program (NASA/JPL). NASA created NMP in 1994 to flight validate new spacecraft technologies. Deep Space 1 (launch Oct. 24, 1998) was the first mission in NMP. The EO−1 (Earth Observing−1, launch Nov. 21, 2000) mission is also part of NMP. Trailblazer/ST5 (Space Technology 5) is a three microsatellite formation flying mission with a planned launch in 2004.

NNSA ..... National Nuclear Security Agency [established in 2000, a semi−autonomous agency within the U.S. Department of Energy (DOE)]

NNSS ..... Navy Navigation Satellite System (USA, also known as the 'Transit' system, was the world's first satellite navigation system.

7273) "NASA−Built Nanosatellite Launch Adapter System Ready For Flight," NASA, May 15, 2013,URL: http://www.nasa.gov/centers/ames/news/2013/NLAS−ready−for−flight.html

NOAA . . . . . National Oceanic and Atmospheric Administration (NOAA is an agency of the US Department of Commerce, established in 1970 (predecessor ESSA), it has the following major divisions: NOS (National Ocean Service), NWS (National Weather Service), NMFS (National Marine Fisheries Service), NESDIS (National Environmental Satellite, Data and Information Service), OOAR (Office of Oceanic and Atmospheric Research), and ONCO (Office of NOAA Corps Operations).

NOAA/AL . . . . . NOAA/Aeronomy Laboratory (Boulder CO)

NOAA/AOML . . NOAA/Atlantic Oceanographic and Meteorological Laboratory, Miami, FL. The HRD (Hurricane Research Division) is part of AOML.

NOAA/ARL . . . . NOAA/Air Resources Laboratory, Silver Spring, MD. Note: ARL consists of the HQ–Division in Silver Spring, MD, the ATTD in Oak Ridge TN, the ASMD (Atmospheric Sciences Modeling Division) in Research Triangle Park, NC, the FRD (Field Research Division) in Idaho Falls, ID, and the SRRB (Solar Radiation Research Branch) in Boulder, CO.

NOAA/AOC . . . . NOAA/Aircraft Operations Center, MacDill AFB, Tampa, FL. Note: AOC was created in 1983 [initially known as OAO (Office of Aircraft Operations)] to manage NOAA aircraft, personnel, budget and facilities in support of NOAA aircraft programs. AOC is under ONCO.

NOAA/ATDD . . . NOAA/Atmospheric Turbulence and Diffusion Division, Oak Ridge, TN

NOAA/CDC . . . . NOAA/Climate Diagnostics Center (Boulder, CO)

NOAA/CMDL . . NOAA/ Climate Monitoring and Diagnostics Laboratory, Boulder CO.

NOAA/ERL . . . . NOAA/Environmental Research Laboratories, headquartered in Silver Spring, MD. (under OOAR). All NOAA laboratories are run through OOAR/ERL, these are: AL, AOML, ARL, CDML, ETL, FSL, GFDL, GLERL, NSSL, PMEL, SEL, CDC, and the Joint Institutes.

NOAA/ETL . . . . NOAA/ Environmental Technology Laboratory, Boulder, CO, (formerly WPL = Wave Propagation Laboratory)

NOAA/FSL . . . . . NOAA/Forecast Systems Laboratory (Boulder, CO)

NOAA/GFDL . . . NOAA/Geophysical Fluid Dynamics Laboratory, Princeton, NJ.

NOAA/GLERL . NOAA/Great Lakes Environmental Research Laboratory, Ann Arbor, MI.

NOAA/NSSL . . . NOAA/National Severe Storms Laboratory, Norman, OK.

NOAA–NESDIS NOAA/National Environmental Satellite Data and Information Service, Suitland, MD. – NESDIS functions are: Satellite Operations, Satellite Data Processing and Distribution, Research and Applications, Systems Development, National Climatic Data Center (NCDC), National Oceanic Data Center (NODC), National Geophysical Data Center (NGDC).

NOAA/NCDC . . NOAA–NESDIS/National Climatic Data Center, Asheville, NC.

NOAA/NDBC . . NOAA–National Data Buoy Center (a NOAA/NWS facility at Stennis Space Center, MS)

NOAA/NGDC . . NOAA–NESDIS/National Geophysical Data Center, Boulder, CO

NOAA/NGS . . . . NOAA–National Geodetic Survey

NOAA/NODC . . NOAA–NESDIS/National Oceanographic Data Center (Silver Spring MD)

NOAA/NOS . . . . NOAA/National Ocean Service – NOS functions are: coast and geodetic survey, ocean resources conservation and assessment, ocean and coastal resources management, ocean and earth sciences.

NOAA/NSIDC . . NOAA/National Snow and Ice Data Center, Boulder, CO (NSIDC is located at the University of Colorado at Boulder)

NOAA/NWS . . . . NOAA/National Weather Service – NWS functions are: meteorology, hydrology, systems operations, systems development, national meteorological center, national data buoy center

NOAA/OAO . . . . NOAA/Office of Aircraft Operations, Miami, FL (old designation)

NOAA/OOAR .. NOAA/Office of Oceanic and Atmospheric Research – OOAR functions: oceanic research program, environmental research laboratories.

NOAA/PMEL ... NOAA/Pacific Marine Environmental Laboratory (Seattle, WA, since 1973)

NOAA/SEC .... NOAA/Space Environment Center (Boulder, CO)

NOAA/SEL ..... NOAA/Space Environment Laboratory (Boulder, CO), Note: NOAA/SEL changed its name to NOAA/SEC in 1997

NOAO ..... National Optical Astronomy Observatory (the US national observatory for nighttime optical/infrared astronomy funded by the National Science Foundation).
As of 1 October 2019, NOAO has joined with Gemini Observatory and LSST operations to create a new organization, NSF's National Optical–Infrared Astronomy Research Laboratory (NSF's OIR Lab). As the preeminent US center for ground–based optical–infrared astronomy, the new organization brings together diverse pathways for astronomical exploration, serves as a focal point for community coordination and collaboration, and enables the discoveries of the future. The integration is part of a long–term evolutionary trend and is reminiscent of the origin of NOAO itself. [7274)]

NODS ..... NASA Ocean Data System (located at JPL; Measurements in the archive are related to altimetry, scatterometry, and microwave radiometry. NODS archives and distributes data products for TOPEX/Poseidon)

NOPEX ..... Northern–Hemisphere Climate Processes Land–surface Experiment (campaign)

NOPP ..... National Oceanographic Partnership Program (USA, since 1997, NOPP has a mandate from Congress). The objective is to foster cooperation and partnerships among federal agencies, academia, industry and other members of the oceanographic scientific community.

NORAD ..... North American Aerospace Defense Command (since 1958), located at Patterson Air Force Base in CO, USA. NORAD is a joint organization of the United States and Canada that provides aerospace warning, air sovereignty, and defense for the two countries. NORAD provides also warnings about geomagnetic storms (NORAD's Solar Forecast Center in Colorado Springs).

NORCSEX ..... Norwegian Continental Shelf Experiment (campaign)

NORDA ..... Northern Oceans Research and Development Activities (Canada)

NORSEX ..... Norwegian Remote Sensing Experiment (campaign)

Northrop ..... Northrop Grumman Corporation with HQ in Los Angeles, CA. A defense and electronics company [DoD radar (SAR) systems, imaging and information technology, OLS (Operational Linescan System) instrument of DMSP series, payload of SBIRS (Space–Based Infrared System) program of DoD, etc.]. Northrop Grumman purchased TRW in Dec. 2002.
On June 6, 2018, Northrop Grumman Corporation announced it has closed the acquisition of Orbital ATK Inc. ("Orbital ATK"), a global leader in aerospace and defense technologies. Orbital ATK is now **Northrop Grumman Innovation Systems (NGIS)**, a new, fourth business sector. [7275)]

NOSA ..... Norwegian Space Agency, located in Oslo. NOSA is a government agency under the Ministry of Trade and Industry. NOSA is responsible for organizing Norwegian space activities, particularly with respect to ESA and the EU, and for coordinating national space activities.

7274) "NOAO Unites with Gemini and LSST," NOAO, October 2019, URL: https://www.noao.edu/

7275) "Northrop Grumman Completes Orbital ATK Acquisition, Blake Larson Elected to Lead New Innovation Systems Sector," Northrop Grumman News, 6 June 2018, URL: https://news.northropgrumman.com/news/releases/northrop–grumman–completes–orbital–atk–acquisition–blake–larson–elected–to–lead–new–innovation–systems–sector

In 2019, The NSC (Norwegian Space Centre) changed its English name to the Norwegian Space Agency. The Norwegian name, **Norsk Romsenter**, remains as is.

NOSC ..... Naval Ocean Systems Center (San Diego, CA)

NOSL ..... Night/Day Optical Survey of Lightning (Shuttle experiment)

NOSS ..... Naval Ocean Surveillance Satellite, also referred to as "Whitecloud," "White Cloud" or "Classic Wizzard" (a US Navy S/C series, sponsored by NRO, and launched from VAFB, CA on Atlas vehicles). [7276] NOSS is a wide area ocean surveillance system used to determine the location of radio and radar transmissions, using triangulation (NRO uses the NOSS satellites to keep tabs on ships around the globe). – Each NOSS launch placed a cluster of one primary satellite and three smaller sub–satellites (that trail along at distances of several hundred m apart in a triangle formation) into low polar orbit. This satellite array can determine the location of radio and radars transmitters, using triangulation, and the identity of naval units, by analysis of the operating frequencies and transmission patterns. NOSS used the ELINT technique called TDOA (time difference of arrival), rather than true interferometry. NOSS–1 launch April 30, 1976 (1100 km altitude, inclination of 63.5°)[7277], NOSS–2 launch Dec. 8, 1977, NOSS–3 launch March 3, 1980, NOSS–4 launch Feb .9, 1983, NOSS–8 launch May 15, 1987 (also referred to as USA–22), NOSS–9 launch Sept. 5, 1988 (also known as USA–32). – Second generation NOSS satellites were launched starting in 1990. There are three groups of the 2nd generation NOSS satellites each having three satellites in close proximity to one another. The first NOSS–2–1 triplet was launched on June 8, 1990 on a Titan–IV vehicle from Cape Canaveral; the second NOSS–2–2 triplet was launched on Nov. 8, 1991; and the third triplet of NOSS–2–3 was launched May 12, 1996 from VAFB. The latest NOSS launch occurred Dec. 2, 2003 from VAFB.

NOWES ..... Northern Wetlands Study (campaign)

NO_x ..... Nitrogen oxides

NO_y ..... Total reactive nitrogen

NPL ..... National Physical Laboratory (Teddington, Middlesex, UK; NPL is the national measurement institute of the UK; it is an agency of the Department of Trade and Industry)

NPO ..... Naulshno Proizwodstwennoje Objedijenie (Scientific/Research Production Association, Russia)

NPO AP ..... NPO for Automation and Instrument Engineering, Moscow; since 1947; participation in the following programs: Venera, Mars, Luna, Soyuz, Proton, Zenit, Energia–Buran; builder of on–board guidance and navigation systems

NPO Geofizika .. Moscow; since 1908, a major enterprise for the development of automatic and visual opto–electronic instruments; participation in national programs: Vostok, Salyut, Soyuz, MIR, Energia–Buran, etc.

NPO Mashinostroyenia Russian company, Reutov, Moscow Region, builder/integrator of S/C (ALMAZ series), participation in programs: Kosmos, Proton, Polyot, Salyut, etc. – NPO Mashinostroyenia came into existence in 1944 as OKB–51 (Design Bureau of Factory 51). In 1955, Chelomey's (Vladimir N. Chelomey was general director and chief designer) group was re–established as a separate design bureau, designated OKB–52. In 1966 the OKB–52 was renamed to TsKBM (Central Design Bureau

7276) A. Andronov, "The US Navy's "White Cloud" Spaceborne ELINT System," in Zarubezhnoye Voyennoye Obrozreniye (Foreign Military Review), ISSN 0134–921X, No. 7, 1993, pp. 57–60, translated by Allen Thomson

7277) Note: The orbital inclination of 63.5° (identical with Molniya–type orbits) of the NOSS satellite series as well as the practice of triple launches suggest strongly that highly elliptical Molniya orbits are being used, providing high–latitude continuous coverage of the northern hemisphere. In this configuration, at least 3 S/C are needed to provide continuous coverage.

for Machine Building) of the Ministry of General Machine–Building. In 1983 TsKBM took its current name, NPO Mashinostroyeniya.

NPO Planeta .... Scientific and Research Center on Space Hydrometeorology (Moscow, since 1974), operators of satellites (Meteor, Okean, Resurs, GOMS series) along with corresponding ground segments, providers of services to the user community in the areas of meteorology/climate, oceanography, Earth resources, and ecological monitoring. From an organizational point of view, NPO Planeta is an agency positioned under ROSHYDROMET, the 'Committee for Hydrometeorology and Environmental Monitoring'

NPO PM ..... Research and Production Association of Applied Mechanics (Prikladnoi Mekaniki), Krasnoyarsk (a closed city until 1991) Siberia. NPO PM was founded in 1959, since 1977 it is builder/integrator of communication satellites (Gorizont, Express, Molniya–1, –2, –3, Raduga–1, Ekran, Ekran–M, Luch, Radio, etc.), navigation satellites (GLONASS, Tsikada), and geodetic satellites (GEO–IK, Etalon); advanced programs (Express–M, Gonets, Arkos, Mayak, Gals)
Note: As of March 2008, NPO–PM was reorganized and renamed to: **JSC–ISS** (Joint–Stock Company – Information Satellite Systems), Zheleznogorsk, Russia. JSC–ISS is also referred to as: JSC "Information Satellite Systems" Reshetnev Company. This is in honor of M. F. Reshetnev, the founder of the enterprise. [7278)]
– JSC Research&Production Enterprise "Geofizika–Cosmos",Moscow
– JSC Research&Production Enterprise "Kvant", Moscow
– JSC Research&Production Enterprise of Space Instruments, Rostov–on–Don
– JSC "Siberian Devices and Systems", Omsk
– JSC "Testing Technical Center – NPO PM, Zheleznogorsk
– JSC "NPO PM – Small Design Bureau", Zheleznogorsk
– JSC "NPO PM – Razvitie", Zheleznogorsk
– JSC "Sibpromprojekt", Zheleznogorsk

NPO Vega ..... Russian space/defense industry consortium, Moscow, designers and builders of SAR instruments, etc., operators of airborne instruments

NPO Yuzhnoye .. Design Office Yuzhnoye, in Dnepropetrovsk, Ukraine (builder of OKEAN S/C series, Dnepr launch vehicle, etc.)

NPOESS ..... National Polar–orbiting Operational Environmental Satellite System (merged POES and DMSP series, with launches projected for 2008 and beyond)

NPOP ..... NASA Polar Platform

NPP ..... NPOESS Preparatary Project

NPS ..... Naval Poraduate School (Monterey, CA)

NPSCuL ..... Naval Postgraduate School CubeSat Launcher

NRAM ..... Nano–RAM (Nanovolatile Random Access Memory), a proprietary computer memory technology from the company Nantero. NRAM is based on the mechanical position of carbon nanotubes deposited on a chip–like substrate.

NRAO ..... National Radio Astronomy Observatory (USA). NRAO is a facility of the NSF (National Science Foundation) and operated under cooperative agreement by Associated Universities, Inc. . The NRAO headquarters is located on the campus of the University of Virginia, Charlotsville, VA. The North American ALMA Science Center and the NRAO Technology Center are also located in Charlottesville, Virginia. Telescopes: Green Bank Telescope (largest steerable telescope with a diameter of 100 m, West Virginia), VLA (Very Large Array) located

7278) http://www.iss–reshetnev.com/images/File/magazin/2008/m4–screen_en.pdf

northwest of Socorro, New Mexico ; ALMA (Atacama Large Millimeter Array), Chile.

NRC . . . . . National Research Council (Washington, DC, USA)

NRC (NRCan) . . Natural Resources Canada (Ottawa, Canada)

NRCS . . . . . Normalized Radar Cross−Section (an aspect of ocean surface reflectivity, also referred to as σ^{o})

NRCSD . . . . . NanoRacks CubeSat Deployer

NRCT . . . . . National Research Council of Thailand

NRE . . . . . Non−Recurring Engineering. NRE refers to the one−time cost to research, develop, design and test a new product.

NREL . . . . . National Renewable Energy Laboratory (Golden, CO, of DOE)

NRL . . . . . Naval Research Laboratory (Washington, DC). NRL is the US Navy's corporate research and development laboratory, created in 1923 with over 4000 personnel (among them 1500 scientists) in the 1990s. NRL maintains 15 research sites throughout the US. The three main NRL sites are at: Washington DC, NRL/SSC (Stennis Space Center in Bay St. Louis, MS), and NRL/MRY (Monterey, CA).

NRL/NCST . . . . . NRL/Naval Center for Space Technology

NRL/RSD . . . . . NRL/Remote Sensing Division

NRLM . . . . . National Research Laboratory of Meteorology (Japan)

NRO . . . . . National Reconnaissance Office (agency of DoD, Chantilly, VA, USA, since 1961). NRO sponsors and operates US reconnaissance S/C (Corona series, etc.). The primary user of the imagery is the former NIMA, now NGA (National Geospatial−Intelligence Agency). In the frame of the 21st century, NRO is very interested in technology introduction in satellites. [7279]

NRO/MSD . . . . . NRO/Mission Support Directorate

NROL . . . . . NRO Launch [a designation for a spacecraft launch with a corresponding number, like NROL−22 (USA−184) which was launched on June 28, 2006]

NROL−38 . . . . . A US reconnaissance satellite of NRO, a classified mission, which was launched on June 20, 2012 on an Atlas−5 vehicle from Cape Canaveral, FL. Launch provider: ULA (United Launch Alliance).

NROSS . . . . . Navy Remote Ocean Sensing System (satellite)

NRSA . . . . . National Remote Sensing Agency (since 1975, Balanagar, Hyderabad, India), NRSA is part of ISRO (Indian Space Research Organization)

NRSC . . . . . National Remote Sensing Centre (UK, this agency was privatized in 1989, commercial sale of remote sensing data, operator of UK−PAF for ESA)

NRSCC . . . . . National Remote Sensing Center of China (Beijing). Note, NRSCC is not a research organization. Rather, it is the administration under the Ministry of Science and Technology of China.

NRZ . . . . . Non−Return to Zero (communication signal parameter)

NRZ−I . . . . . Non−Return to Zero−Inverted

NSBF . . . . . National Scientific Balloon Facility (NASA−owned facility in Fort Sumner, NM)

NSC . . . . . Norwegian Space Centre (Oslo, Norway, established in 1987 and a member of ESA). Note: As of 5 February 2019, the NSC changed its name to NOSA (Norwegian Space Agency). The Norwegian name remains **Norsk Romsenter.**

NSERC . . . . . Natural Sciences and Engineering Research Council (Canada)

NSF . . . . . National Science Foundation (Arlington, VA, USA; since 1950; NSF is an independent govenment agency responsible for promoting science and engineering). About 20,000 programs per year are supported by NSF.

7279) Bruce Carlson, "NRO's Historical, Current, and Potential Future Use of Small Satellites," Aug. 8, 2011, URL: http://www.nro.gov/news/speeches/2011/2011−01.pdf

NSG . . . . . National System for Geospatial Intelligence (of NGA)
NSI . . . . . NASA Science Internet – an international dual protocol (TCP/IP and DECnet) network (successor to SPAN)
NSIDC . . . . . National Snow and Ice Data Center (Boulder, CO, NOAA facility at University of Colorado, established in 1982). NSIDC is co–located with WDC–A (World Data Center A for Glaciology). NSIDC is also a DAAC site of the EOS Program. NSIDC has extensive holdings of cryospheric and polar ocean surface–flux data and routinely produces sea ice maps from SSM/I sensor.
NSMC . . . . . National Satellite Meteorological Center [since 1971, NSMC is the research and operational facility of CMA (China Meteorological Administration)]. NSMC has ground stations in Beijing, Guangzhou, and Urumqi.
NSO . . . . . Netherlands Space Office (since October 2008). NSO was established by the Dutch government in order to develop the Netherlands' space program and to bring that program to action.
NSOAS . . . . . National Satellite Ocean Application Service, a center of SOA (State Oceanic Administration), Beijing, China.
NSPO . . . . . National Space Organization of Taiwan – official name as of March 2005. The former meaning of NSPO was: National Space Program Office (Hsin–Chu City, Taiwan). NSPO is Taiwan's space agency (founded in Oct. 1991).
NSR . . . . . Northern Sky Research. NSR is an international market research and consulting firm specializing in satellite and wireless technology and applications.
NSSC/CAS . . . . . National Space Science Center/Chinese Academy of Sciences, Beijing
NSSDC . . . . . National Space Science Data Center (at NASA/GSFC)
NSSK . . . . . North–South Stationkeeping
NSSL . . . . . National Severe Storms Laboratory (Norman, OK, USA)
NSSO . . . . . National Security Space Office (Washington, DC)
NSTAR . . . . . NASA Solar Electric Power (SEP) Technology Application Readiness
NSTC . . . . . National Science and Technology Council (USA, established in Nov. 1993). This Cabinet–level Council is the principal means within the executive branch to coordinate science and technology policy across the diverse entities that make up the Federal research and development enterprise.
NSW . . . . . New South Wales (Australia)
NT . . . . . NEC Toshiba Space Systems Ltd. (Tokyo, Japan, since 2001)
NTIA . . . . . National Telecommunications & Information Administration (agency of the US Department of Commerce)
NTIS . . . . . National Technical Information Service (USA)
NTP . . . . . Nuclear Thermal Propulsion
NTS . . . . . Navigation Technology Satellite (DoD/NRL program of the 1970s also referred to as Timation which predated the GPS program)
NTSB . . . . . National Transportation Safety Board (an independent U.S. agency to investigate every civil aviation accident in the U.S)
NTSC . . . . . National Television Standards Committee (US TV display standard which is also adopted by a number of other countries. This is a 525–line video signal with a 3.58 MHz chroma subcarrier at 60 Hz)
NTs OMZ . . . . . Research Center for Operational Earth Monitoring (Moscow, Russia). NZs OMZ (created by Roscosmos in 1999) is the Russian operator of all Russian EO missions (and data reception of foreign EO missions), providing also operative monitoring of JSC (Russian Space Systems),

i.e, Russian Science Missions (since 2009). [7280]

NTT ..... New Technology Telescope of ESO (European Southern Observatory) in Chile (since 1989). NTT is a 3.5 m Richey–Chretien telescope which pioneered the use of active optics. NTT was the first in the world to have a computer–controlled main mirror. This technology, developed by ESO, known as active optics, is now applied to all major modern telescopes, such as the VLT (Very Large Telescope) at Cerro Paranal and the future E–ELT (European Extremely Large Telescope).

NTT ..... Nippon Telegraph and Telephone Corporation (Japan)

NTU ..... Nanyang Technological University, Singapore

NVM ..... Non–Volatile Memory (a computer storage technique that can retain stored information even when not powered).

NWC ..... National Weather Center

NWP ..... Numerical Weather Prediction (this involves sophisticated computer models and huge volumes of real–time data to arrive finally at weather forecasting)

NWS ..... National Weather Service (USA)

O

O_2 ..... Molecular oxygen

O_3 ..... Ozone

O_x (Ox) ..... Odd oxygen ($O+O_3$)

O3B Networks .. The company was founded by Greg Wyler in 2007. The name O3B "(The) Other 3 Billion", is referring to the population of the world where broadband Internet is not available without help.
O3B Networks, Ltd. (Ops HQ in Den Haag, The Netherlands) is a next generation network service provider building the world's first MEO (Medium Earth Orbit) satellite communications constellation (8063 km orbital altitude). The network combines the ubiquitous reach of satellite with the speed of fiber to deliver satellite Internet services and mobile backhaul services to emerging markets. The first launch of 4 spacecraft took place on June 25, 2013.

OACT ..... Office of Advanced Concepts and Technology (NASA, formerly OAST)

OADR ..... Open Architecture Data Repository – of the US DOC (Department of Commerce). OADR is a cloud–based system designed to track satellites and debris in space, and eventually replace the space catalog currently maintained by the U.S. military. The data would be used to calculate the probability of collisions in orbit, an issue of growing concern to the space industry as large numbers of satellites are being launched and more debris is generated. — The goal for the OADR is to enable services like satellite collision notifications, launch monitoring, space object reentry and space debris awareness. The system combines data from government and commercial sources. [7281]
The transition of space traffic management responsibilities will happen in 2024. Between now and then, the OADR prototype has to be matured into a real operational system that can support government agencies and private sector satellite operators.

OAI ..... Ohio Aerospace Institute, Cleveland, OH [consortium of nine Ohio universities, NASA/GRC (Lewis Field in Cleveland), AFRL (Dayton), and private industry]

OARE ..... Orbital Acceleration Research Experiment (Shuttle payload)

7280) "An Operator of Russian Space Systems of the Earth Remote Sensing," Roscosmos, Proceedings of the 49th Session of UNCOPUOS–STSC (UN Committee on the Peaceful Uses of Outer Space–Scientific and Technical Subcommittee), Vienna, Austria, Feb. 6–17, 2012, URL: http://www.oosa.unvienna.org/pdf/pres/stsc2012/2012ind–06E.pdf

7281) Sandra Erwin, "Office of Space Commerce rolls out prototype space catalog for traffic management," SpaceNews, 12 February 2022, URL: https://spacenews.com/office–of–space–commerce–rolls–out–prototype–space–catalog–for–traffic–management/

OACES ..... Ocean–Atmosphere Carbon Exchange Study (campaign)
OAP ..... Orbit Average Power (OAP is one of the most important figures derived from the spacecraft systems design)
OAS ..... Optical Aperture Synthesis. The OAS technique allows to reconstitute a telescope aperture of large surface by cophasing several individual telescopes of smaller size. – OAS is a candidate concept which may be applied to extended source imagery from GEO. Such a configuration may eventually be applied from a geostationary orbit to provide high–resolution imagery (< 10 m) in particular target areas (disaster management support). Studies show that OAS implementations may be feasible and affordable from ~ 2020 onwards.
O–ASIM ..... Optical– Appliqué Sensor Interface Module. The radiation–hardened O–ASIM, jointly developed by AFRL/RV and Space Micro Inc., will include VCSEL–based short–reach full duplex optical interfaces (4x 10Gbps) with seamless migration to coarse–WDM or 40 Gbit/s for higher throughput.
OASIS ..... Orbital Aggregation & Space Infrastructure (NASA launch concept)
OASIS–1 ..... Orbiter Autonomous Supporting Instrumentation System (Shuttle payload)
OASIS ..... On–Line Data Access and Service Information System (Catalog system at NOAA–NCDC)
OAST ..... Office of Application and Space Technology (NASA, Shuttle payloads are also designated by this name – OAST–1, OAST–2, etc.)
OBC ..... On–Board Computer
OBS ..... Observatoire Paris–Mendon (France)
OCA ..... Observatoire de la Côte d'Azur (Nice, France)
OCE ..... Ocean Color Experiment (Shuttle payload)
OCEAN ..... Ocean Color Environment Archive Network (ESA Program)
OClO ..... (ClO_2) Chlorine dioxide
OCO ..... Orbiting Carbon Observatory
OCOS ..... Ocean Climate Observing Study (campaign)
OCT ..... OmniCorder Technologies, Inc. of Stony Brook, NY (USA), since 1997, manufacturer of the BioScanIR System (a medical device providing a painless, non–contact, radiation–free method of measuring blood flow in tissues and organs).
OCTL ..... Optical Communications Telescope Laboratory (NASA/JPL). OCTL is a state–of–the–art optical communications ground terminal located on Table Mountain, Wrightwood, CA.
OCTW ..... Optical Communications Through Windows (Shuttle experiment)
OCXO ..... Oven Controlled Crystal Oscillator
ODERACS ..... Orbital Debris Radar Calibration System (Shuttle payload)
ODIN ..... Proposed Swedish astronomy and aeronomy mission (C.23, in Norse mythology Odin (also called Woden or Wotan) is one of the principal gods)
ODPO ..... Orbital Debris Program Office (NASA)
ODQN ..... Orbital Debris Quarterly News (NASA). The journal was first published in June 1996.
QE ..... Quantum Efficiency
OECD ..... Organization for Economic Cooperation and Development, with HQs in Paris, France (since Sept. 30, 1961).
OEDIPUS ..... Observations of Electric–field Distributions in the Ionosphere Plasma – a Unique Strategy (Canadian sounding rocket missions from Andoya, Norway and Poker Flat, Alaska)
OEIC ..... Optoelectronic Integrated Circuit (a monolithic chip technology containing light sources, photodetectors, modulators, and VLSI–density electronic circuitry)

OES ..... Office of Earth Science (NASA/HQ, since 1998, formerly Office of Mission to Planet Earth (OMTPE)

Ofcom ..... Office of Communications, London, UK. Ofcom is the government–approved regulatory and competition authority for the broadcasting, telecommunications and postal industries of the United Kingdom (since June 2001).

OEX ..... Orbiter Experiments (Shuttle)

OFDM ..... Orthogonal Frequency Division Multiplexing

OFDMA ..... Orthogonal Frequency Division Multiple Access. OFDMA is the multi–user variant of the OFDM scheme where multiple–access is achieved by assigning subsets of sub–carriers to different users, allowing simultaneous data transmission from several users. In OFDMA, the radio resources are two dimensional regions over time (an integer number of OFDM symbols) and frequency (a number of contiguous or non–contiguous sub–carriers).

OGC ..... Open Geospatial Consortium. OGC is an international not for profit organization committed to making quality open standards for the global geospatial community.

OGLOW ..... Sun Orbiter Glow (Shuttle experiment)

OGT ..... Optical Ground Terminal

OH ..... Hydroxyl radical

OHB–System ... Orbital– und Hydrotechnologie Bremen System GmbH (since 1958, originally known as: Otto Hydraulik Bremen). A mid–sized aerospace and telecommunication company, located in Bremen, Germany – with a number of company participants and subsidiaries in Germany and Italy. OHB–System is part of the Fuchs Gruppe (since 1981). Satellites built by the Fuchs Gruppe are: BremSat, SAFIR–1, –2, ABRIXAS, DIAMANT, MITA. Note: The company Carlo Gavazzi Space (CGS) S.p.A, Milan, Italy was taken over by the Fuchs Gruppe in 1996; OHB–Teledata was founded in 1996. LUXspace of Luxembourg, has been formed in 2004 by OHB Technology AG as part of its European Company Network Strategy. In June 2007, OHB Technology AG acquired the company Kayser–Threde GmbH of Munich, Germany.
In June 2011, OHB purchased the Space System Division of SSC (Swedish Space Corporation). [7282) 7283) 7284)]
March 2015: Following the entry in the commercial register, OHB AG has officially adopted the legal structure of a Societas Europaea (SE) and is therefore now known as **OHB SE**. [7285)]

OICETS ..... Optical Interorbit Communications and Engineering Test Satellite (of NASDA, Japan)

OIP ..... Optronic Instruments & Products [OIP is trading under the trade name 'Delft Sensor Systems' (DSS)], located in Oudenaarde, Belgium. Note: As of July 2003, OIP was purchased by Elbit Systems Ltd. of Haifa, Israel.

OISL ..... Optical Inter–Satellite Communication Link

OKEAN ..... Ukrainian/Russian satellite series, F.37

OLED ..... Organic Light Emitting Diode (a LED made of semiconducting organic polymers). The OLED technology is being introduced into all types of displays (TV, camera, computer displays, etc.)

OLFAR ..... Orbiting Low Frequency Array

7282) Peter B. de Selding, "OHB Purchases SSC's Space Systems Division," Space News, June 27, 2011, p. 11, URL: http://www.spacenews.com/satellite_telecom/110624–ohb–buys–ssc–space–systems.html

7283) http://www.aipas.it/aipas_sito/materiali/workshop/Fichs_OHB_AIPAS_Workshop2011.pdf

7284) Martin Stade, "OHB planning to merge OHB System AG and Erwin Kayser–Threde GmbH," OHB Press Release, May 19, 2014, URL: http://www.ohb.de/press–releases–details/items/ohb–planning–to–merge–ohb–system–ag–and–erwin–kayser–threde–gmbh.html

7285) "OHB AG converted into OHB SE," OHB Ress Release, March 26, 2015, URL: http://www.ohb.de/press–releases–details/ohb–ag–converted–into–ohb–se–1140.html

OLSG ..... Optical Link Study Group of IOAG (Inter–agency Operations Advisory Group). OLSG was established in 2010. [7286)]

OMNI ..... Operating Missions as Nodes on the Internet. OMNI is the first end–to–end demonstration of operating NASA missions as nodes on IP.

OMUX ..... Optical Multiplexer

ONERA ..... Office National d'Etudes et de Recherches Aérospatiales – The French Aeronautics and Space Research Center (Chatillon, Meudon, Palaiseau, Avrieux, Mauzac, Toulouse, Lille, France) ONERA reports to the French Ministry of Defense. CERT (Centre d'Etudes et de Recherches de Toulouse) is a center of ONERA. It carries out research for and with the aeronautics, space and defense industries.

ONR ..... Office of Naval Research (HQ in Arlington, VA). ONR coordinates the science and technology programs of the US Navy and Marine Corps. NRL is a technical department of ONR.

OOA ..... On–Orbit Assembly

OOK ..... On–Off Keying (modulation technique)

OOS ..... On–Orbit Servicing

OPAC ..... Occultations for Probing Atmosphere and Climate (Workshop series)

OPO ..... Optical Parametric Oscillator (laser type)

O–QPN ..... Offset Quadriphase Pseudo–Noise

OQPSK ..... Offset Quadrature Phase Shift Keying

OREGIN ..... Organization of European GNSS Equipment and Services Industry (an industry association to support development of Galileo equipment and services)

ORFEUS ..... Orbiting Retrievable Far and Extreme Ultraviolet Spectrograph (German/US Shuttle payload)

ORI ..... Ocean Research Institute (University of Tokyo, Japan)

ORNL ..... ORNL (Oak Ridge National Laboratory), Oak Ridge, TN (of DOE)

ORS ..... Operationally Responsive Space (a DoD vision/initiative to provide quick–response tactical space–based capabilities). The ORS Office was set up in May 2007 at Kirtland Air Force Base. – The ORS–1 spacecraft of USAF was launched on June 30, 2011 on a Minotaur–1 vehicle of OSC from MARS (Mid–Atlantic Regional Spaceport), Wallops Island, VA. [7287)]
The ORS–1 S/C features the SYERS–2 (Senior Year Electro–Optical Reconnaissance System–2), a pushbroom VIS/infrared camera.

ORS ..... Orbital Recovery System, called ConeXpress, of Orbital Recovery Corporation. ConeXpress ORS will be operated by Orbital Recovery Ltd., UK

Ørsted ..... Danish research satellite, G.18

ORSTOM ..... Office de la Recherche Scientifique et Technique Outre–Mer (Paris, Montpellier, Orleans, etc., France) also: L'Institut francais de recherche scientifíque pour le développement en coopération (French scientific research institute for development in cooperation). In 1998 OSTROM was renamed to IRD (Institut de Recherche pour le Développement)

OSA ..... Optical Society of America

OSDPD ..... Office of Satellite Data Processing and Distribution (of NOAA)

OSC ..... Orbital Sciences Corporation (Dulles, VA, USA, since April 1982, builder of small satellites and instruments, owner/operator of commercial launch services for small payloads, Pegasus vehicle, etc.). ORBCOMM, ORBIMAGE and Magellan (GPS receivers) are affiliates of OSC, so are CTA Space Systems (McLean, VA) and MacDonald Det-

7286) Klaus–Juergen Schulz, John Rush, "Results of the Optical Link Study Group," Proceedings of SpaceOps 2012, The 12th International Conference on Space Operations, Stockholm, Sweden, June 11–15, 2012, URL: http://spaceops2012.com/proceedings/documents/id1275004–Paper–002.pdf

7287) "Minotaur Launches ORS–1 From NASA Wallops Flight Facility," Space Daily, July 1, 2011, URL: http://www.spacedaily.com/reports/Minotaur_Launches_ORS_1_From_NASA_Wallops_Flight_Facility_999.html

twiler Associates Ltd (MDA, Vancouver, BC).
In the spring of 2010, OSC acquired GDAIS (General Dynamics Advanced Information Systems) of Scottsdale/Gilbert, AZ GDAIS built such spacecraft as: Fermi/GLAST astronomy satellite for NASA, the C/NOFS space weather satellite for the Air Force, the GeoEye−1 commercial imaging satellite for GeoEye, Inc., and the NFIRE experimental satellite for MDA (Missile Defense Agency).
In April 2014, **Orbital ATK** formed from the merger of OSC (Orbital Sciences Corp.) and the ATK (Aerospace and Defense groups of Alliant Techsystems Inc.). The merger was finalized on Feb. 9, 2015, and Orbital ATK marks its first full day of operations on Feb. 10, 2015. Orbital ATK is headquartered in Dulles, VA, USA (workforce of more than 12,000 people). [7288)]
On June 6, 2018, Northrop Grumman Corporation announced it has closed the acquisition of Orbital ATK Inc. ("Orbital ATK"), a global leader in aerospace and defense technologies. Orbital ATK is now **Northrop Grumman Innovation Systems**, a new, fourth business sector. [7289)]

OSCAR ..... Orbiting Satellite Carrying Amateur Radio (initially a satellite series of a USA−based group of amateur radio enthusiasts; OSCAR I, the first amateur satellite, was launched Dec. 12. 1961 by a Thor Agena B launcher (piggyback to Discover 36 of USAF) from VAFB, CA (orbit of 372 km x 211 km, inclination of 81.2°, period of 91.8 min). OSCAR I was the first of the phase I series. In 1969 AMSAT was founded to give amateur radio satellites an international base. Note: Occasionally, there is also the spelling of OSKAR.

OSI ..... Open System Interconnect (a standard for open communication)

OSS ..... NASA's Office of Space Science (Shuttle payloads, etc.)

OSSS ..... One Stop Satellite Solutions (Ogden, UT, since 1996, a spin−off commercial company of CAST at Weber State University). OSSS built MPA (Multi−Payload Adapter) for JAWSAT. Within the CubeSat program, OSSS is also a US contact/partner for the Dnepr launch vehicle of ISC Kosmotras of Moscow.

OST ..... Outer Space Treaty: formally the "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies", is a treaty that forms the basis of international space law. OST entered into force onOctober 10, 1967. As of May 2013, 102 countries are states parties to the treaty, while another 27 have signed the treaty but have not completed ratification. − Article 1 of **OST** states that participation in outer space activities is what is legally defined as the "province of mankind", hence encouraging international cooperation.

OSTA ..... Office of Space and Terrestrial Applications, NASA (a designation that was also given to the early Shuttle payloads)

OSTC ..... Federal Office for Scientific, Technical, and Cultural Affairs of Belgium [also referred to as SSTC (Services Fédéraux des Affaires Scientifiques, Techniques et Culturelles, Belgium)]

OSTM ..... Ocean Surface Topography Mission (a joint NASA, CNES, NOAA and EUMETSAT altimetry mission, also known as Jason−2 in Europe)

OSTP ..... Office of Science and Technology Policy. OSTP was established by Congress in 1976 with a broad mandate to advise the President and others within the Executive Office of the President on the effects of science

7288) Mike Wall, "Orbital ATK, Merger of Orbital Sciences and ATK, Begins Operations," Sapce.com, Feb. 10, 2015, URL: http://www.space.com/28515−orbital−atk−merger−private−spaceflight.html

7289) "Northrop Grumman Completes Orbital ATK Acquisition, Blake Larson Elected to Lead New Innovation Systems Sector," Northrop Grumman News, 6 June 2018, URL: https://news.northropgrumman.com/news/releases/northrop−grumman−completes−orbital−atk−acquisition−blake−larson−elected−to−lead−new−innovation−systems−sector

and technology on domestic and international affairs. The 1976 Act also authorizes OSTP to lead interagency efforts to develop and implement sound science and technology policies and budgets, and to work with the private sector, state and local governments, the science and higher education communities, and other nations toward this end.

OSTST ..... Ocean Surface Topography Science Team (an international team involving altimetry missions)

OSVS ..... Orbiter Space Vision System (Shuttle payload)

OSVW ..... Ocean Surfave Vector Wind

OTTER ..... Oregon Transect Ecosystem Research (campaign)

OV−LWA ..... Owens Valley Long Wavelength Array. [7290] OV−LWA (located in CA, USA) is a new radio telescope, developed by a consortium led by Caltech, the team includes: JPL, Harvard University, the University of New Mexico, Virginia Tech, and the Naval Research Laboratory. Operating at full speed, the new array produces 25 TB of data every day. Combining the observing power of more than 250 antennas spread out over a desert area equivalent to about 450 football fields, the OV−LWA is uniquely sensitive to faint variable radio signals such as those produced by pulsars, solar flares, and auroras on distant planets.

OVRO ..... Owens Valley Radio Observatory. OVRO is a 40 m telescope of Caltec, located near Big Pine in the Owens Valley, CA (~320 km north of Los Angeles and 20 km southeast of Bishop).

OWL ..... Orbiting Wide−angle Light−collectors (proposed NASA/GSFC mission of two satellites; also: a measurement technique for the detection of ultrahigh−energy cosmic radiation)

OWL ..... OverWhelmingly Large telescope of ESO (European Southern Observatory). OWL is a next−generation optical and near−infrared telescope, dubbed OWL for the eponymous bird's keen night vision. With a diameter of 100 m, OWL would combine unrivalled light gathering power with the ability to resolve details down to a milli−arc second (marsec). The design is based on a spherical primary segmented mirror.

OWLS ..... Optical Wireless Links for intra−Satellite applications

OWWS ..... Operational Windshear Warning System (NCAR)

OZA ..... Observation Zenith Angle

P

PaCoRa ..... Passive Correlation Ranging. As of 2013, PaCoRa is a new system for the orbit determination of satellites in geostationary orbit. [7291] [7292]

PACSAT ..... A Protocol suite first developed by SSTL. PACSAT uses packet radio techniques in the microsatellite system to transmit its data over the satellite RF link. Several layers of protocol are implemented in the PACSAT suite, at the lower level HDLC (High−Level Data Link Control) and X.25 provide the functions of packet multiplexing, error detection and ARQ (Automatic−Repeat Request) error correction. PACSAT is a point−to−multipoint protocol (broadcast); small ground terminals in the satellite footprint receive/send the data. The PACSAT protocol suite is also supporting data communications within the radio amateur community (referred to as AX.25).

PADE ..... Paquete Argentino de Experimentos (Argentine Experiments Package on Shuttle)

7290) "Powerful New Radio Telescope Array Searches the Entire Sky 24/7," Caltech, May 11, 2015, URL: http://www.caltech.edu/news/powerful−new−radio−telescope−array−searches−entire−sky−247−46754

7291) "A new way to track geostationary orbiting satellites," ESA, May 22, 2013, URL: http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=32417

7292) Luis Rodríguez Gómez, Georges Krier, Marc Thill, Javier de Vicente, "PaCoRa: A new system for accurate and cost−efficient tracking and orbit determination of geostationary satellites," Proceedings of TTC 2013, 6th International Workshop on Tracking Telemetry and Command Systems for Space Applications, Darmstadt, Germany, Sept. 10−13, 2013

PAF ..... Processing and Archiving Facility (ESA facilities for the ERS–1 mission in Europe: D–PAF at DLR/DFD, Oberpfaffenhofen, Germany; F–PAF at CERSAT, Brest, France; I–PAF at ASI Matera, Italy; UK–PAF at RAE, Farnborough, UK)

PAGASA ..... Philippine Atmospheric, Geophysical and Astronomical Services Administration, Manila, Republic of the Philippines

PAGES ..... Past Global Changes (IGBP core program)

PAL ..... Phase Alternation Line (German TV display standard). PAL has 625 scan lines per frame at 50 Hz.

PALACE ..... Profiling ALACE (Autonomous Lagrangian Circulation Explorer) of NOAA/AOML. PALACE is a later version of ALACE, first deployed in 1997. PALACE buoys have the added capability of data storage. They cary a sensor package providing measurements of various parameters such as conductivity and temperature. In the late 1990s, hundreds of PALACE floats in the Atlantic Ocean are reporting to data collection satellites on subsurface currents as well as profiles of salinity and temperature.

PALE ..... Paleoclimates for Arctic Lakes and Estuaries (campaign)

PAM ..... Portable Automated Mesonet (weather stations of NCAR)

PAMS ..... Passive Aerodynamically–Stabilized Magnetically–Damped Satellite (Shuttle payload)

PAN ..... Panchromatic (data)

PAN ..... Peroxyacetylnitrate

PANASH ..... Paleoclimates of the Northern and Southern Hemispheres (IGBP/PAGES program under focus 1)

PANSAT ..... Petite Amateur Naval Satellite (S/C of Naval Postgraduate School, Monterey, CA, ejected from Shuttle)

Pan–STARRS .. Panoramic Survey Telescope and Rapid Response System. Pan–STARRS is the world's largest digital sky survey, consisting of a 1.8 m telescope equipped with a 1.4 billion pixel digital camera, located at the summit of Haleakala, on Maui. Pan–STARRS is owned and operated by the University of Hawaii Institute for Astronomy (IfA).

PARASOL ..... Polarization and Anisotropy of Reflectances for Atmospheric Science coupled with Observations from a Lidar, a French mission, O.28.3

PARE ..... Physiological and Anatomical Rodent Experiment (Shuttle experiment)

PARLIQ ..... Phase Partitioning in Liquids (Shuttle experiment)

PAS ..... PanAmSat Corporation of Greenwich, CT (a daughter of Hughes Electronics Corporation of Los Angeles, CA. PanAmSat is the world leader of commercial satellite–based communications services, launch of first satellite (Galaxy–1) in 1983, launch of PAS–1 in 1988)

PASC ..... Polar Atmospheric and Snow Chemistry (IGBP/IGAC project)

PASDE ..... Photogrammetric Appendage Structural Dynamics Experiment (Shuttle)

PASS ..... Prince Albert Satellite Station (since 1972), owned by NRCan (Natural Resources Canada and operated by CCRS (Canada Centre for Remote Sensing).

PBL ..... Planetary Boundary Layer

PBO ..... Plate Boundary Observatory (a distributed network of GPS stations and strainmeters in the framework of the US EarthScope program

PbS ..... Lead Sulfide (detector material)

PbSi ..... Lead Silicon (detector material)

PC ..... Photoconductive (detector)

PC/104 ..... An embedded computer standard controlled by the PC/104 Consortium (since 1992) which defines both a form factor and computer bus. The PC/104 is intended for specialized computing environments where

applications depend on reliable data acquisition despite an often extreme environment.

PCB . . . . . Printed Circuit Board

PCG . . . . . Protein Crystal Growth (Shuttle experiment)

PCG/STES . . . . . Protein Crystal Growth / Single−Locker Thermal Enclosure System (Shuttle experiment)

PCI . . . . . Peripheral Connection Interconnect (backplane commonly found in IBM−compatible PCs). The industry standard PCI backplane (PCI local bus) allows development of custom interfaces that provide DMA to instruments with unique interfacing requirements.

PCIe . . . . . Peripheral Component Interconnect Express. PCIe is a high−speed expansion card format that connects a computer with its attached peripherals. PCIe has a point−to−point architecture. This means that each device connects to the host with its own serial link and does not have to share a bus.

PCM . . . . . Pulse Code Modulation

PD . . . . . Photodiode (detector)

PDA . . . . . Photodiode Array (detector)

PDF . . . . . Portable Document Format (Adobe standard)

PDO . . . . . Pacific Decadal Oscillation. PDO is a long−lived El Niño−like pattern of Pacific climate variability.

PDOP . . . . . Position Dilution of Precision (in the GPS information collection process a quality parameter − PDOP is a measure of the geometrical "strength" of the visible satellite configuration. The higher the number, the more "noise" in the position reading)

PDP . . . . . Plasma Diagnostics Package (Spacelab−2 sensor, studies of the interaction between the Earth's magnetic field and charged particles in the ionosphere)

PDR . . . . . Preliminary Design Review (a formal inspection of a project's high−level design)

PE&RS . . . . . Photogrammetric Engineering & Remote Sensing (ASPRS journal)

PEACAMPOT . . Perturbation by East Asia Continental Air Mass to Pacific Oceanic Troposphere (campaign)

PEM . . . . . Polymer Electrolyte Membrane (fuel cell technology), sometimes PEM is also referred to as Proton Electrolyte Membrane. Both meanings are the same.

PEMs . . . . . Plastic Encapsulated Microcircuits (PEMs are being used in many space applications)

PEM−West . . . . . Pacific Exploratory Mission − West (campaign)

PEO . . . . . Polyethylene Oxide (a fuel cell type)

PEP . . . . . Pole−Equator−Pole (transect of PANASH campaign)

PFM . . . . . Proto−Flight Model (generally an early version of a payload instrument)

PGIM . . . . . Plant Growth Investigations in Microgravity (Shuttle experiment)

PHCF . . . . . Pituitary−Growth Hormone Cell Function (Shuttle experiment)

PHM . . . . . Passive Hydrogen Maser (ESA selected the PHM as the master clock in the Galileo navigation payload − due to with its excellent frequency stability)

PHOTON . . . . . Russian solar−terrestrial mission (M.8.1)

PL . . . . . Phillips Laboratory of USAF (PL is headquartered at Kirtland Air Force Base, Albuquerque, NM, and has locations at Hanscom AFB, Bedford, MA, and Edwards AFB, CA)

PI . . . . . Principal Investigator

PISCES . . . . . Pacific International Space Center for Exploration Systems, University of Hawaii, Hilo, HI

PLZT . . . . . Lead Lanthanum Zirconium Titanate (PLZT ceramics is a ferroelectric material with an interesting behavior of phase transition and trans-

parency in quite wide spectral range (at least 0.4–6 μm), allowing to use optical methods to study principles of solid state physics and optics)

PIC . . . . . Photonic Integrated Circuit

PIC . . . . . Peripheral Interface Controller (a family of Harvard architecture microcontrollers made by Microchip Technology)

PICS . . . . . Pseudo Invariant Calibration Sites. PICS are being used for on–orbit radiometric trending of optical satellite sensors. The most highly regarded sites used by the calibration community tend to be in the Sahara desert of North Africa. A suite of sites has been developed and endorsed by CEOS. [7293)] The chief advantages of these locations are the relatively high reflectances, extremely limited rainfall that severely curtails any vegetative growth, and the relatively limited human population which limits human–induced changes.

PID . . . . . Proportional Integral Derivative (controller – a generic control loop feedback mechanism)

PID . . . . . Prototype International Directory (CEOS–defined Directory Interchange Format (DIF)); CEOS members operating an archive with PID capability are: CCRS, DLR/DFD, ESA/ESRIN, NASA, NASDA, NOAA, RAE, etc. . Hence, standardized archival access is possible (see: IDN).

PIDC . . . . . Precision Instrument Development Center (of the National Science Council, Taiwan), Hsinchu, Taiwan ROC

PIK . . . . . Potsdam Institut für Klimaforschung (Potsdam Institute for Climate Impact Research, Potsdam, Germany)

PILOT . . . . . Portable Inflight Landing Operations Trainer (Shuttle experiment)

PILPS . . . . . Project for Intercomparison of Landsurface Parameterization Schemes (WCRP/GEWEX project)

PIN . . . . . Positive Insulator Negative (diode)

Pioneer–10 . . . . . A NASA/JPL interplanetary S/C (Jupiter Flyby Mission) mission with a launch March 3, 1972. Pioneer–10 is the first known man–made object to leave the solar system when it passed Pluto's orbit in 1983. In March 2002, after 30 years in orbit, the spacecraft was able to receive and retransmit a signal from NASA – at a distance of more than 12 billion km (22 hours roundtrip time) from Earth.

PIPOR . . . . . Program for International Polar Ocean Research

PIXEL . . . . . Picture Element

PLB . . . . . Personal Locator Beacon (COSPAS and S&RSAT). PLB is a satellite–aided search and rescue system that aims to reduce the time required to alert rescue authorities whenever a distress situation occurs. In the US, the FCC is permitting a PLB service as of July 1, 2003. The first ever rescue of a person using PLB in the USA took place on Nov. 14, 2003.

PLC . . . . . Programmable Logic Controller

PLL . . . . . Phase Locked Loop (communication technique to enable integration of voice and data)

PLO . . . . . Phase Locked Oscillator

PM . . . . . Phase Modulation (modulation technique of the main carrier)

PM . . . . . Polymer Morphology (Shuttle experiment)

PM . . . . . Post Meridiem (refers to the afternoon time designations in the US; a time of 5 PM is equivalent of 17:00 hours in international notation)

PMA . . . . . Pressurized Mating Adapter (Shuttle)

PMAP . . . . . Paleoenvironment Multiproxy Analysis and Mapping Project (see PANASH campaign)

PMD . . . . . Photonic Mixer Device (a technology used to detect 3D data in real time). The PMD sensors are based on the ToF (Time of Flight) principle. The PMD imager detects both the intensity and the distance in each PMD pixel or voxel, respectively.

7293) "CEOS Reference Sites," URL: http://calval.cr.usgs.gov/sites_catalog_ceos_sites.php

PMDG . . . . . Programmable Micro Diffraction Grating (PMDGs are attractive components for spatial light modulation in the infrared domain)
PMG . . . . . Plasma Motor Generator (R.257.5)
PMOD/WRC . . . Physikalisch–Meteorologisches Observatorium Davos, World Radiation Center (Switzerland)
PMS . . . . . Particle Measuring Systems Inc. (of Boulder CO)
PMST . . . . . Small ("Piccole") Missions for Science and Technology. PMST is a program of ASI (Italian Space Agency) with such missions as AGILE [Astrorivelatore Gamma a Immagini Leggero, or (Extreme Light Imager for Gamma Astronomy)] and DAVID (Data and Video Interactive Distribution)
PMT . . . . . Photomultiplier Tube (detector)
PMV&D . . . . . (Plume Model Validation and Development (campaign)
PN . . . . . Pseudo Noise (code)
pn–CCD . . . . . pn–junction CCD (Charge Coupled Device) detector. A pn–CCD combines high quantum efficiency, high–speed readout and excellent energy resolution.
pn–junction . . . . A p–n junction is a junction formed by joining p–type and n–type semiconductors together in very close contact.
PNEDC . . . . . Programme National d'Etude de la Dynamique du Climat (France)
PNNL . . . . . Pacific Northwest National Laboratory (Richland, WA, USA) of DOE, operated by Battelle Memorial Institute
PnP . . . . . Plug–n–Play. PnP refers to hardware and software devices in a computer (PC) that, after being installed ("plugged in"), can immediately be used ("played with") without requiring a system reconfiguration or manual installation of device drivers by the user.
PNR . . . . . Pseudo Noise Number (a GPS series designation)
PNRA . . . . . Italian National Program for Antarctic Research
PNT . . . . . Positioning, Navigation, and Timing (spaceborne service as provided by GNSS)
PRN . . . . . Pseudo Random Noise
POCC . . . . . Payload Operations and Control Center
PocketQube . . . . The PocketQube (also referred to as PocketQub) standard allows for satellites of varying size measured in standard units. A single–unit, or 1p, PocketQube is one eighth the size of a single–unit CubeSat – with a side length of 5 cm. Single, 1.5 and 2.5 unit satellites have been developed.
POD . . . . . Precise Orbit Determination
PODS . . . . . Payload Orbital Delivery System (a goal of the DARPA Phoenix program)
P–POD . . . . . Poly–Picosatellite Orbital Deployer (the standardized deployer system of CalPoly)
POEM–1 . . . . . Polar–Orbit Earth–Observation Mission (planned ESA Series) F.13
POES . . . . . Polar–orbiting Operational Environmental Satellites (NOAA series of operational polar orbiting satellites), I.13
POGO . . . . . Polar–Orbiting Geophysical Observatory
POL . . . . . Prowdman Oceanographic Laboratories (UK)
POLAR . . . . . NASA/GSFC Solar–Terrestrial Mission (M.22)
POLARIS . . . . . Photochemistry of Ozone Loss in the Arctic Region in Summer (campaign)
POLINAT . . . . . Pollution from Aircraft Emissions in the North Atlantic Flight Corridor (campaign)
POLinSAR . . . . . SAR Polarimetry and Polarimetric Interferometry
POLSA . . . . . Polish Space Agency (since 26 Septmber 2014, with HQs in Gdansk).[7294]

7294) http://www.kpk.gov.pl/wp–content/uploads/2016/07/2–POLSA–21–09–2016.pdf

PO/KB Polyot . . . Launch vehicle and satellite manufacturer in Omsk, Russia. PO = Production Association. In its post−war history, Polyot manufactured a total of about 1500 missiles, more than 750 space launchers (Kosmos−3 and Kosmos−3M) and more than 200 satellites.
PoSAT . . . . . Portuguese Satellite (F.62.9)
POSIX . . . . . Portable Operating System Interface for UniX (an IEEE standard for Unix operating systems). IEEE1003.1 (1990) and IEEE1003.2 (1992)
PPARC . . . . . Particle Physics and Astronomy Research Council, UK
PPARC KITE Club KITE (Knowledge Innovation, Technology, Enterprise). The PPARC KITE Club is an established UK business network which includes defense, security, aerospace, and space sector activities. On April 1, 2007, PPARC and CCLRC merged to form the **STFC** (Science and Technology Facilities Council). STFC is an independent, non−departmental public body of the Department for Innovation, Universities and Skills (DIUS).
PPC . . . . . Power Personal Computer (based on the MPC601−Chip)
PPD . . . . . Polymer Photo Detector
PPE . . . . . Phase Positioning Experiments (Shuttle payload)
PPF . . . . . Polar Platform (ESA Columbus program, PPF is utilized for POEM payloads)
PPM . . . . . Pulse Position Modulation (PPM is a form of block encoding modulation technique in which bits are transmitted in blocks instead of one at a time)
PPP . . . . . Precise Point Positioning (navigation solution)
PPP . . . . . Public Private Partnership (an arrangement between various partners in a program to share the costs)
PPS . . . . . Precise Positioning Service (GPS)
PPT . . . . . Pulsed Plasma Thruster
PPU . . . . . Power Processing Unit
PRARE . . . . . Precision Rate and Range−Rate Equipment, J.8.2
PRESENSE . . . . Pipeline Remote Sensing for Safety and the Environment [a European initiative (17 partner consortium, started in Dec. 2001) co−funded by the European Commission. The aim of PRESENSE is to develop and integrate the elements of a pipeline management system for European gas/oil pipeline operators to improve safety, reduce survey costs and improve transmission efficiency using remote monitoring techniques.]
PRF . . . . . Pulse Repetition Frequency
PRI . . . . . Photochemical Reflectance Index
PRI . . . . . Pulse Repetition Interval (1/PRF)
PRIMA . . . . . Piattaforma Riconfigurabile Italiana Multi−Applicativa (Reconfigurable Italian Platform for Multiple Applications), ASI platform for a total S/C mass of 300−1000 kg
PrioraNet . . . . . PrioraNet is a commercial ground services antenna network of SSC (Swedish Space Corporation), incorporating ground stations in Sweden (Esrange, 67.9°N, 21°E); Australia (Yatharagga 19°S, 115.35°E; USN Western Australia, 29°S, 114.9°E); Chile (Santiago 33°S, 70.6°W; Punta Arenas); Canada (Inuvik station, owned by SSC and DLR, 68.3°N, 133.5°W), Hawaii (South Point, 19°N, 155.6°W); USA (Clewiston FL); Rock Springs, Wyoming; Alaska (Poker Flat, 65°N, 147°W;North Pole 64.8°N, 147.5°W). The main services provided by PrioraNet are S−band and X−band communications. [7295)]
PRIRODA . . . . . Research module of the Space Station MIR (F.41)
PRN . . . . . Pseudo Random Noise
PRNU . . . . . Photo Response Non−Uniformity (PRNU is one source of pattern noise in digital cameras)

7295) Petrus Hyvönen, "Evolved Global SSC Ground Station Network," SSC, 2012, URL: http://earth.esa.int/gscb/papers/2012/21−Evolved_Global_SSC_Ground_Station_Network.pdf

PROBE ..... Prototype Radiation Observation Experiment (campaign)
PRODEX ..... PROgramme de Développement d'Expériences scientifiques (an ESA program created in 1986). The PRODEX program office fullfils the role of coordinating experiment development and awarding industrial contracts.
Prometheus ..... Prometheus is an ultra−low cost reusable rocket engine, using liquid oxygen–methane propellants, to power Europe's future launchers. On 14 Dec. 2017, ESA and ArianeGroup signed a contract to develop a full−scale demonstrator to be ground tested in November 2020. [7296)]
ProSEDS ..... Propulsive Small Expandable Deployer System (tether experiment)
PROTEUS ..... Platforme Reconfigurable pour l'Observation, les Telecommunications et les Usages Scientifiques (French minisatellite bus for a S/C mass less than 500 kg)
PROTEUS ..... Profile Telemetry of Upper Ocean Currents [a NOAA/PMEL mooring system, a taut−wire surface mooring with a toroidal float similar to ATLAS]
PSI ..... Paul Scherrer Institute, Villigen, Switzerland (database of space environmental data)
PSC ..... Polar Stratospheric Clouds
PSE ..... Physiological Systems Experiment (Shuttle)
PSE ..... Polar Sunrise Experiment (campaign)
PSF ..... Point Spread Function (used in image processing − refers to the non−perfect optics of a system so the relative intensity of the point of light is distributed). The PSF function is used to assess the spatial resolution of an imaging system. PSF describes the distribution of light intensity in an image of a point and sets an upper limit to a number of possible image points per unit area.
PSI ..... Persistent Scatterer Interferometry (a new way of processing SAR imagery that allow ground movements over wide areas to be detected and monitored with even greater sensitivity)
PSK ..... Phase Shift Keying (a modulation technique)
PSLR ..... Peak Side Lobe Ratio
PSLV ..... Polar Satellite Launch Vehicle (ISRO launch vehicle)
PSN ..... Piano Spaziale Nationale (previous name of Italy's Space agency , now ASI)
PSRC ..... Polish Space Research Center, Warsaw, Poland
PSTG ..... Polar Space Task Group (WMO)
PtSi ..... Platinum−silicide (detector material)
PTB ..... Physikalisch−Technische Bundesanstalt (Braunschweig, Germany, since 1887). PTB is the German national metrology institute (timekeeper) providing scientific and technical services.
PTFE ..... Polytetrafluorethylen (also known as Teflon^{TM} as solid propellant)
PTT ..... Platform Transmitter Terminal (data collection platform for ARGOS system on a remote terminal in the ground segment)
PTT ..... Public (Postal) Telephone and Telegraph (utility company). Refers to operating agencies directly or indirectly controlled by governments in charge of telecommunication services in most countries of the world.
PTTI ..... Precise Time and Time Interval (US strategic systems and applications meeting series in precise time)
Pumpkin Inc. .... San Francisco, CA, provider of commercial CubeSat Kit−based bus (since 2003) and MISC (Miniature Imaging Spacecraft) Kit, a 3U CubeSat structure (since 2008) and 3U CubeSat Kit Hinge (deployable panels)
PUS ..... Packet Utilization Standard (of ECSS). PUS has been used by a number of ESA and non−ESA missions (XMM, MSG, Integral, GOMOS in-

7296) "Prometheus to power future launchers," ESA, 14 Dec. 2017, URL: http://m.esa.int/Our_Activities/Space_Transportation/Prometheus_to_power_future_launchers

strument of Envisat, ATV, Ørsted, PROBA, Rosetta, MARS Express, Herschel/Planck, CryoSat−2, GOCE, Galileo) in combination with the CCSDS protocol.

PV ..... Photovoltaic (detector)

PVT ..... Position, Velocity, Time

PVTOS ..... Physical Vapor Transport of Organic Solids (Shuttle experiment)

PWV ..... Precipitable Water Vapor (atmosphere)

PYREX ..... Pyrenean Experiment (campaign)

PZT ..... Lead (Pb) Zirconate Titanate – a ceramic material that shows a marked **piezoelectric effect**. PZT−based compounds are composed of the chemical elements lead and zirconium and the chemical compound titanate which are combined under extremely high temperatures. Being piezoelectric, it develops a voltage (or potential difference) across two of its faces when compressed (useful for sensor applications).

Q

QA4EO ..... Quality Assurance Framework for Earth Observation data – QA4EO has been endorsed by CEOS as a contribution to facilitate the GEO vision for a Global Earth Observation System of Systems (GEOSS). [7297)]

QAM ..... Quadrature Amplitude Modulation. QAM is a modulation scheme which conveys two digital bit streams or two analog message signals. Two orthogonal sinusoidal carriers are used to transmit data over a given physical channel. One signal is called the I signal, and the other is called the Q signal.

QB50 ..... CubeSat50, an EU project supported within FP7: QB50 is an international network of 50 CubeSats for multi−point, in−situ measurements in the lower thermosphere and re−entry research. The CubeSats (2U or 3U) are being built by University students. The common launch is scheduled for 2016 on a Cyclone−4 vehicle from the Alcantara Launch Center in Brazil. The purpose of the QB50 project is to achieve a sustained and affordable access to space for small scale research space missions and planetary exploration. The QB50 consortium is coordinated by VKI (Von Karman Institute for Fluid Dynamics) in Brussels, Belgium, and comprises a team of 11 partners.

QCL ..... Quantum Cascade Laser

QD ..... Quantum Dot

QDIP ..... Quantum−Dot Infrared Photodetector

QFH ..... Quadrifilar Helix (antenna)

QGG ..... Quantum Gravity Gradiometer (based on atom interferometer)

QinetiQ ..... New name of DERA (Defence Evaluation and Research Agency), Farnborough, UK, pronounced as "kin−et−tik" (as of July 2, 2001). QinetiQ is organized as a PPP (Public Private Partnership) establishment providing more managerial freedom. – QinetiQ comprises the greater part of former DERA, an agency of the UK Ministry of Defence (MoD), incorporating the bulk of the MoD's non−nuclear research, technology and test and evaluation establishments. On July 2, 2001, former DERA split into two organisations, DSTL (Defence Science and Technology Laboratory) and QinetiQ plc. DSTL remains part of the MoD and continues to handle the most sensitive areas of research. QinetiQ is a wholly government−owned UK Plc, and competes on the world stage to deliver innovations to customers and their communities. In Sept. 2005, QinetiQ bought the Verhaert Design and Development N. V. (company) of Kruibeke, Belgium.

QKD ..... Quantum Key Distribution [a means for two (or more) parties to exchange with unconditional security an enciphering key over a quantum

7297) Pascal Lecomte, Greg Stensaas, "Overview of progress towards a data quality assurance strategy to facilitate interoperability," June 3, 2009, URL: http://qa4eo.org/docs/GSICS_QA4EO.pdf

channel, since its privacy against an eavesdropper can always be detected]. QKD guarantees the distribution of random sequences of bits with a level of confidentiality that cannot be achieved by any classical means.

Q−LCT ..... Quantum−Laser Communication Terminal (Tesat Spacecom) [7298)]

QMW ..... Queen Mary and Westfield College (London, UK)

QoS ..... Quality of Service

QPN ..... Quadra Pseudo Noise (modulation technique)

QPSK ..... Quadra−Phase Shift Keying (4−PSK is a modulation technique and a data transmission standard). Soon 8−PSK and higher modulations for such applications as DBS (Digital Broadcast System) will be used.

QSO ..... Quasi−Stellar Object (a QSO emits great amounts of radio energy)

QSS ..... Quadrant Sun Sensor .....

Qubit ..... A quantum bit of information (the qubit is a bit of information "stamped" in a quantum physical property, for instance the polarization of a photon). A qubit has some similarities to a classical bit, but is overall very different. Like a bit, a qubit can have only two possible values − normally a 0 or a 1. The difference is that whereas a bit must be either 0 or 1, a qubit can be 0, 1, or a superposition of both. That information is described by a state vector in a two−level quantum mechanical system which is formally equivalent to a two−dimensional vector space over the complex numbers.

QueSST ..... Quiet Supersonic Transport. In June 2017, NASA has achieved a significant milestone in its effort to make supersonic passenger jet travel over land a real possibility by completing the PDR (Preliminary Design Review). QueSST is the initial design stage of NASA's planned LBFD (Low Boom Flight Demonstration) experimental airplane, otherwise known as an X−plane. [7299)]

QuickBird ..... Commercial imaging satellite (D.6)

QUT ..... Queensland University of Technology, Australia

QWIP ..... Quantum Well Infrared Photodetector (an IR sensor technology for applications in the range from 6 − 25 μm)

QWIPM ..... Quantum Well Infrared Photon Multiplier

QZSS ..... Quasi−Zenith Satellite System (NICT, JAXA, Japan), a GPS augmentation system of Japan consisting of a 3 spacecraft constellation planned to provide a regional satellite positioning service as well as communication and broadcasting services. The S/C orbits are elliptical geosynchronous in 3 planes (120° apart).

R

R ..... Resolving power (used in astronomical applications). $R = \lambda/\Delta\lambda$, where $\Delta\lambda$ is the smallest difference in wavelengths that can be distinguished, at a wavelength of λ.

RAAN ..... Right Ascension of the Ascending Node (orbit parameter, the angle measured at the center of the Earth, from the vernal equinox to the ascending node.

RADAR ..... Radio Detection and Ranging

RADARSAT .... A Canadian (CSA/CCRS) EO mission with a SAR instrument (F.42)

RADCAL ..... Radar Calibration Satellite (A microsatellite of USAF, launch June 25, 1993 from VAFB. It provides space−based radar cross−sectional area calibration for more than 70 radars operating in the C−band, and car-

7298) Dominique Elser, Stefan Seel, Frank Heine, Thomas Länger, Momtchil Peev, Daniele Finocchiaro, Roberta Campo, Annamaria Recchia, Alessandro Le Pera, Thomas Scheidl, Rupert Ursin, "Network Architectures for Space−Optical Quantum Cryptography Services," Proceedings of the ICSO (International Conference on Space Optics), Ajaccio, Corse, France, Oct. 9−12, 2012, URL: http://icsos2012.nict.go.jp/pdf/1569657077.pdf

7299) "NASA Completes Milestone Toward Quieter Supersonic X−Plane," NASA Release 17−059, June 26, 2017, URL: https://www.nasa.gov/press−release/nasa−completes−milestone−toward−quieter−supersonic-x−plane

ries two GPS receivers with the aim to demonstrate GPS based attitude determination.)

RADFET ..... Radiation–sensitive Field Effect Transistor

RADI ..... Institute of Remote Sensing and Digital Earth (of CAS), Beijing, China (inauguration in April 2013, founded in 2012). RADI was established through consolidating two CAS institutes: the Institute of Remote Sensing Applications (IRSA) and the Center for Earth Observation and Digital Earth (CEODE).

RAE ..... Royal Aerospace Establishment [Farnborough, UK, (in the early 1990s RAE was renamed into 'DRA' – Defense Research Establishment)]

RAIM ..... Receiver Autonomous Integrity Monitoring (a GPS and GLONASS technology – RAIM requires a minimum of five visible satellites for fault detection and six satellites for fault detection and exclusion)

RAL ..... Rutherford Appleton Laboratory (Chilton, Oxon, UK)

RAM ..... Random Access Memory

RAMSAR ..... The RAMSAR Convention on Wetlands is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". As of January 2013, 163 nations have joined the Convention as Contracting Parties, and more than 2,060 wetlands around the world, covering over 197 million hectares, have been designated for inclusion in the Ramsar List of Wetlands of International Importance. [7300)]
Note: Ramsar is the oldest of the modern global intergovernmental environmental agreements. The treaty was negotiated through the 1960s by countries and non – governmental organizations concerned about the increasing loss and degradation of wetland habitat for migratory waterbirds. The Convention was adopted in the **Iranian city of Ramsar** in 1971 and came into force in 1975. Since then, almost 90% of UN member states, from all the world's geographic regions, have acceded to become "Contracting Parties". [7301)]

RAN (RAS) .... Russian Academy of Sciences

RARS ..... Regional ATOVS Retransmission Service. RARS allows fast delivery of ATOVS satellite sounding data acquired by receiving stations around the globe.

Raytheon ..... As of 10 November 2020, Raytheon Technologies with HQ in Waltham MA has signed a definitive agreement to acquire privately held **Blue Canyon Technologies**, a leading provider of small satellites and spacecraft systems components. Closure of the acquisition, expected by early 2021, is subject to the completion of customary conditions and regulatory approvals. Blue Canyon Technologies will report into Raytheon Intelligence & Space upon closing. [7302)]
Based in Boulder, Colorado with more than 200 employees, Blue Canyon Technologies was founded in 2008. The company currently has more than 90 satellites in production, and has supported missions for the U.S. Air Force, NASA and the Defense Advanced Research Projects Agency.

RPA ..... Retarding Potential Analyzer (a technique used for the monitoring of the space environment)

RASCAL ..... Responsive Access Small Cargo Affordable Launch [DARPA program (started in 2002) to place payloads into orbit at reduced costs]

7300) "The Ramsar Convention Manual, 6th edition," 2013, URL: http://www.ramsar.org/sites/default/files/documents/library/manual6–2013–e.pdf

7301) "History of the Ramsar Convention," Ramsar, URL: http://www.ramsar.org/about/history–of–the–ramsar–convention

7302) "Raytheon Intelligence & Space to acquire Blue Canyon Technologies," Raytheon Technologies, 10 November 2020, URL: https://www.rtx.com/News/News–Center/2020/11/10/raytheon–intelligence–space–to–acquire–blue–canyon–technologies

RASS ..... Radio−Acoustic Sounding System (a ground−based system of wind and temperature vertical profiles is used in meteorology and atmospheric research).
RBDS ..... Radio Broadcast Data System
RBSP ..... Radiation Belt Storm Probes (NASA Geospace mission)
RCVR ..... Receiver
RCS ..... Radar Cross Section (a measure of how detectable an object is with a radar; a larger RCS indicates that an object is more easily detected)
RCS ..... Reaction Control System (usually a S/C onboard system for the purpose to provide such functions as orbit maintenance or orbit raising and/or attitude control, it may also be used for reaction wheel unloading)
RCSGSO ..... Reducing the Costs of Spacecraft Ground Systems and Operations (a series of international symposia)
R&D ..... Research & Development
RDL ..... Research & Development Laboratories, Culver City, CA (since 1984)
REALS ..... REmote ALert System (REALS provides Alert Services and remote Telemetry Access Services) [7303)]
REBAL ..... Radiation and Energy Balance for Imagery and Electromagnetic Propagation (campaign)
RECONSO ..... RECONnaissance of Space Objects (a student−led CubeSat project at the Georgia Institute of Technology in the U.S. that is focused on efforts to mitigate the threat of space debris).
REDD+ ..... Reducing Emissions from Deforestation and forest Degradation (the "plus" signifying conservation, sustainable management of forests, and enhancement of forest carbon stocks), see UN−REDD below.
Redwire ..... Redwire, a space company of Jacksonville, FL, is a leader in mission critical space solutions and high reliability components for next generation space systems and infrastructure. In particular, Redwire acquired many companies in the timeframe 2020−21 such as Made in Space, Roccor, Loadpath, Oakman Aerospace, and DSS (Deployable Space Systems) Inc. of Goleta, CA that manufactures various structures and mechanisms including the Roll−Out Solar Array (ROSA). [7304)]
REFLEX ..... Radiation and Eddy Flux Experiment (campaign)
REFLEX ..... Return Flux Experiment (Shuttle SPARTAN payload)
REL ..... Reaction Engines Ltd., a British aerospace company based in Oxfordshire, England. Developers of the Sabre rocket engine. [7305)]
RELL ..... Robotic External Leak Locator. A NASA instrument on the ISS that can smell leaks from the station's ammonia coolant loop. [7306)]
REM ..... Release/Engage Mechanism (Shuttle, used for Spartan flights)
REMSAT ..... Real−time Emergency Management via Satellite (ESA project − an integrated system for communications and localization services in emergency situations e.g. in forest fire fighting, earthquakes etc.) REMSAT provides mobile high speed satellite links.
RENE ..... Rehearsal ERS−1 Validation Northern Europe (campaign)
RESTEC ..... Remote Sensing Technology Center, Tokyo, Japan (since 1975)
Resource21 ..... Commercial imaging satellite venture (under development by Resourse21 LLC, Englewood, CO, since 1995). Boeing S&C (Space and Communications) is a major owner of Resource21, with members BAE

7303) R. Messaros, R. Bolek, E. Gomez, R. Santos, "On Exploitation of Smartphone Technology for Satellite Operations, Providing Ubiquitous Operations," Proceedings of SpaceOps 2012, The 12th International Conference on Space Operations, Stockholm, Sweden, June 11−15, 2012, URL: http://www.spaceops2012.org/proceedings/documents/id1294382−Paper−014.pdf

7304) Debra Werner, "Redwire acquires Deployable Space Systems," SpaceNews, 23 February 2021, URL: https://spacenews.com/redwire−acquires−deployable−space−systems/

7305) "The Biggest Breakthrough In Propulsion Since The Jet Engine," Space Travel, Nov.. 30, 2012, URL: http://www.space−travel.com/reports/The_Biggest_Breakthrough_In_Propulsion_Since_The_Jet_Engine_999.html

7306) "NASA's Robotic 'Sniffer' Confirms Space Station Leak, Repair," NASA, Sept. 14, 2017, URL: https://www.nasa.gov/feature/goddard/2017/nasa−s−robotic−sniffer−confirms−space−station−leak−repair

Systems, Farmland Industries Inc., and the Institute for Technology Development (ITD).

RESSOX ..... Remote Synchronization System of Onboard Crystal Oscillator (Japan)

Resurs ..... Russian satellite series for resource monitoring, F.44, F.45

Resurs−DK1 ... Resurs (High Resolution 1), in Russian DK stands for "Detailed Space"

RF (R/F) ..... Radio Frequency (of active sensors, also data transmission link, etc.)

RFC ..... Regenerative Fuel Cell

RFI ..... Radio Frequency Interference. RFI is an increasingly serious problem for both, passive and active microwave sensing of the Earth.

RFID ..... Radio Frequency Identification (a technology that incorporates the use of electromagnetic or electrostatic coupling in the RF portion of the electromagnetic spectrum to uniquely identify an object, animal, or person). RFID is coming into increasing use in industry as an alternative to the bar code. The advantage of RFID is that it does not require direct contact or line−of−sight scanning.

RFQ ..... Request for Quotation.

RF−SET ..... Radio Frequency − Single−Electron Transistor

RGB ..... Red, Green, Blue (color code of a pixel)

RGGB ..... Red, Green, Green, Blue (Each of the letters represents one pixel, and the letter indicates the color of the filter which is used for the associated pixel. Hence, RGGB represents a group of 4 pixels.

RHCP ..... Right Hand Circular Polarization

RICE ..... Regional Interactions of Climate and Ecosystems (IGBP/IGAC program)

RIKEN ..... Institute of Physical and Chemical Research, Tokyo, Japan (founded in March 1917 by industrialist Eiichi Shibusawa). RIKEN is Japan's largest and most comprehensive research organization for basic and applied science and a world leader in a diverse array of scientific disciplines. Today, RIKEN encompasses a network of world−class research centers across Japan, with main campuses in Wako, Tsukuba, Yokohama, Kobe and Harima offering state−of−the−art facilities that rank among the best in the world. — In 2015, Element 113, discovered by a RIKEN group led by Kosuke Morita, has become the first element on the periodic table found in Asia. [7307)]

RIMS ..... Ranging and Integrity Monitoring Station (EGNOS system)

RIN ..... Royal Institute of Navigation (UK)

RINEX ..... Receiver Independent Exchange format (of GNSS receivers − permits the user to post−process the received data to produce a more accurate solution)

RIRT (RIRV) ... Russian Institute of Radionavigation and Time, St. Petersburg, since 1957. Prior to 1993, the institute was called: Leningrad Scientific and Research Radiotechnical Institute (LSRRT); participation in programs: Tsikada, Glonass, Cospas−S&RSAT

RIS ..... Resonance Ionization Spectroscopy (a laser technique)

RISAT ..... Radar Imaging Satellite (of ISRO, India)

RISDE ..... Russian Institute of Space Device Engineering

RIT−10 ..... Radio−frequency Ion Thruster (electric propulsion system of DASA)

RIT ..... Royal Institute of Technology, Sweden

RITS ..... Radiatively Important Trace Species (campaign)

RKA (RSA) .... Russian Space Agency, Moscow, since Feb. 25, 1992 (by decree issued by the President of the Russian Federation). RKA has centralized control of Russia's civilian space program, including all manned and unmanned nonmilitary space flights. − On Oct. 25, 1999, RKA changed its name officially to "**Rosaviakosmos**" (Russian Aviation and Space Agency). In June 2004, the name Rosaviakosmos was changed to **Ros-**

7307) "It's official! Element 113 was discovered at RIKEN," RIKEN, Dec. 31, 2015, URL: http://www.riken.jp/en/pr/press/2015/20151231_1/

kosmos (or **Roscosmos**) by the Russian Government. −− The prime contractor used by Roskosmos is RKK Energia, which owns and operates the Mission Control Center in Kaliningrad and operates the Mir space station.

RMM . . . . . Risk Mitigation Maneuver — aka DAM (Debris Avaoidance Maneuver). RMMs are for debris avaidance — a propulsive maneuver designed to increase separation (reducing the probability of collision) between the spacecraft and, usually, debris with a predicted CA (Collision Approach)).

RRA . . . . . Retro−Reflector Array (for Satellite Laser Ranging)

RRAM . . . . . Resistive Random Access Memory

RSC Energia . . . . Rocket Space Corporation, S.P. Korolev, Moscow region (since 1946); responsibility for all Russian manned space projects; builders of launch vehicles (Proton) and of S/C (i.e. MIR space station), payloads, sensors, etc.

RLG . . . . . Ring Laser Gyroscope (an angular rate gyro)

RLSBO . . . . . Radiolokazionnaja Sistema Bokowo Obzora (side view radar system)

RME . . . . . Radiation Monitoring Experiment (Shuttle payload)

RMIB . . . . . Royal Meteorological Institute of Belgium

RMS . . . . . Remote Manipulator System (robot arm of Shuttle, provided/built by Canada). RMS is a 15.2 m long articulating arm that is remotely controlled from the flight deck of the orbiter. The elbow and wrist movements of the RMS permit payloads to be grappled for deployment out of the payload bay attach points or to be retrieved and secured for return to Earth.

rms . . . . . root mean square (also known as the quadratic mean)

RMS . . . . . Royal Meteorological Service (UK)

RMSE . . . . . Root Mean Square Error

RNAV . . . . . Area Navigation. RNAV is a method of aircraft navigation which permits aircraft operations on any desired flight path (user preferred routes) within the coverage of station referenced navigation aids or the limits of the capability of self−contained aids, or any combination thereof.

RNII KP (ISDE) Russian Institute of Space Device Engineering, Moscow; a leading company in the design and development of sensors; participation in programs: Venera, Vega, Phobos, Luna, Mars, Prognoz, Granat, Resurs, Okean, Glonass, etc.

RNSS . . . . . Radionavigation Satellite System (GPS, GLONASS, GALILEO, QZSS, etc.)

RNSS . . . . . Radionavigation Satellite Service (ITU)

Rocket Lab . . . . . A privately funded launch company with HQs in Huntington Beach, CA, USA and launch facilities in Mahia, New Zealand, Alaska, USA, and Cape Canaveral, FL. Developer of a two−stage Electron launch vehicle with payloads of 225 kg max into SSO of 500 km. − On 21 Jan. 2018, Rocket Lab has successfully reached orbit with the test flight of its second Electron orbital launch vehicle, 'Still Testing'. Electron reached orbit and deployed customer payloads of Planet (Dove) and Spire Global of San Francisco (Lemur−2). [7308)]

ROCSat . . . . . Republic of China Satellite (Taiwan). − Note: A public naming competition regarding ROCSat took place in Taiwan in late 2004. In this contest, the ROCSat program was given the new nickname of FormoSat. Hence; ROCSat−1 became FormoSat−1, ROCSat−2 became FormoSat−2, and ROCSat−3 became FormoSat−3. However, ROCSat is going to remain the project name.

ROIC . . . . . Readout Integrated Circuit (silicon device for readout of infrared detector photodiodes)

7308) https://www.rocketlabusa.com/electron/

ROM ..... Read Only Memory
ROMPS ..... Robot Operated Materials Processing System (Shuttle payload)
ROSA ..... Romanian Space Agency – Agentia Spatiala Romana (since 1991, Bukarest, Romania). On December 22, 2011, Romania officially became ESA's 19th Member State.
Rosaviakosmos .. Russian Aviation and Space Agency (RASA), Moscow. The name of Rosaviakosmos was adopted by decree (No 1186) on Oct. 25, 1999. The previous name was RKA (Russian Space Agency) which in turn was created Feb. 25, 1992.
Roskosmos ..... Federal Space Agency of Russia, Moscow. The new name of "**Roskosmos**" was determined by the government decision N 314 (Russia) as of 26.06.2004 (superseding the previous name "Rosaviakosmos")
ROSHYDROMET Committee for Hydrometeorology and Environmental Monitoring (Russian Government Agency, similar in functions and services to EUMETSAT and NOAA)
ROTEX ..... Robotic Technology Experiment (Shuttle/Spacelab–2 experiment of ESA/DLR on STS–55, 1993)
Royal Society ... London, UK. Founded in 1660 by a group of learned men who met to promote scientific discussion. The Royal Society is the oldest scientific organization in Great Britain and one of the oldest in Europe.
RPC ..... Remote Procedure Call. RPC is a powerful technique for constructing distributed, client–server based applications. It is based on extending the notion of conventional, or local procedure calling, so that the called procedure need not exist in the same address space as the calling procedure. The two processes may be on the same system, or they may be on different systems with a network connecting them.
RPOD ..... Rendezvous, Proximity Operations and Docking (mission capability)
RRA ..... RetroReflector Array (an onboard device used for satellite laser tracking)
RRM ..... Robotic Refueling Mission. A NASA technology experiment conducted at the ISS in March 2012 using Dextre of CSA (Canadian Space Agency). The objective was to demonstrate satellite servicing tasks.
RPI ..... Repeat Pass Interferometry
RPS ..... Radioisotope Power System (RPS uses the heat generated from the decay of radioisotope material and converts the heat into useful electrical power)
RS ..... Reed Solomon (encoding technique). RS was initially proposed in 1960 by Irving S. Reed and Gustave Solomon of MIT/LL. It happens to be one of the most effective error–correction schemes in the history of data handling – for everything from computer hard disk drives to CD players to data transmission to and from distant spacecraft.
RSC ..... Rocket System Corporation, Tokyo, Japan (RSC markets launch services on Japan's H–2A vehicle)
RSCC ..... Russian Satellite Communication Company (Moscow)
RSI ..... Radarsat International Ltd. (Richmond, BC, Canada, established in 1989 by a consortium of Canadian aerospace companies and Lockheed Martin of USA, RSI is the distributor of Radarsat data)
RSIF ..... Rain–Sea Interaction Facility (at NASA/GSFC/WFF, established in 1993; RSIF provides a controlled environment for studies of a) microwave scattering from rain–generated features, and b) physical processes at the air–water interface and in the adjacent boundary layers)
RSNAS ..... Regional Satellite Navigation Augmentation System (a concept of NSPO, Taiwan, to further enhance the existing navigation and positioning capabilities)
RSNIC ..... Reprogrammable Space Network Interface Card (payload concept)
RSO ..... Resident Space Object. RSOs include active and inactive satellites, spent rocket bodies, and other pieces of orbital debris created by decades of human activity in space.

RSRE ..... Royal Signals and Radar Establishment (Great Malvern, Worcestershire, UK)
RST ..... Radar Systemtechnik AG, Sankt Gallen, Switzerland
RTCA ..... Radio Technical Commission for Aeronautics (Washington, DC)
RTCM SC−104 . Radio Technical Commission for Maritime Services [the RTCM Special Committee 104 established the worldwide standard for meter−level differential GNSS (Global Navigation Satellite System) broadcasts]
RTEMS ..... Real−Time Executive for Multiprocessor Systems [a free open source real−time operating system (RTOS) designed for embedded systems].
RTG ..... Radioisotope Thermoelectric Generator (a nuclear propulsion system first flown on Transit−4A, also on Ulysses M.32). Deep space missions in particular depend on RTG propulsion (the use of solar arrays is infeasible due to the significant distance from the sun)
RTG ..... Real−Time GIPSY (a GDGPS software package)
RTI ..... Remote Terminal Interface
RTK ..... Real−Time Kinematic (a DGPS technique)
RTLS ..... Return to Launch Site.
RTM ..... Radiative Transfer Model
RTU ..... Remote Terminal Unit
RTSX ..... Ranger Telerobotic Shuttle Experiment
RUAG Space ... RUAG Space is the Space Division of the Swiss technology group RUAG. At a total of eight sites in Europe: in Switzerland (Zurich, Emmen and Nyon), Sweden (Gothenburg, Linköping), Finland (Tampere) and Austria (Vienna, Berndorf). In USA, RUAG Space has facilities on Decatur, AL, and in Titusville, FL. The Titusville factory includes the manufacturing of satellite structures for the global communications company, OneWeb.
RUM ..... Rotating Unbalanced Mass (a US patent for scanning)
R/V (or RV) .... Research Vessel
RVSN ..... Russian Strategic Missile Force (agency responsible for launching most of Russia's military satellites)
RWS ..... Rijkswaterstaat (Rijswijk, Netherlands)
Rx/Tx ..... Receiver/Transmitter
Rymdstyrelsen ... Swedish National Space Agency (SANSA) since 1972. SANSA has financed seven Swedish satellite projects to date, many of them in international cooperation: Viking, Freja, Astrid 1, Astrid 2, Odin, Prisma and Mats.

S

S/A ..... Signal to Ambiguity ratio
SA ..... Selective Availability (GPS)
SAA ..... South Atlantic Anomaly, Note: SAA is a major deviation from (even roughly) dipole geometry in the Earth's magnetic field which causes asymmetrical strong enhancement in particle trapping. The localized dip of the Earth's trapped ion belts into LEO altitude can impact functionality of LEO spacecraft electronic components during traversals.
SAAMD/WBSAAMD Stand Alone Acceleration Measurement Device/Wide Band Stand Alone Acceleration Measurement Device (Shuttle payload)
SAAMEX ..... Surface & Atmospheric Airborne Microwave Experiment (campaign)
SaaS ..... Software as a Service. SaaS is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. SaaS is also known as "on−demand software" and Web−based/Web−hosted software.
SABLE ..... South Atlantic Backscatter Lidar Experiment (campaign)
SAC/CSIR ..... Satellite Application Center [of CSIR (Council for Scientific and Industrial Research), South Africa]. The SAC ground receiving station (Landsat, Spot, NOAA/POES series, ERS series, Radarsat, etc.) is lo-

cated at Hartebeesthoek south–west of Pretoria, South Africa. Initial SAC tracking services started in 1961.

SAC–C ..... Satélite de Aplicaciones Científicas–C (Scientific Application Satellite–C), a mission of CONAE, Argentina (with partners)

SADA ..... Solar Array Drive Assembly (NASA)

SADM ..... Solar Array Drive Mechanism. SADM is a crucial component of the electrical transfer section of the modern long life and large power satellite, which is used to rotate the solar array to follow sunlight for maximum energy acquisition, as well as transfer power and signals from the solar array to satellite through the sliprings of SADM.

SAF ..... Satellite Applications Facility (ESA)

SAFARI ..... Southern African Fire–Atmosphere Research Initiative (campaign)

SAFER ..... Simplified Aid for EVA Rescue (Shuttle system)

SAFIR ..... Satellite for Information Relay, E.6

SAFISY ..... Space Agency Forum for the International Space Year in Europe (in 1992)

SAFOD ..... San Andreas Fault Observatory at Depth (within the framework of the US EarthScope program)

SAGA ..... Soviet–American Gases and Aerosols Experiment (campaign)

SAGE ..... Stratospheric Aerosol and Gas Experiment (NASA mission, I.8)

SAI ..... Space Applications Institute (of JRC, Ispra, Italy)

SAIC ..... Science Applications International Corporation (HQs in San Diego, CA, since 1969, with over 35,000 employees worldwide)

SAIR ..... Synthetic Aperture Interferometric Radiometer

SAL ..... Synthetic Aperture Ladar (Ladar=Laser Detection and Ranging). The SAL technique uses infrared light for "SAR" measurements (which is 10^3 to 10^4 times shorter in the RF wavelength than current SAR wavelengths in the microwave region). It means that phase coherence is much harder to maintain. The SAL imaging technique offers the potential of much higher resolutions than SAR.

SALRO ..... Saudi Arabian Laser Ranging Observatory, located some 45 km northwest of Riyadh, Saudi Arabia (tracking of SLR systems)

SALSA ..... Semi–Arid Land–Surface–Atmospheric Program (campaign). The SALSA program is a multi–agency, multi–national global–change research effort that seeks to evaluate the consequences of natural and human–induced changes in semi–arid environments.

SALT ..... Savannas on the Long Term (IGBP program of France)

SALT ..... Strategic Arms Limitation Treaty (cold war agreement)

SAM ..... Shuttle Activation Monitor (Shuttle experiment)

SAMIR ..... Satellite Microwave Radiometer (ISRO sensor on Bhaskara S/C)

SAMPEX ..... Solar Anomalous and Magnetospheric Explorer (GSFC mission, M.25.1)

SAMS ..... Space Acceleration Measurement System (Shuttle experiment)

SAMSO ..... Space and Missile System Organization (USAF in El Segundo, CA)

SANDRA ..... Seamless Aeronautical Networking through integration of Data links, Radios and Antennas. SANDRA is a new aircraft system (in 2013) that combines all communication channels in one device and adds a reliable automatic data transfer system to the ground and via satellite. The new system has now been tested for the first time under real flight conditions using DLR's ATRA (Advanced Technology Research Aircraft) test aircraft, which is a modified Airbus 320. The SANDRA project is supported by 30 international development partners. DLR is responsible for the development of the network technology and carrying out flight tests on the new system with the ATRA aircraft. The Italian company, SELEX ES Spa, is, overall, responsible for the project. [7309)]

7309) "New communication channels in the air," DLR, June 27, 2013, URL: http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid–10081/151_read–7457/year–all/#gallery/1719

SAN MARCO . . . Cooperative Italian/NASA mission (C.28)
SANSA . . . . . South African National Space Agency (since Dec. 9, 2010) [7310) 7311)]
SansEC . . . . . "sans (without) Electrical Connections" –SansEC (developed at NASA) is a wireless sensor measurement system that receives power wirelessly, eliminating the need for a power source. The technology can be used for fuel and other liquid measurements in vehicles, above or below ground fuel storage tanks as well as cryogenic fluid tanks. The technology has the ability to measure many physical quantities using only a single component, including, but not limited to, fluid level, temperature, pressure, strain, structural damage, and rotational velocity. SansEC sensors use self–resonating patterns of electrically conductive material. Magnetic fields are used to power and interrogate the sensors. Arrays of the SansEC sensors can be made from thin conductive films placed on non–conductive surfaces and can be used as sensing skins. [7312)]
SAO . . . . . Smithsonian Astrophysical Observatory (Cambridge, MA, USA)
SAPOS . . . . . Satellite Positioning Service [a ground–based DGPS network (over 200 sites of DGPS reference stations in Germany) of the German National Survey]. SAPOS is coordinated by BKG (Bundesamt für Kartographie und Geodäsie = Federal Agency for Cartography and Geodesy) of Frankfurt, Main.
SAR . . . . . Synthetic Aperture Radar (a high–rate imaging technique)
SARAO . . . . . South African Radio Astronomy Observatory
SAREX–2 . . . . . Shuttle Amateur Radio Experiment (Shuttle payload)
SAREX–92 . . . . South American Radar Experiment (ESA airborne campaign)
SAR–Lupe . . . . . Germany's first military radar (SAR) reconnaissance minisatellite mission (in development at OHB System, Bremen), contract award in Aug. 2001 by the German Office of Defense Technology and Procurement (BWB). The project consists of a constellation of 4 satellites in two polar orbital planes. RF data transmission in Ku–band. The overall objective is to provide high–resolution X–band radar imagery (0.5 m) to German defense forces over a period of ten years starting in 2004; the full satellite constellation is planned to be in orbit in 2006.
SAR/MTI . . . . . Synthetic Aperture Radar / Moving Target Indication (a motion sensing concept)
S&R . . . . . Search and Rescue (Emergency System on NOAA S/C)
S&RSAT . . . . . Search and Rescue Satellite Aided Tracking System (Canada/France/NOAA). K.11
SAS–1 . . . . . Small Astronomy Satellite–1 (DoD S/C, launched Dec. 12, 1970)
SAS . . . . . Synthetic Aperture Sonar
SASA . . . . . South African Space Agency (approved in Aug. 2006 by the government of South Africa)
SASNet . . . . . SDR–based Ad hoc Space Network
SAS&R . . . . . Satellite Aided Search & Rescue (INSAT–2 system)
SASS . . . . . Subsonic Assessment (program, NASA)
SAST . . . . . Shanghai Academy of Spaceflight Technology (Shanghai, China, launch vehicle provider)
SASTIND . . . . . State Administration of Science, Technology and Industry for National Defence (Beijing, China)
S@tMax . . . . . S@tMax (an emerging service as of 2006 developed at TU Delft, The Netherlands) defines telematics as mobile wireless information services that connect users in mobile vehicles on roads to data, voice, en-

7310) "Launch of the National Space Strategy and the SA National Space Agency," Nov. 29, 2010, URL: http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=14919&tid=25109
7311) "South Africa Launches Space Agency," Space Mart, Dec. 13, 2010, URL: http://www.spacedaily.com/reports/South_Africa_Launches_Space_Agency_999.html
7312) Stanley E. Woodard, "SansEC Sensing Technology – A New Tool for Designing Space Systems and Components," 2011 IEEE Aerospace Conference, Big Sky, MT, USA, March 5–12, 2011

tertainment, internet access, navigation and safety services. S@tMax provides IP services to users using a ground infrastructure and satellites.

SAT−IP ..... A communications protocol introduced by SES in 2012. SAT−IP is a new satellite reception technology that demodulates and converts satellite signals to IP for further in−home distribution to any IP−enabled device. [7313)]

SaTReC ..... Satellite Technology Research Center (Daejeon, Korea, since 1992, SaTReC is a university based research center of KAIST) SaTReC performs KITSAT operations, etc.

SI (Satrec Initiative) Satrec Initiative (SI Co. Ltd.), a private spin−off company which was established in January, 2000 by former SaTReC (KAIST) engineers, Daejeon, Korea. The SI activities cover the whole spectrum of EO mission hardware, including satellite platforms, payloads, spacecraft components, and spin−offs. SI is the developer of small satellites like: RazakSat, DubaiSat−1, DubaiSat−2, X−SAT, RASAT, etc. SI is the developer of various optical imaging instruments. SI was appointed as the exclusive global data distributor of KOMPSAT imagery (KOMPSAT−2, KOMPSAT−3, and KOMPSAT−5). [7314)] [7315)]

Satlet ..... A DARPA concept of a cellularized satellite, or "satlet," as a satellite architectural unit. A satlet is an individual "cell" that would provide one or more traditional satellite functions and that could be aggregated into a satlet system without additional elements. [7316)]

SATO ..... Space Adaptation Tests and Observations (Shuttle experiment)

SAXON−FPN .. Synthetic Aperture Radar and X−band Ocean Nonlinearities − Forschungsplatform Nordsee (campaign)

Sb ..... Antimonide (detector type material)

SBAS ..... Satellite Based Augmentation System (element of GNSS)

SBIR ..... Small Business Innovation Research (a NASA−sponsored program)

SBIRS ..... Space Based Infrared System (a US DoD 10−year development program that was approved in Oct. 1996 to include HEO/GEO (referred to as SBIRS High)and LEO (referred to as SBIRS Low) satellite constellations along with a corresponding ground segment. The planned space segment will consist of 4 GEO, 4 HEO hosted payloads, and ~24 LEO satellites. The SBIRS mission is to develop, deploy, and to operate space−based surveillance systems for missile warning, missile defense, battlespace characterization, and technical intelligence). The SBIRS program office is at SMC, Los Angeles AFB, CA. Note: the above original version was cancelled by the Pentagon in 1999 due to cost overruns and technical problems. − A new version of SBIRS Low was defined and funded in 2002. The restructured version consists of 8 LEO satellites.

The first SBIRS GEO−1 spacecraft, built by Lockheed Martin, was launched on May 6, 2011 on an Atlas−5 vehicle from the Cape Canaveral Air Force station to provide global, persistent, infrared surveillance capability to meet 21st century US military demands in four key areas including missile warning, missile defense, technical intelli-

7313) "SES unveils IP−based in−home distribution of satellite TV signals," Space News, May 04.12, URL: http://www.spacedaily.com/reports/SES_unveils_IP_based_in_home_distribution_of_satellite_TV_signals_999.html

7314) http://www.satreci.com/eng/ds1_1.html?tno=5#a32

7315) "Total Solution Provider for Earth Observation Missions, Satrec Initiative," URL: http://www.satreci.com/eng/_down2.php

7316) David Banhart, Lisa Hill, Erin Fowler, Roger Hunter, Lucy Hoag, Brook Sullivan, Peter Will, "A Further Look at Potential Impact of Satlets on Design, Production, and Cost of Satellite Systems," Proceedings of the AIAA/USU Conference on Small Satellites, Logan, Utah, USA, August 2−7, 2014, paper: SS14−V−6, URL: http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=3042&context=smallsat

gence and battle space awareness. [7317)]
The first HEO−1 payload was launched on June 28, 2006 onboard NROL−22 from VAFB. SBIRS−HEO−2 was launched on March 13, 2008 onboard the NROL−28 mission of DoD.
The SBIRS program delivers timely, reliable and accurate missile warning and infrared surveillance information to the President of the United States, the Secretary of Defense, combatant commanders, the intelligence community and other key decision makers.

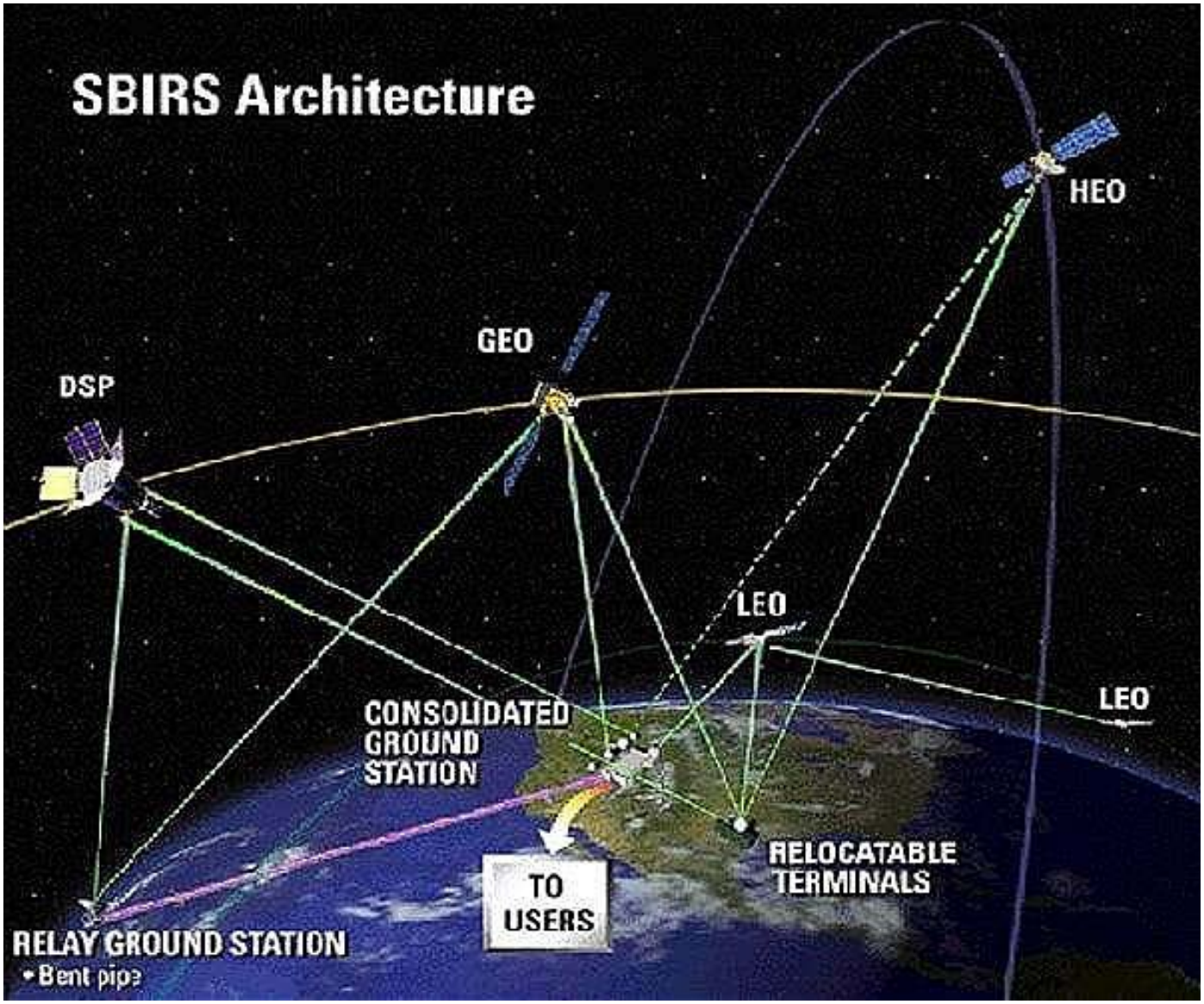

Figure 1625: Illustration of the SBIRS architecture (image credit: USAF)

SBRC . . . . . Santa Barbara Research Center (of Hughes Aircraft Company in Goleta, CA − The name (SBRC) was valid until 1996; the facility was renamed to SBRS)

SBR . . . . . Space−Based Radar (a DoD program in the definition phase as of 2002). SBR is conceived as a constellation of reconnaissance satellites in various orbital planes and altitudes (LEO, GEO). Some of the S/C will feature SAR/MTI (Moving Target Indication) instruments. First S/C launches may be expected in the time frame 2008.

7317) "Next Generation Missile Warning Satellite Launched Successfully," Space Daily, May 9, 2011, URL: http://www.spacedaily.com/reports/Next_Generation_Missile_Warning_Satellite_Launched_Successfully_999.html

SBRS ..... Santa Barbara Remote Sensing (of Hughes Aircraft Company in Goleta, CA, since 1996). Note: in Dec. 1997 Raytheon merged with the defense operations of Hughes Electronics. The merger outcome was the "Raytheon Systems Company" with HQ in Washington DC, consisting of the following units: Raytheon Electronic Systems, Raytheon E–Systems, Raytheon TI Systems and Hughes Aircraft Company. SBRS instruments include: multispectral imagers (MSS and TM), radiometers, spectrometers, polarimeters, and sounders.
Three major units of Raytheon Electronic Systems are based in Santa Barbara/Goleta, CA. These are: RIO (Raytheon Infrared Operations), SBRS (Santa Barbara Remote Sensing), and EWO (Electronic Warfare Operations).

SB–SAT ..... Swift–Broadband Terminal for Satellite. SB–SAT is a communications terminal designed for LEO S/C applications that provides a bi–directional communications link to the LEO from the ground via the Inmarsat 4th Generation GEO Communications Satellite Constellation and the Inmarsat BGAN Network.

S/C ..... Spacecraft

SCA ..... Service Component Architecture (SCA) and Service Data Objects (SDO) are emerging new industry standards (2006–2010) that simplify service–oriented architecture (SOA) programming.

SCaN ..... Space Communications and Navigation program of NASA. SCaN is responsible for three networks: the Space Network (SN), the Near–Earth Network(NEN), and the Deep Space Network(DSN).

ScanEx RDC .... ScanEx Research and Development Center, Moscow Region, Russia. Provider of ground stations, networks, and ground station services; commercial archiver and distributor of remote sensing data. Direct acquisition of EROS–A and –B, RADARSAT–2, SPOT–5, IRS–P5, –P6, UK–DMC2, etc.). ScanEx is partner of Infoterra GmbH for TerraSAR–X data distribution in Russia. Reseller of Ikonos data in Russia. etc. ScanEx is the operator of a commercial network of UniScan™ ground stations in Russia and has agreements with many partners in Russia and at the international level. [7318] [7319]

SCAPE ..... Shenandoah Cloud and Photochemistry Experiment (campaign)

SCAR ..... Smoke/Sulfates Clouds and Radiation (campaign)

SCAR ..... Scientific Committee on Antarctic Research (of ICSU)

SCARAB ..... Spacecraft Atmospheric Reentry and Aerothermal Breakup (ESA funded software package for spacecraft reentry simulation)

SCARLET ..... Solar Concentrator Array with Refractive Linear Element Technology (a patented solar cell technology of AEC–Able Engineering Co., Goleta, CA, sponsored by BMDO and NASA/LeRC)

SCARS ..... Scalable Self–Configurable Architecture for Reusable Space Systems (in 2008 a research project at the University of Arizona using FPGAs to fix a computer problem in a spacecraft)

SCATHA ..... Spacecraft Charging at High Altitude (satellite of the USAF)

SCATT ..... (Wind) Scatterometer (ESA)

SCCC ..... Serial Concatenated Convolutional Turbo Coding

SCCCAMP ..... South Central Coast Cooperative Aerometric Monitoring Program (campaign)

SCCS–SM ..... Space Communication Cross Support–Service Management (of CCSDS) [7320]

SCD ..... Swept Charge Detector

SCD–1 ..... Satélite de Coleta de Dados (Data Collection Satellite of Brazil)

7318) http://www.scanex.ru/en/company/default.asp?submenu=about&id=index

7319) http://www.scanex.ru/pdf/General_eng_2007.pdf

7320) "CCSDS 910.11–B–1, Space Communication Cross Support – Service Management–Service Specification," Blue book, August 2009, URL: http://mtc–m18.sid.inpe.br/col/sid.inpe.br/mtc–m18%4080/2010/07.19.14.46/doc/CCSDS%20910.11–B–1.pdf

SCE ..... Superconducting Electronics
SCERIN ..... South Central and Eastern European Regional Information Network. SCERIN is an established network of the Global Observation of Forest and Land Cover Dynamics (GOFC–GOLD) project of GTOS (Global Terrestrial Observation System). [7321)]
SCF_Lab ..... **S**atellite/Lunar/GNSS laser ranging and altimetry **C**haracterization **F**acilities' **L**aboratory. SFC_Lab is a facility of INFN located in Frascati, Italy. SCF–Lab provides SLR (Satellite Laser Ranging) services, Lunar Laser Ranging (LLR) and Planetary Laser Ranging and Altimetry (PLRA) for industrial and scientific applications. Design, construction and characterization of LRAs (Laser Retroreflector Arrays). [7322)]
SCISAT/ACE ... Science Satellite/Atmospheric Chemistry Experiment, C.29
SCIGN ..... Southern California Integrated GPS Network
SCMS ..... Small Cumulus Microphysics Study (campaign)
SCORE ..... SCan–On–REceive (a digital beam forming technique in elevation for SAR instrumentation). Within the SCORE operation scheme, a wide transmit beam that illuminates the complete swath is generated, while on receive, a narrow beam with high gain, generated using DBF techniques, follows the ground reflection across the swath. [7323)]
SCOPE ..... San Clemente Ocean Probing Experiment (campaign)
SCOPE ..... Scientific Committee on Problems of the Environment (ICSU)
SCOS–2000 .... Spacecraft Control & Operation System–2000 (SCOS–2000® is the generic mission control system software of ESA).
SCOSTEP ..... Scientific Committee on Solar–Terrestrially Physics [since 1978, an international organization under the auspices of ISCU (International Council for Science)]. SCOSTEP is a permanent observer to UNCOPUOS. SCOSTEP's Secretariat Office is hosted by the Centre for Research in Earth and Space Science (CRESS) at York University in Toronto, Canada. Previously it was hosted within NOAA from 1995 to 2006 and then at NCAR till 2010. [7324)]
SCPS ..... Space Communications Protocol Standard (A standardization initiative by NASA, DoD, DERA and others with the objective to complement and expand the current CCSDS standards) Although the CCSDS packetized standards provide the underpinning for the automated, error–free exchange of data between space and ground stations, it is limited to basic data transfer. SCPS will provide the additional capability to aggregate both telecommand and telemetry data into recognizable files and transport them end–to–end through the data networks containing space links in a reliable and secure manner.
SCPS–SP ..... SCPS–Security Protocol
Scramjet ..... Supersonic Combustible Ramjet (an air–breathing engine technology)
SCRS ..... Saudi Center of Remote Sensing, Riyadh, Saudi Arabia
SCS ..... Soil Conservation Service (USA)
SCSMEX ..... South China Sea Monsoon Experiment (campaign)

7321) Petya Campbell, "The South Central and Eastern European Regional Information Network," NASA, The Earth Observer, Volume 27, Issue 2, March–April 2015, pp: 34–37, URL: http://eospso.gsfc.nasa.gov/sites/default/files/eo_pdfs/Mar_Apr_2015_color_508.pdf

7322) Simone Dell'Agnello, G. Delle Monache, R. Vittori, C. Cantone, A. Boni, G. Patrizi, M. Tibuzzi, E. Ciocci, C. Lops, M. Martini, L. Salvatori, S. Contessa, L. Palandra, M. Maiello, "Design and SCF–Test of Laser Retroreflector Arrays with Formation Flying Functionality (LRA–3F)," Proceedings of the 5th International Conference on Spacecraft Formation Flying Missions and Technologies (SFFMT), Munich, Germany, May 29–31, 2013, URL: http://www.sffmt2013.org/PPAbstract/4133p.pdf

7323) Sebastian Bertl, Paco Lopez–Dekker, Marwan Younis, Gerhard Krieger, "Equivalency of Multiple Beams and Multiple Phase Centers for Digital Beamforming SAR systems," Proceedings of EUSAR 2014 (10th European Conference on Synthetic Aperture Radar), Berlin, Germany, June 3–5, 2014

7324) Marianna G. Shepherd, "SCOSTEP: Understanding climate and weather of the Eaerth–Sun System," UN COPUOS 55th General Session, Vienna, Austria, 6 – 15 June, 2012, URL: http://www.oosa.unvienna.org/pdf/pres/copuos2012/tech–15.pdf

SCT ..... Space Communications Testbed (as of 2006 SCT is being developed by Comsat Laboratories, Glenn Research Center, Jet Propulsion Laboratory, Goddard Space Flight Center, and Langley Research Center)
SCTP ..... Stream Control Transmission Protocol (a new transport layer protocol in the Internet, along with TCP)
S−DAB ..... Satellite − Digital Audio Broadcast
SD Card ..... Secure Digital Card. An SD card is an ultra small flash memory card designed to provide high−capacity memory in a small size.
SDA ..... Space Development Agency. [7325)] SDA is a DoD agency established in March 2019. SDA is responsible for orchestrating the Department's future threat−driven space architecture and accelerating the development and fielding of new military space capabilities necessary to ensure U.S. technological and military advantage in space for national defense.
SDA ..... Space Domain Awareness. SDA is the ability to detect, track, and characterize passive and active space objects.
SDARS ..... Satellite Digital Audio Radio Service (commonly called Satellite Radio)
SDCM ..... System of Differential Correction and Monitoring (SBAS of GLONASS in planning as of 2009 by Roskosmos)
SDI ..... Ship Detection and Identification (method in AIS)
SDI ..... Strategic Defense Initiative. In 1983, US President Ronald Reagan proposed the SDI plan in the Cold War period, pointing to a new defense direction. However, implementation was held back because of technological shortfalls.
SDIO ..... Strategic Defense Initiative Organization (within the US DoD, since 1984). In 1993, SDIO was renamed to BMDO (Ballistic Missile Defense Organization). In 2002, BMDO was renamed to **MDA** (Missile Defense Agency)
SDLS ..... Space Data Link Security (protocol), a CCSDS protocol [7326) 7327)]
SDMA ..... Space−Division Multiple Access (a beamforming technique permitting a multi−user environment). In the SDMA scheme, the same channel, the same time slot, and the same modulation scheme can be shared with different distributed user terminals, thereby giving efficient frequency reuse by the large number of users under the coverage of a platform.
SDR ..... Software Defined Radio (a reconfigurable wireless technology − a radio communication system which uses software for the modulation, filtering and error correction of radio signals (these were traditionally implemented in hardware). Unlike traditional radios, a software radio receiver digitizes the received waveforms as soon as possible using a fast analog−to−digital converter (ADC). − The benefit of SDR technology over fixed−capability digital electronics is that the waveform implementation—the implementation of the algorithm that converts between digital data and analog radio signals—can be independent of the hardware implementation. SDR will be a powerful innovator in the communications technology.
SDRAM ..... Synchronous Dynamic Random Access Memory
SDSC ..... Satish Dhawan Space Center SHAR (main launch center of ISRO on the south−east coast of India, Sriharikota)

7325) https://www.sda.mil/home/about−us/

7326) I. Aguilar Sánchez, D. Fischer, "The CCSDS Space Data Link Security Protocol," Proceedings of TTC 2013, 6th International Workshop on Tracking Telemetry and Command Systems for Space Applications, Darmstadt, Germany, Sept. 10−13, 2013

7327) I. Aguilar Sanchez, G. Moury, C. Biggerstaff, B. Saba, D. Fischer, H. Weiss, "Towards Completion of the CCSDS Space Data Link Security Protocol", Proceedings of the IEEE Aerospace Conference, Big Sky, MT, USA, March 3−10, 2012

SDSS ..... Sloan Digital Sky Survey — a major multi–filter imaging and spectroscopic redshift survey using a dedicated 2.5 m wide–angle optical telescope at Apache Point Observatory in New Mexico. The project was named after the Alfred P. Sloan Foundation. The survey was begun in 2000, and aims to map 25% of the sky and obtain observations on around 100 million objects and spectra for 1 million objects.

SEACAT ..... type of buoy (made by Sea–Bird Electronics), temperature and conductivity sensor

SEADEX ..... Shoreline Environment Atmospheric Dispersion Experiment (campaign)

SEAFIRE ..... South–East Asia Fire Experiment (campaign)

Sea Launch ..... A sea–going launch system, based at Long Beach, CA. Sea Launch is a joint venture of The Boeing Commercial Space Co., Seattle, USA, KB Yuzhnoye/PO of Dnepropetrosvk, Ukraine (provider of the Zenit rocket), RSC Energia of Korolev, Russia (builder of an upper stage of the rocket), and Kvaerner Maritime A/S, Lysaker, Norway and London, UK (builder of the self–propelled launch platform and the Sea Launch command and assembly ship). The Sea Launch venture was announced in June 1994. The first launch of a demonstration satellite with a Zenit–3SL rocket took place March 27, 1999 from the floating Sea Launch platform, positioned at the equator. Sea Launch has a capacity to put up to 5000 kg of launch mass into a geostationary transfer orbit (GTO).

Seasat ..... NASA/JPL EO mission (F.52)

SEASOAR ..... Towed profiling CTD and ADCP system (TOGA/COARE campaign)

SeaStar ..... An ORBIMAGE mission with the SeaWiFS sensor (D.12). In 1997 OSC renamed the SeaStar mission to Orbview–2)

SeaWiFS ..... Sea Wide Field Sensor (this sensor is considered the CZCS successor)

SECAM ..... Sequential Color and Memory [European (French) video standard]. SECAM has an image format of 4:3, operating with 625 lines per picture frame at 50 Hz and 6 MHz video bandwidth with a total of 8 MHz video channel width.

SECDED ..... Single Error Correction – Double Error Detection

SECOMS ..... Satellite EHF Communications for Mobile Multimedia Services, an EU project in the time frame 1995–98

SEDAC ..... Socio–Economic Data and Applications Center (DAAC at CIESIN)

SEDIS ..... SeaWiFS European Data Information System (ESA/ESRIN)

SEDS ..... Students for the Exploration and Development of Space (since 1980, international student organization)

SEE ..... Single Event Effect in onboard logic circuits. SEE refers to the disruption in function of electronic circuits due to single ionizing particle interaction. [SEEs manifested themselves in two ways: unexpected short circuits (Single Event Latch Up), and in erroneous bit flips (Single Event Upset)].

SEE ..... Société des Electriciens et des Electroniciens

SEE ..... Space Environments and Effects program since 1995 [NASA (US government, industry and university participants), also international participation]

SEEDS ..... Seeds in Space Experiment (Shuttle payload)

SeeMe ..... Space Enabled Effects for Military Engagements (a DARPA program of small satellites of $\sim$ 20 kg)

SEG ..... Society of Exploration Geophysicists

SEH ..... Solar Extreme Ultraviolet Hitchhiker (Shuttle payload)

SEI ..... Space Electronics Inc., San Diego, CA

SEI ..... Specific Emitter Identification (of an RF system)

SEL ..... Space Environment Laboratory (NOAA, Boulder CO, real–time processing of all SEM package data, space environment forecasts)

SEL ..... Surface−Emitting Laser (a conventional diode laser with a horizontal cavity, beams are emitted in the direction parallel to the wafer plane)

SEL ..... Single Event Latchup (refers to a potentially destructive condition involving parasitic circuit elements forming a silicon controlled rectifier. In traditional SEL, the device current may destroy the device if not current limited and removed "in time") In spaceflight an SEL in an IC (integrated circuit) is normally caused by cosmic radiation.

SELEX Galileo . Campanies in the UK (SELEX Galileo Ltd) and in Italy (SELEX Galileo S.p.A.). In January 2010, the campany's Italian registration has changed from "Galileo Avionica S.p.A." to "SELEX Galileo S.p.A.".

SELODE ..... Solar Exposure to Laser Ordnance Device (Shuttle experiment on SPARTAN)

SEM ..... Space Environment Monitor (NOAA Sensor package on GOES and POES series; Note: the GOES series SEM package arrangement differs considerably from the POES series SEM package)

SEM ..... Space Experiment Module (Shuttle structure for small experiments)

SEMAPHORE .. Structure des Echanges Mer−Atmosphere, Proprietes des Heterogeneites Oceaniques (French airborne campaign)

Sentinel Asia .... The Sentinel Asia initiative is a cooperation between space agencies and disaster management agencies, applying remote sensing and Web−GIS technologies to support disaster management in the Asia−Pacific region. In case of a major disaster in the Asia−Pacific region, the Sentinel Asia team triggers an emergency observation by Earth observation satellites, based on specific observation requests of JPT (Joint Project Team) and ADRC (Asian Disaster Reduction Center) members.

SEPAL ..... System for Earth Observation Data Access, Processing and Analysis for Land Monitoring (UN FAO). SEPAL allows users to query and process satellite data quickly and efficiently, tailor their products for local needs, and produce sophisticated and relevant geospatial analyses quickly. − Harnessing cloud−based supercomputers and modern geospatial data infrastructures (e.g. Google Earth Engine), SEPAL enables access and processing of historical satellite data as well as newer data from Landsat and higher−resolution data from Europe's Copernicus program.

SEP storm ..... Solar Energetic Particle (storm). Zipping through space at close to the speed of light, SEPs (Solar Energetic Particles) are one of the main challenges for the future of human spaceflight. Clouds of these tiny solar projectiles can make it to Earth – a 93 million mile journey – in under an hour. They can fry sensitive spacecraft electronics and pose serious risks to human astronauts. But their onset is extraordinarily hard to predict, in part because we still don't know exactly where on the Sun they come from. [7328)]

SERB ..... Space Experiments Review Board [an instrument of the DoD STP (Space Test Program) to select and manage projects]

SERC ..... Science and Engineering Research Council (UK, the Mullard Space Science Laboratory of SERC)

SerDes ..... Serializer/Deserializer. SerDes is a key component of serial communication architecture for high−speed servers and communications networking systems and point−to−point communication links. It is a vital building block for spaceborne high−speed data communications. SerDes converts parallel data, typically a data bus, to one or more serial data channels (lanes) and vice−versa.

SERON ..... South Eastern (US) Regional Oxidant Network (field program to study atmospheric chemistry, July−August 1991)

7328) Miles Hatfield, "In First, Scientists Trace Fastest Solar Particles to Their Roots on the Sun," NASA Feature, 10 March 2021, URL: https://www.nasa.gov/feature/goddard/2021/in−first−scientists−trace−fastest−solar−particles−to−their−roots−on−the−sun

SERSS ..... Space−based Earth Remote Sensing System (an imaging project of Rosaviakosmos using the Monitor satellite series)
SERT ..... SSP (Space Solar Power) Exploratory Research and Technology [SERT program of NASA established in 1999]
SERVIR ..... SERVIR is a joint venture between NASA and the U.S. Agency for International Development (USAID), which provides satellite−based Earth observation data and science applications to help developing nations in Central America, East Africa and the Himalayas improve their environmental decision making. SERVIR — an acronym meaning "to serve" in Spanish — provides this critical information to help countries assess environmental threats and respond to and assess damage from natural disasters. The program started in 2004 and is managed by NASA/MSFC in Huntsville, AL.
SES ..... Saab−Ericsson Space, Göteborg (HQ), Sweden
SES ..... Société Européenne des Satellites (Luxembourg, since 1985, owner and operator of the ASTRA satellite series, in 2001 SES acquired GE Americom of Princeton, NJ). The acquisition of GE Americom by SES resulted in the formation of SES Global that had two operating companies known as SES Astra and SES Americom. As of Nov. 2001, the new company is called **SES Global, SA.** In 2011 SES introduced in the USA SES−GS (Government Slolutions) with HQs in Reston, VA.
SESAME ..... Second European Stratospheric Arctic and Midlatitude Experiment (campaign)
SESAME ..... Severe Environmental Storms and Mesoscale Experiment (campaign)
SESAR ..... Single European Sky Air Traffic Management Research (European Iris program in ARTES 10 for satellite based communication). − In this context, "Iris" is the dedicated ESA program to support SESAR under the umbrella of ESA's ARTES 10 program.
SET ..... Single Electron Transistor
SET ..... Single Event Transient (a SET occurs when the charge collected from an ionization event discharges in the form of a spurious signal traveling through the circuit. This is de facto the effect of an electrostatic discharge)
SETAS ..... Space Environments and Technology Archive System (NASA/LaRC)
SETI ..... Search for Extraterrestrial Intelligence
SEU/SET ..... Single Event Upset / Single Event Transient
S&F ..... Store−and−Forward (a non−real−time communication technique)
SFDU ..... Standard Format Data Unit (a CCSDS format concept)
SFO ..... Store and Forward Overlay (a store and forward mechanism where each file is assembled at each relay. This allows detailed status reporting and allows queues of files at relays to be manipulated)
SFODB ..... Spaceborne Fiber Optic Data Bus (SFODB employs a redundant cross−strapped ring architecture supporting up to 127 nodes, scalable data rates from 200 Mbit/s − 1 Gbit/s per node)
SFTP ..... Scalable Fault−Tolerant Protocol (for parallel runtime environments)
SGAC ..... Space Generation Advisory Council (since 1999). A non−profit organisation that represents 18−35 year olds in international space policy at the United Nations, at agencies, in industry, and in academia.
SGG ..... Satellite Gravity Gradiometry
SGGM ..... Superconducting Gravity Gradiometer Mission, NASA (SGGM was cancelled by NASA in the 1990s due to budget constraints)
SGLS ..... Space−to−Ground Link Subsystem (DoD satellite communications, an NRL developed system). Since the 1960s, DoD has enjoyed the exclusive use of the SGLS band (1755−1850 MHz) for satellite operations.
SGP4 ..... Simplified General Perturbations Satellite Orbit Model 4. NORAD provides TLEs (Two Line Elements) in conjunction with SGP4. These

elements are being used for many LEO missions in LEOP (Launch and Early Orbit Phase).

SGR ..... Space GPS Receiver (a device built by SSTL, Surrey UK)

SGS 85 ..... Soviet Geodetic System 1985

SGS ..... Svalbard Ground Station (also referred to as **SvalSat**), located at 78.216° N, 20° E on the Norwegian Svalbard archipelago (also referred to as Spitsbergen) near the town of Longyearbyen. SGS/SvalSat is owned by the Norwegian Space Center (formerly Norsk Romsenter), Oslo, Norway, and operated by the Tromsø Satellite Station (TSS). The high latitude makes SGS (just 960 km from the North Pole) a very sought−after link for polar−orbiting satellites. SGS can in fact provide S/C contact for all orbits of polar orbiting satellites having altitudes above 500 km. [7329)]

In the time frame 1997−99, NASA built its own TT&C station (two 11m antennas in X− and S−band) right next to SGS in support of its own Earth observing satellites (Landsat−7, Terra, EO−1, SAC−C, Acrim-Sat, CHAMP, QuikSCAT, Aqua, QuikTOMS, etc.). − As of Aug. 1, 2001, TSS is operating a new 13 m multi−mission ground station in support of Envisat and ERS−2 missions on a priority basis. Since the end of 2000, ESOC has been tracking the ERS−2 S/C from SGS. − The EPS (EUMETSAT Polar System), consisting of the MetOp series, is also planned to be operated from SGS. Two complete ground stations with 10 m diameter antennas are being installed for EPS. The ground stations at SGS are operated by a team of TNOC (Tromsø Network Operations Center) from Tromsø.

In this context, there is another location on Svalbard, namely at Ny−Ålesund (78.9275° N, 11.8825° E), with the DLR/GFZ NGS (Ny−Ålesund Ground Station) using an S−band receiving antenna dish of 4 m diameter, installed by DLR. NGS is remotely operated and maintained/serviced from DLR/DFD or from GFZ (program controlled operation by two−line elements). Initial remote operations of NGS started in April 2001 with the tracking support of the CHAMP mission. The tracking of the BIRD and GRACE missions is planned to start in the second half of 2002, after multimission upgrades are implemented at NGS.

SHAR ..... Sriharikota Range (ISRO's main launch site, India, located on India's east coast at 13.9° N, 80.4° E, about 100 km north of Chennai). SHAR covers an area of about 145 km^2, the range became operational in 1971. In 2002, SHAR has been renamed to ", SHAR (SDSC−SHAR)" in honor of the former chairman of the space commission, a pioneer of India's space program.

SHARE ..... Space−Station Heat Pipe Advanced Radiator Experiment (Shuttle)

SHEBA ..... Surface Heat Budget in the Arctic (campaign)

SHELS ..... Shuttle Hitchhiker Experiment Launch System

SHF ..... Super High Frequency (3 − 30 GHz band)

SHOM ..... Service Hydrographique et Océanographique de la Marine (French Naval Hydrographic and Oceanographic Service) since 1971, with HQ in Brest, France. SHOM is a public service and a defense support agency − providing science and technical services (data acquisition, bathymetry, cartography, geophysics, oceanography).

SHOOT ..... Super Fluid Helium On Orbit Transfer (Shuttle experiment)

SHS ..... Spatial Heterodyne Spectroscopy (see Q.6.3)

Si ..... Silicon (detector material)

SI ..... International System of Units (from the French: Système International d'Unités). SI is the most widely used system of units. It is the most com-

7329) T. Andreassen, T. Beck, J. Bolle, A. Haaland, A. Jensen, "Polar Bears and Spacecraft Tracking," ESA Bulletin 109, Feb. 2002, pp. 118−121

mon system for everyday commerce in the world, and is almost universally used in the realm of science. Since 1960
SI comprises seven base units: the meter (m), kilogram (kg), second (s), Kelvin (K), ampere (A), mole (mol) and candela (cd).

SI ..... SaTReC Initiative Co. Ltd., Daejeon, Korea; SIIS (SI Imaging Services). In November 2012, Satrec Initiative (SI) of Daejeon, Korea announced an agreement with KARI (Korea Aerospace Research Institute) for "Worldwide Marketing and Sales Representative of KOMPSAT−2, −3, −3A and −5 image data." KARI assigned Satrec Initiative as the 'worldwide exclusive representative' for KOMPSAT imagery sales. — In response, the SI (Satrec Initiative Group) started a new company, **SIIS** (SI Imaging Services).The SIIS facilities are located at KARI. [7330)]

SiAs ..... Arsenic−doped silicon detectors

SiGa ..... Silicon gallium (detector)

SiC ..... Silicon Carbide (example: SiC−type ceramic mirrors and structures are components in optomechanical systems), in this context C−SiC is Carbon−Silicon Carbide.

SIC ..... Sea Ice Concentration

SICH ..... Owl (in Ukrainian, see SICH−1 under OKEAN)

SIDECAR ..... System for Image Digitization, Enhancement, Control And Retrieval − an advanced low−noise, low power microprocessor−based control chip as of 2008 [an ASCI(Application Specific Integrated Circuit], designed by Teledyne Imaging Sensors of Thousand Oaks, CA, to convert the analog signals into digital signals.

SIF ..... Solar−Induced chlorophyll Fluorescence. SIF is a rapidly advancing front in terrestrial vegetation science, with emerging capability in space−based detection methods and diverse application prospects. Although remote sensing of SIF is a contemporary new specialty for terrestrial plants, it is founded upon a multi−decadal history of research, applications, and sensor developments in active and passive sensing of chlorophyll fluorescence. Current technical capabilities allow SIF to be measured across a range of biological, spatial, and temporal scales. As an optical signal, it may be discriminated remotely using highly resolved spectral sensors and state−of−the−art retrieval approaches to separate the emission from reflected and/or scattered ambient light. — Because the red to far−red SIF emission is detectable non−invasively, it may be sampled repeatedly to acquire spatiotemporally explicit information about vegetation photosynthetic light responses and steady−state behavior. [7331)]

SIGINT ..... Signals Intelligence. SIGINT is intelligence−gathering by interception of signals.

Sigma−0 ..... σ^o (sigma naught) is computed from the signal power measurement using the distributed target radar equation. σ^o is the conventional measure of the strength of a radar signal reflected from a geometric object (the target area).

SIL ..... Space Innovations Limited, Newburry, Berks, UK [founded in 1983, since 1998 a subsidiary of SpaceDev Inc., San Diego, CA; SSTL (Surrey) purchased SIL in 2000]

SIM ..... Space Interferometry Mission (NASA); now referred to as SIM−Lite

SIMMS ..... Seasonal Sea Ice Monitoring and Modeling Site (campaign)

7330) "Satrec Initiative Announces Agreement with Korea Aerospace Research Institute," SI, Nov. 15, 2012, URL: http://www.satreci.com/eng/ds1_1.html?tno=100&db=pr_board&no=22

7331) G. Mohammed, R. Colombo, E. Middleton, U. Rascher, et al., "Remote sensing of solar−induced chlorophyll fluorescence (SIF) in vegetation: 50 years of progress," EU Science Hub, URL: https://ec.europa.eu/jrc/en/publication/remote−sensing−solar−induced−chlorophyll−fluorescence−sif−vegetation−50−years−progress

SIMONE ..... Smallsat Intercept Missions to Objects Near Earth, [a mission constellation (concept study led by QinetiQ, UK) to search for NEOs within the framework of ESA]

SIMPLEX ..... Shuttle Ionospheric Modification with Pulsed Local Exhaust (Shuttle payload)

SIMOX ..... Separation by Implantation of Oxygen (a SOI manufacturing process)

SINPLEX ..... Small Integrated Navigation System for Planetary Exploration. SINPLEX is a sensor suite for spacecraft navigation purposes. A project within the EU FP7 program. [7332)]

SIO ..... Scripps Institution of Oceanography (part of UC at San Diego, La Jolla, CA)

SIPRNet ..... Secure Internet Protocol Router Network (integral part of DoD's Defense Information Systems Network)

SIPT ..... Société Internationale de Photogrammétrie et de Télédétection

SIR ..... Shuttle Imaging Radar (SIR−A with Payload A; SIR−B with Payload B, etc.), see L.21 − L.23

SIRTF ..... Space InfraRed Telescope Facility (NASA/JPL, a spaceborne cryogenic infrared observatory dedicated to astronomy, a launch took place on Aug. 25, 2003). SIRTF uses a Ritchey−Chretien telescope with 85 cm aperture diameter, total spectral range: 3.6 − 160 μm (cooled to < 5.5 K). The three instruments are: IRAC (Infrared Array Camera) operating in MWIR (3.6 − 8 μm); IRS (Infrared Spectrograph) operating in 5.3 − 37 μm range for high and low−resolution spectroscopy; and MIPS (Multiband Imaging Photometer for SIRTF) operating in FIR (24−160 μm). S/C launch mass of 950 kg.

SIS ..... Superconductor−Insulator−Superconductor (tunnel junctions, also a microwave spectrometer receiver type)

SISNET ..... Signal in Space over the Internet (ESA data server within the framework of EGNOS and ESTB)

SITe ..... Scientific Imaging Technologies Inc. (US company in Beaverton, OR, CCD imaging products)

SITP ..... Shanghai Institute of Technical Physics (of the Academy of Sciences of China), founded in 1958. Development of optical and infrared sensors since 1964 as well as radiometers.

SIZEX ..... Seasonal Ice Zone Experiment (campaign)

SJ ..... Shi Jian (meaning "experiment" or "experimental"). A spin−stabilized scientific minisatellite series of CAST, China; launch of SJ−1 on March 3, 1971; SJ−2 (2A and 2B) launch Sept. 19, 1981, S/C mass = 257 kg for each S/C (note: three satellites were launched by a single launch vehicle); SJ−4 launch on Feb. 8, 1994 (orbit: 210 km x 36125 km, inclination = 28.6°), S/C mass = 396 kg; SJ−5 launch on May 10, 1999

SKA ..... Square Kilometer Array [International project plan of the IAU (started in 2000) for a new radiotelescope which will come into operation in about 2020]. Its collecting area will be almost 100 times larger than today's biggest radio imaging telescopes — providing orders−of−magnitude increases in sensitivity and field of view. The SKA project is managed by the SPDO (SKA Program Development Office). The SKA Organization, with its headquarters at Jodrell Bank Observatory, near Manchester, UK, was established in December 2011.
In May 2012, a decision was made by SPDO to split the SKA implementation sites between the host contries, Australia−New Zealand and South Africa. When fully implemented in 2024, the SKA will be the

7332) Erik Laan, Marco Esposito, Bert Monna, Simon Silvio Conticello, Frank Stelwagen, Stephan Theil, Stephen Steffes, Michael Dumke, David Heise, Marco Sagliano, Han Oosterling, David Nijkerk, Tom Duivenvoorde, Joris Berkhout, Yuriy Yanson, Jan Schulte, Daniel Skaborn, Murat Durkut, "SINPLEX: A Small Integrated Navigation System for Planetary Exploration," Proceedings of the 64th International Astronautical Congress (IAC 2013), Beijing, China, Sept. 23−27, 2013, paper: IAC−13−C1.4.6

world's largest and most sensitive radio telescope. [7333] [7334]
In July 2013, Australia switched on a MWA (Murchison Widefield Array), a a low−frequency radio telescope at the remote Outback site that will host the SKA. [7335]

SKYLAB ..... Sky Laboratory, NASA Space Station of the 1970s (N.5)

SL ..... Spacelab − a modular general purpose laboratory. An integral element of NASA's Space Shuttle Program provided by ESA (build by MBB/ERNO). Spacelab itself comprised several elements that could be mixed−and−matched to suit mission requirements. A typical launch mass of a Spacelab was in the order of about 10 tons. SL−1 totalled a PM (Pressurized Module) mass of 8,145 kg plus a Pallet mass of 3,386 kg (including 1392 kg of payload mass). Spacelab is the first European manned space project. A total of 22 missions were flown with Spacelab starting with STS−9 (Nov. 28, 1983) until STS−90 (April 17, 1998). The Spacelab program provided numerous investigators from many countries an opportunity, to fly their instruments. Experiments conducted were generally in the fields of Earth observation, astronomy, atmospheric physics, life sciences, and material sciences under microgravity conditions.

SLA ..... Shuttle Laser Altimeter (Shuttle payload)

SLAR ..... Side−Looking Airborne Radar (an active sensor with Real Aperture Radar technology)

SLC ..... Space Launch Complex

SLE ..... Space Link Extension. A service adopted by many space agencies to provide cross−support for interoperability for missions. SLE is a standard interface defined by the CCSDS for the transport and management of space data between mission control centers and ground stations. Data transmission services in telemetry and command from the Mission Control Center via different SLE compliant ground segment systems are provided by ESA, NASA, CNES, DLR, ASI, JAXA, CNSA, INPE, ISRO, KARI, etc. To ensure a correct inter−agency operability among these SLE systems, the execution of coordinated cross−support SLE tests between the different space organizations is required. SLE provides an effcient space data exchange with cooperating agencies and interoperability through the SLE interfaces.

SloshSat−FLEVO A small satellite of the Netherlands to study fluid dynamics in low gravity with FLEVO (Facility for Liquid Experimentation and Verification in Orbit). Shuttle payload

SLR ..... Satellite Laser Ranging (a network of ground stations providing services of laser range measurements).

SLS ..... Space Launch System (NASA, human exploration and avionics architecture of the Orion spacecraft). SLS will also be NASA's heavy−lift rocket, targeted for a first flight test in 2018. [7336]

SLS ..... Space Life Sciences (Shuttle payload)

SLS ..... Strained Layer Superlattice (an advanced infrared detector type) [7337]

SMA ..... Shape Memory Alloy

SMART ..... Small Missions for Advanced Research in Technology (ESA Horizons 2000 mission)

7333) "Dual site agreed for Square Kilometre Array telescope," May 25, 2012, URL: http://www.skatelescope.org/news/dual−site−agreed−square−kilometre−array−telescope/

7334) SKA newsletter, Volume 24, July 2012, URL: http://www.skatelescope.org/wp−content/uploads/2011/03/SKA_NEWSLETTER_VOLUME_24.pdf

7335) "Australia switches on telescope to explore universe origins," Space Daily, July 9, 2013, URL: http://www.spacedaily.com/reports/Australia_switches_on_telescope_to_explore_universe_origins_999.html

7336) Stephanie Schierholz, "NASA Completes Key Review of World's Most Powerful Rocket in Support of Journey to Mars," NASA Release 14−229, , Aug. 27, 2014, URL: http://www.nasa.gov/press/2014/august/nasa−completes−key−review−of−world−s−most−powerful−rocket−in−support−of−journey−to/

7337) "Next−Generation Photodetector Camera Studied for CapSat Application," Cutting Edge, Vol. 12, Issue 4, Summer 2016, pp:6−7, URL: https://gsfctechnology.gsfc.nasa.gov/newsletter/Current.pdf

SMART ..... Smart Multi−Aperture Radar Techniques (in applications for high−resolution wide−swath SAR imaging). Use of multiple transmit/receive channels and the introduction of DBF (Digital Beam−Forming) in the conventional SAR processing.

SmartSat ..... Lockheed Martin has developed "SmartSat," a satellite architecture that enables one to change the mission of a satellite while orbiting . The new architecture will let users add capability and assign new missions with a software push, just like adding an app on a smartphone. SmartSat is a software−defined satellite architecture that will boost capability for payloads on several pioneering nanosats ready for launch this year (2019). Add a SmartSat app to your satellite in−orbit, and you've changed the mission," said Rick Ambrose, executive vice president of Lockheed Martin Space. "We are the first to deploy this groundbreaking technology on multiple missions. SmartSat will give our customers unparalleled resiliency and flexibility for changing mission needs and technology, and it unlocks even greater processing power in space." [7338]

SMC ..... Space and Missile Systems Center, part of Air Force Materiel Command, with HQs located at Los Angeles AFB, El Segundo, CA (since 1954). SMC has operating sites throughout the USA, including the operating location detachment at NASA's Johnson Space Center, Houston, Texas; Detachment 2 at Onizuka Air Station in Sunnyvale, CA; and Detachment 9 at Vandenberg Air Force Base, CA. SMC is also the parent center of the host unit at Kirtland Air Force Base, Albuquerque, NM. SMC's work force totals over 9,500 employees. Some major programs of SMC are GPS/NAVSTAR, DMSP, SBIRS, etc.

SMCS ..... Scalable Multi−Channel Communication Subsystem. SMCS−332 and SMCS−Lite are chips from the same family.

SMC/TE ..... Space and Missile Systems Center / Test & Evaluation Directorate. A tri−service (Army, Navy, Air Force) S/C division with locations at Kirtland AFB, Albuquerque, NM; Falcon AFB, Colorado Springs, CO; VAFB, Vandenberg, CA; Los Angeles AFB, El Segundo, CA; and at NASA/JSC, Houston TX. SMC/TE was established in 1992.

SMC/TEL ..... Space and Missile Systems Center / Space and Missile Test Evaluation Directorate. The Air Force serves as the executive agent for the Space Test Program (STP).

SMC/TEO ..... SMC / Orbital Telemetry, Tracking and Commanding Operations Division

SMC/XR ..... SMC/Development Planning Directorate

SMDC ..... Space & Missile Defense Command (US Army Forces Strategic Command)

SME ..... Small and Medium−sized manufacturing Enterprise (established in Europe in 1992 by the EC)

SME ..... Solar Mesosphere Explorer (NASA, M.24)

SMEX ..... Small Explorer Program (NASA/GSFC program since 1988 supporting disciplines in astrophysics, space physics and upper atmospheric science; SMEX missions are SAMPEX, FAST, SWAS, TOMS, etc.)

SMHI ..... Sweriges Meteorologiska och Hydrologiska Institut (Swedish Meteorological and Hydrological Institute), Norrköping

SMM ..... Solar Maximum Mission (NASA,M.26)

SMOS ..... Soil Moisture and Ocean Salinity (ESA mission, F.53)

SMS ..... Synchronous Meteorological Satellite (designation of the first US weather satellites (1974); this series was later renamed GOES (NOAA)

7338) "Lockheed Martin's First Smart Satellites are Tiny with Big Missions," Lockheed Martin, 20 March 2019, URL: https://news.lockheedmartin.com/2019−03−20−Lockheed−Martins−First−Smart−Satellites−are−Tiny−with−Big−Missions

SMTI ..... Surface Moving Target Indication (a mode of operation of a radar to discriminate a target against clutter – detection of objects that move on Earth's surface)
SMTP ..... Simple Mail Transfer Protocol
SN ..... Space Network of NASA. SN was established in the early 1980s to replace NASA's worldwide network of ground tracking stations. The Space Network consists of: [7339)]
1) A constellation of geosynchronous (Earth orbiting) satellites named the Tracking Data Relay Satellite (TDRS)
2) Ground systems that operate as a relay system between satellites
3) Satellites in low Earth orbit (LEO) above 73 km
4) Ground facilities.
SNAP ..... Surrey Nanosatellite Applications Program (F.62.16)
SNAS ..... Satellite Navigation Augmentation System, of China
SNC ..... Sierra Nevada Corporation, with HQ in Sparks NV, USA. SNC developed the privately constructed Dream Chaser spacecraft, a mini shuttle which launches aboard an Atlas V rocket and then, like the shuttle, come back to Earth on a runway. SNC owned subsidiaries are:
MSI (MicroSat Systems Inc.) of Englewood, CO
SpaceDev of Poway, CA
SpaceDev of Louisville, CO
Straight Flight Inc. of Englewood, CO
SNCMP ..... Service National des Champs Magnetique Pulses (Toulouse, France)
SNECMA ..... SNECMA Moteurs, Paris, France [manufacturer of aircraft and spacecraft engines (launch vehicles), also builder of electric propulsion systems for satellites].
– SEPR (Société d'Etudes de la Propulsion par Réaction) was founded in 1944
– In 1965 SNECMA launched its Space Motors Division
– In 1969, SEPR merged with Snecma's Motors division to produce the Société Européenne de Propulsion (SEP).
– In 2002, the company became a subsidiary of Snecma S.A. (that became the Safran Group in 2005), and adopted the corporate name "Snecma Propulsion Solide".
SNL ..... Sandia National Laboratories (Albuquerque, NM – since 1945, and Livermore CA, USA; SNL is part of DOE and operated by AT&T since 1949). Since Oct. 1, 1993, SNL is managed by Martin Marietta Corp., now Lockheed Martin. Part of SNL is now part of LANL.
SNOE ..... Student Nitric Oxide Explorer (P.26.1)
SNR ..... Signal–to–Noise Ratio
SNSB ..... Swedish National Space Board (RYDSTYRELSEN), Solna Sweden. SNSB is a central governmental agency under the Ministry of Industry, Employment and Communication. SNSB is responsible for national and international activities relating to space and remote sensing, primarily research and development.
SO_2 ..... Sulphur dioxide
SO_4 ..... Sulphur radical
SOA ..... Service Oriented Architecture. In computing, SOA provides methods for systems development and integration where systems package functionality as interoperable services. A SOA infrastructure allows different applications to exchange data with one another.
SOA ..... State Oceanic Administration (Beijing, China). NSOAS (National Satellite Ocean Application Service) is a center of SOA.
SoC ..... System on Chip (communication I/F). A SoC can be defined as a single device that incorporates CPU, ROM, RAM, IO, clocking, analog to

7339) "Space Network (SN)," NASA, March 11, 2016, URL: https://www.nasa.gov/directorates/heo/scan/services/networks/txt_sn.html

digital, digital to analog and communication, or some mix of peripherals to support a complete task.

SOC . . . . . Science Operations Center

SOCC . . . . . Satellite Operations and Control Center (NOAA)

SOCEX . . . . . Southern Ocean Cloud Experiment (campaign)

SODAR . . . . . Sound Detection and Ranging (system)

SODERN . . . . . Societe Anonyme d'Etudes et Realisations Nucleaires (instrument company, Limeil–Brévannes, France, since 1962).

SOEST . . . . . School of Ocean & Earth Science & Technology, University of Hawaii at Manoa, HI

SOFC . . . . . Solid Oxide Fuel Cell

SOFIA . . . . . Stratospheric Observatory For Infrared Astronomy (R.195). A cooperative NASA and DLR astronomy observatory. A Boeing 747–SP aircraft, a modified airliner, is the platform of SOFIA. Flights start in late 2002, long–term observations for up to 20 years are planned. The telescope of SOFIA, provided by DLR, has an effective diameter of 2.5 m. The mass of the telescope is 18,000 kg.

SOFIA . . . . . Surface of the Ocean, Fluxes and Interaction with the Atmosphere (campaign)

SOFRADIR . . . . Société Francaise de Détecteurs InfraRouge (HQ in Chatenay–Malabry, near Paris, France). Sofradir manufactures advanced infrared detectors (IR) for military, space and commercial applications.

SOHO . . . . . Solar and Heliospheric Observatory (see M.27)

SOI . . . . . Silicon–On–Insulator (thin insulator technology for microprocessors). In SOI devices the electronic active layers are fabricated on the insulator layer, while in conventional bulk CMOS devices the active layers are fabricated on the silicon layer. SOI is the technology of choice for radiation–critical applications (immunity to single–event latch–up from high–energy particles).

SOIF . . . . . Spacecraft Onboard InterFaces (a sub–panel of CCSDS)

SOIS . . . . . Spacecraft Onboard Interface Services (a standard is being developed as of 2008 to map SOIS functions onto the protocols of SpaceWire, MIL–STD–1553B and CAN)

SOLAR–A . . . . . ISAS Solar–Terrestrial Mission

SOLAS . . . . . International Convention for the "Safety of Life at Sea"

SOLSE/LORE . . Shuttle Ozone Limb Sounding Experiment/Limb Ozone Retrieval Experiment (Shuttle payload)

SONEX . . . . . SASS Ozone and NOx Experiment (NASA campaign in planning)

SONG . . . . . Space Oceanography Navigation and Geodynamics) (a Workshop series on satellite altimetry)

SOP . . . . . Special Observation Period (in campaigns)

SOP . . . . . Standard of Practice (referring to those technologies which are mainstream and in common use)

SORCE . . . . . Solar Radiation and Climate Experiment, C.30

SOS . . . . . Southern Oxidants Study (campaign)

SOTDMA . . . . . Self Organizing Time Division Multiple Access (this is a protocol that rules the AIS signals send between vessels)

SOUP . . . . . Solar Optical Universal Polarimeter (Spacelab–2 sensor)

Sovinformsputnik Provider/distributor of commercial imagery and image products, Moscow (since 1991). The company was founded by Russian space enterprises such as: a) State Research and Production Space Rocket Center (TsSKB–Progress), Samara, b) the joint stock company "Krasnogorskiy Zavod", c) NPO Lavotchkin, d) State Scientific and Production Center "Priroda".

SPA . . . . . Space Plug–and–play Architecture. SPA combines modularity, standardization, and intelligent interfaces. The SPA architecture implements a self–organizing network of devices where components are

self−describing and attached to a standardized data and power bus. The SPA architecture defines the following: SPA components, SPA interfaces, ASIMs, SPA Networks, SPA systems, SPA middleware, Ontology and System Conventions.

SPAC . . . . . Special−Purpose Acquisition Company. SPAC is a company with no commercial operations that is formed strictly to raise capital through an initial public offering (IPO) for the purpose of acquiring an existing company. Also known as "blank check companies," SPACs have been around for decades. In recent years, they've become more popular, attracting big−name underwriters and investors and raising a record amount of IPO money in 2019.

SxPA . . . . . Plug−and−Play Architecture of Sputnix (of Skolkovo, Russia). Note: SxPA is a variant implementation of SPA in combination with SpaceWire.

SpaceDev . . . . . SpaceDev Inc. is a commercial company with HQ in Poway (San Diego, since 1997), CA, manufacturer of microsatellites (ICESAT, etc.), subsystems and propulsion

SpaceFibre . . . . . As of 2013, SpaceFibre is an emerging standard for multi−Gbit/s network technology ideal for spaceflight applications, which is galvanically isolated, which does provide comprehensive quality of service, which includes robust FDIR support, and which extends the time−codes of SpaceWire into a much more versatile Broadcast Message service. Furthermore SpaceFibre uses the same packet format and routing concepts as SpaceWire making it very easy to bridge between existing SpaceWire devices and networks and SpaceFibre. SpaceFibre is planned for ECSS standardization in 2014. [7340)]

Spaceflight Inc. . Spaceflight Inc. of Seattle, WA, USA, founded in 2009, has the goal to revolutionize secondary payload flight services for fixed and deployable cargo and transport. In 2012, Spaceflight formally started its SHERPA in−space tug service project, which is dedicated to hosting and deploying small and secondary payloads.

In Feb. 2016, Spaceflight announced it is the first launch services provider to be awarded the U.S. GSA (General Services Administration). As a recipient of the contract, Spaceflight provides its services to federal agencies at a pre−negotiated fixed rate, enabling them to quickly and easily secure small satellite launch contracts completely online. This in turn reduces administrative costs and overhead and potentially increases how frequently the agencies access space. [7341)]

June 14, 2020: Spaceflight Inc. has been acquired by Mitsui & Co., Ltd., in partnership with Yamasa Co., Ltd. — this acquisition is now complete with the final review of the Committee on Foreign Investment in the United States (CFIUS). [7342)] − In February 2020, Spaceflight's parent company, Spaceflight Industries, announced it had signed an agreement with the Japanese companies for the sale of the launch service provider, pending the CFIUS review. The review was completes in April and the acquisition finalized on June 12, 2020. Mitsui & Co. and Yamasa will have 50/50 joint venture ownership in Spaceflight, but the launch service provider will continue to operate as a privately held, independent U.S.−based company.

SPACEHAB . . . . A concept for commercially sponsored and procured payloads and services on Shuttle. SPACEHAB Inc., of Vienna, VA, has a NASA contract

7340) Steve Parkes, Chris McClements, Albert Ferrer, Alberto Gonzalez, "SpaceFibre: Multi−Gbits/s Network for Spaceflight Applications," Proceedings of the 64th International Astronautical Congress (IAC 2013), Beijing, China, Sept. 23−27, 2013, paper: IAC−13−B2.3.1

7341) "Spaceflight Awarded First GSA Schedule Contract for Satellite Launch Services," Spaceflight, Feb. 10, 2016, URL: http://www.spaceflight.com/spaceflight−awarded−first−gsa−schedule−contract−for−satellite-launch−services/

7342) "Spaceflight Acquired," Satnews Daily, 14 June 2020, URL: http://www.satnews.com/story.php?number=343160094

leasing Shuttle space on a commercial basis in the so−called 'Commercial Middeck Augmentation Module' (CMAM), a pressurized research lab owned by SPACEHAB® (an extension of the Shuttle orbiter middeck in the Shuttle cargo bay). SPACEHAB in turn sells its services, providing the needed support for commercial development of space payloads as well as physical and operational integration, and all services (training, etc.) for these payloads. Once in flight, SPACEHAB payloads are crew−tended on request. The SPACEHAB contract was awarded in Nov. 1990, the first SPACEHAB flight took place on STS−57 in June 1993. − SPACEHAB−1, −2 identifies also a series of Shuttle payloads.

SPACELAB . . . . . Space Laboratory on NASA Shuttle missions.

Space Imaging . . Space Imaging Inc. (since 1994) of Thornton, CO, acquired EOSAT in 1995 [distributor of IKONOS imagery, ERS−1/2, JERS and Radarsat data (USA), global distributor of IRS−1C/D imagery]. The owners of Space Imaging are: LM, E−Systems (of Raytheon), Mitsubishi, Vander Horst (Singapore), Halla Heavy Industries (Korea).− As of Sept. 2005, Lockheed Martin and Raytheon, the parent companies, have agreed to sell Space Imaging to OrbImage Inc.

SpaceQuest Ltd. . Small satellite and components builder, Fairfax, VA, USA (since 1994). Provider of AIS services on AprizeSat−3 and −4 (launch in July 2009).

SpaceWire . . . . . SpaceWire (SpW) is an emerging network standard for on−board space applications, composed of nodes and routers, interconnected through bi−directional high−speed digital serial links, operating at 2−400 Mbit/s. − In 2010, SpaceWire has became a mature de−facto standard; it is being implemented into many spaceborne missions like JWST (James Webb Space Telescope), GAIA, Astro−H, Bepicolombo, etc.

SpaceX . . . . . Space Exploration Technologies Inc., Hawthorne, CA, USA (since June 2002, founded by Elon Musk), provider of low−cost launch services (Falcon−1 vehicle) based mostly on reusable rockets. Falcon−9 is the current workhorse of the SpaceX fleet of launch vehicles. In 2010, during the second, highly successful launch of Falcon 9, SpaceX deployed eight secondary payloads from six P−PODs (PicoSatellite Orbital Deployers). In Sept. 2014, SpaceX (along with Boeing) signed a contract with NASA to develop space vehicles that would bring astronauts to and from the ISS by 2017 and end the nation's reliance on Russia. — The Dragon V2 capsule of SpaceX is designed to ferry crew members and supplies into orbit, and then land propulsively (i.e. under its own power) back to Earth before refueling and flying again. This is made possible thanks to the addition of eight side−mounted SuperDraco engines. [7343)]

SPAD . . . . . Single Photon Avalanche Diode. In 2020, Researchers have developed the first megapixel photon−counting camera based on new−generation image sensor technology that uses single−photon avalanche diodes (SPADs). The new camera can detect single photons of light at unprecedented speeds, a capability that could advance applications that require fast acquisition of 3D images such as augmented reality and LiDAR systems for autonomous vehicles. [7344)]

SPADE . . . . . Stratospheric Photochemistry, Aerosols and Dynamics Experiment (campaign)

SPAN . . . . . Space Physics Analysis Network (based on the DECnet protocol). [The US − SPAN (NASA) service was discontinued at the end of 1990; the

7343) Matt Williams, "SpaceX Continues to Expand Facilities, Workforce in Quest for Space," Universe Today, Dec. 16, 2014, URL: http://www.universetoday.com/117321/spacex−continues−to−expand−facilities−workforce−in−quest−for−space/

7344) Kazuhiro Morimoto, Andrei Ardelean, Ming−Lo Wu, Arin Can Ulku, Ivan Michel Antolovic, Claudio Bruschini, and Edoardo Charbon, "Megapixel time−gated SPAD image sensorfor 2D and 3D imaging applications," Optica, Vol. 7, No 4, April 2020, URL: https://tinyurl.com/y9qcf6h8

E−SPAN (ESA) service will be continued]. SPAN permits user access to data archives. The successor of SPAN in the US is NSI (NASA Science Internet), a dual protocol (TCP/IP and DECnet) network.

SPARC ..... Stratospheric Processes and their Role in Climate (WCRP project, successor to STIB)

SPARTAN ..... Shuttle Pointed Autonomous Research Tool for Astronomy (Shuttle). SPARTAN is a small free−flying vehicle (about 1 x 1.25 x 1.5 m) for a variety of experiments (managed by OAST)

SPAS ..... Shuttle Pallet Satellite (a Shuttle retrievable free−flyer platform for payloads, SPAS was built by MBB), SPAS−1 on STS−7 in 1983, ASTRO−SPAS is a direct successor of SPAS, ASTRO−SPAS−1 on STS−51 in Sept. 1993

SPDM ..... Special Purpose Dexterous Manipulator

SPDT ..... Single Point Diamond Turning. A technique used to to manufacture high−quality aspheric optical elements from crystals, metals, acrylic, and other materials. Optical elements (mirrors), produced with SDPT, are used in optical assemblies in telescopes, video projectors, missile guidance systems, lasers, scientific research instruments, etc.

SPECTRA ..... Surface Processes and Ecosystems Changes through Response Analysis (a proposed ESA Core Mission), in 2001 SPECTRA is the new name and successor of PRISM (Processes Research by an Imaging Space Mission), an instrument, and LSPIM (Land Surface Processes and Interactions Mission)

SPECTRE ..... Spectral Radiance Experiment (campaign)

Spectrum Astro .. Spectrum Astro Inc. of Gilbert, AZ (since 1988); Spacecraft builder of missions: Deep Space 1, MightySat−II−1, Coriolis, GLAST, etc. Note: As of July 2004, Spectrum Astro Inc. was acquired by General Dynamics (HQ in Falls Church, VA). Spectrum Astro is now part of General Dynamics C4 Systems of Scottsdale, AZ.

SPHERES ..... Synchronized Position Hold Engage Re−orient Experiment Satellites (a testbed at the MIT Space Systems Laboratory) − a reconfigurable platform with representative dynamics for the validation of metrology, formation flight, and autonomy algorithms.

SPI ..... Serial Peripheral Interface (communications bus)

SPICA ..... Space Infrared Telescope for Cosmology and Astrophysics of ISAS (Institute for Space and Astronomical Science at the University of Tokyo, Japan). A launch is planned for 2010 to L2.

SPICE ..... Sensors Performance in Cloud Experiment (campaign)

SPIDER ..... Segmented Planar Imaging Detector for Electro−optical Reconnaissance (developed at Lockheed Martin, Palo Alto, CA with DARPA funding). SPIDER has the potential to start a new era of low−mass and thin−disk telescope configurations for future missions. [7345)]
The SPIDER telescope imaging concept is based on interferometry, using a thin array of tiny lenses that replaces the large, bulky mirrors or lenses in traditional telescopes. The array of tiny lenses feed silicon−chip PICs (Photonic Integrated Circuits) to combine the light in pairs to form interference fringes.

SPIE ..... Society of Photo−Optical Instrumentation Engineering (international)

SPIE ..... Shuttle Plume Impingement Experiment

SPIFEX ..... Shuttle Plume Impingement Flight Experiment

SPIN−2 ..... Space Information−2 Meter. SPIN−2 is a joint venture (company) of Interbranch Association SOVINFORMSPUTNIK (Moscow, Russia), Aerial Images, Inc. (Raleigh, NC), and Central Trading Systems, Inc.,

7345) Alan L. Duncan, Richard L. Kendrick, Chad Ogden, Danielle Wuchenich, Samuel T. Thurman, S. J. S. B. Yoo, Tiehui Su, Shibnath Pathak, Roberto Proietti, "SPIDER: Next Generation Chip Scale Imaging Sensor," Proceedings of the 16th AMOS (Advanced Maui Optical and Space Surveillance Technology Conference), Maui, Hawaii, USA, Sept. 15−18, 2015, URL: http://www.amostech.com/TechnicalPapers/2015/Optical_Systems/Duncan.pdf

(Huntington Bay, NY). The objective is to market high−resolution panchromatic imagery data (2 m) of past Russian missions (Resurs−F series). See KFA−1000 camera system under RESURS−F (the camera is also known by the name KVR−1000).

SPORT ..... Small Payload Orbit Transfer (an AeroAstro concept)

SPOT ..... Système Pour l'Observation de la Terre (French Earth Observing Satellite), (F.55)

Spot Image ..... SPOT program data distributor (Toulouse, France, and Reston, VA, USA), a unit of CNES, France. As of July 15, 2008, the EADS's Astrium Services unit has acquired a majority stake (81%) in Spot Image (from CNES). − In January 2011, Astrium fully integrated Spot Image and Infoterra into new GEO−Information business division. [7346)]

SPRE ..... SPARTAN Packet Radio Experiment (an amateur radio experiment on Shuttle SPARTAN)

SPS ..... Standard Positioning Service (GPS)

SPST ..... Single Pole Single Throw (Switch)

SPT ..... Stationary Plasma Thruster (method of electric on−orbit propulsion)

Sputnix Ltd ..... A startup company located in Skolkovo, Russia, and a subsidiary of ScanEx Research and Development Center. Sputnix specializes in small satellite technology (ADCS components, antennas, micropropulsion, etc.). The TabletSat bus of Sputnix uses a variant of the open SPA of AIAA/AFRL avionics standard, called SxPA (Space Plug− and−Play Architecture). [7347) 7348)]

SQUID ..... Superconducting Quantum Interference Device (detector type, most sensitive device for magnetic field detection in particular with superconducting technology)

SQPSK ..... Staggered Quadrature Phase Shift Keying (modulation type)

SRAM ..... Static Random Access Memory

SRB ..... Surface Radiation Budget (GEWEX project)

SRC ..... Space Regatta Consortium (Konsorsium Kosmicheskaya regata) since 1990, the association is based on the premises of RSC Energia

SRC/PAS ..... Space Research Centre / Polish Academy of Sciences, Warsaw, Poland

SRDL ..... Signal Research and Development Laboratory, Fort Monmouth, N.J (of the US Army Signal Corps). SRDL provided important contributions (first solar power) in the early US space program.

SRGPS ..... Shipboard Relative GPS (GPS augmentation system for the US Navy. Within the JPALS program, SRGPS represents the shipboard component of JPALS. Instead of a precise surveyed point, the "reference station" is installed on a ship. Despite the ship's motion, a single difference calculation between a ship antenna and an aircraft antenna can be made just as accurately as its shore based counterpart.)

SRI ..... Stanford Research Institute (original designation, founded in 1946), now: 'SRI International' at Menlo Park, CA. The institute separated from the University for legal reasons, − SRI International is a nonprofit organization funded by contract research. About 2700 employees.

SRI ..... Système de Référence Inertielle

SRL ..... Space Radar Laboratory (Shuttle missions of SIR−C/X−SAR payloads)

SRLL ..... Simple Radio Link Layer (protocol of some AMSAT S/C)

SRON ..... Space Research Organisation Netherlands (Stiching Ruimlteonderzoek Nederland, Utrecht, Groningen − the Netherlands), since

7346) "Astrium fully integrates Spot Image and Infoterra into new GEO−Information business division," Astrium, Dec. 1, 2010, URL: http://www.astrium.eads.net/en/press_centre/astrium−fully−integrates−spot−image−and−infoterra−into−new−geo−information.html

7347) "Plug−and−Play technology for microsatellites has been experimentally confirmed," Space Daily, May 31, 2013, URL: http://www.spacedaily.com/reports/Plug_and_Play_technology_for_microsatellites_has_been_experimentally_confirmed_999.html

7348) "Open SxPA specifications," URL: http://www.sputnix.ru/en/technologies/open−specifications

1983, builder of scientific instruments (HXIS, SCIAMACHY, HIFI, etc.)

SRR ..... System Requirements Review

SRSC ..... Siberian Remote Sensing Center, Novosibirsk, Russia

SRTC ..... Savannah River Technology Center (DOE facility in Aiken, SC, USA)

SRTM ..... Shuttle Radar Topography Mission

SS/CPMA ..... Spread Spectrum/Code Position Multiple Access (communication concept)

SSA ..... Space Situational Awareness. SSA is defined as knowing the location and potential function of every object orbiting the Earth – active or inactive – regardless of its size, its purposes, its mission and its status. SSA includes the ability to track and understand what exactly is in orbit from either space or from the ground.

SSALTO ..... Segment Sol Altimetrie et Orbitographie (a CNES/AVISO ground segment for altimetry satellites)

SSALTO/DUACS SSALTO/(Developing Use of Altimetry for Climate Studies). A European Commission project since 1997. The project's purpose is to demonstrate that climate applications could receive multi–mission altimetry data in near–real time under operational conditions.

SSB ..... Single Sideband

SSBUV ..... Shuttle Solar Backscatter Ultraviolet (Shuttle Experiment)

SSC ..... Stennis Space Center (a NASA center in Bay St. Louis, MS)

SSC ..... Surrey Space Center, located at the University of Surrey, UK. SSC is a world leading Center of Excellence in Space Engineering.

SSC ..... Swedish Space Corporation (Solna, Sweden; a government–owned limited corporation under the Ministry of Industry, established in 1972).
Note: In June 2011, OHB AG of Bremen, Germany, acquired the Space Systems Division from SSC. The new company is called OHB Sweden AB, Stockholm. [7349)]

SSCC ..... SSA Space Weather Coordination Centre. SSCC is a new ESA Center in Brussels, Belgium (since April 2013). [7350)]

SSCE ..... Solid Surface Combustion Experiment (Shuttle payload)

SSCO ..... Satellite Servicing Capabilities Office (located at NASA/GSFC, since 2009)

SSD ..... Spatial Sampling Distance

SSDL ..... Space Systems Development Laboratory, since 1994 (at the Department of Aeronautics and Astronautics of Stanford University, Stanford, CA)

SSEOP ..... Space Shuttle Earth Observation Project

SSEP ..... Student Spaceflight Experiments Program (of NASA to fly experiments to the ISS)

SSERVI ..... Solar System Exploration Research Virtual Institute (since 2017, located at NASA/ARC), formerly NASA Lunar Science Instiurte. [7351)]

SSETI ..... Student Space Exploration and Technology Initiative (ESA education program, since 2000, participants are various European universities)

SSH ..... Sea Surface Height (measured by satellite altimetry)

SSI ..... Spaceport Systems International, operators of the commercial California Spaceport at Vandenberg, CA

SSIP ..... Shuttle Student Involvement Program

7349) "OHB AG acquires Space Systems Division from Swedish Space Corporation," Space Daily, June 28, 2011, URL: http://www.spacedaily.com/reports/OHB_AG_acquires_Space_Systems_Division_from_Swedish_Space_Corporation_999.html

7350) "Eyes on our Sun: ESA opens new Space Waether Center in Brussels," ESA, April 05, 2013, URL: http://www.esa.int/Our_Activities/Operations/Space_Situational_Awareness/Eyes_on_our_Sun_ESA_opens_new_space_weather_centre_in_Brussels

7351) https://sservi.nasa.gov/

SS/L ..... Space Systems/Loral, Palo Alto, CA (major US builder of communication satellites, consortium leader of Globalstar series, sensors, etc.). SS/L (also written as SSL) is the successor of Ford Aerospace.

SSMA ..... Spread Spectrum Multiple Access (communication transmission technique) Spread–spectrum modulation is emerging as the technology of choice to provide secure, interference–tolerant transmission.

SSM/I ..... Special Sensor Microwave/Image (US Department of Defense, US Air Force Sensor)

SSMM ..... Solid State Mass Memory (technology)

SSN ..... Space Surveillance Network (of the US Space Command, Colorado Springs, CO). SSN maintains a global catalog of orbit elements for RSOs (Resident Space Objects).

SSO ..... Sun–Synchronous Orbit

SSP ..... Space–based Solar Power (referring to orbiting "powersat" concepts that could eventually beam power to Earth)

SSP ..... Sub–Satellite Point

SSPA ..... Solid–State Power Amplifier

SSPD ..... Superconducting Single Photon Detector

SSPEDI ..... Small Spacecraft Prototyping Engineering Development and Integration. SSPEDI is a DoD contract managed by NASA/ARC (Ames Research Center). The SSPEDI concept establishes a rapid and flexible method for the Department of Defense's Space Rapid Capabilities Office to acquire commercially–developed solutions for small to medium spacecraft and related systems from a pool of pre–qualified candidates.

SSPM ..... Solid–State Photomultiplier (detector type)

SSPP ..... Shuttle Small Payloads Project

SRMS ..... Shuttle Remote Manipulator Arm (since 1981, also referred to as Canadarm1), built by Spar Aerospace of Canada

SSR ..... Solid State Recorder

SSRMS ..... Space Station Remote Manipulator System (since 2001, provided by CSA, also referred to as Canadarm2)

SSS ..... Sea Surface Salinity

SST ..... Space Solar Telescope (planned Chinese satellite mission in LEO with a 1 m diameter telescope using a 2048 x 1024 CCD detector array)

SST ..... Satellite–to–Satellite Tracking (a technique employed with two or more S/C in various orbits for determining the Earth's gravity field)

SST ..... Sea Surface Temperature (a physical parameter derived from radiometer data)

SST ..... Space Surveillance Telescope. A ground–based DARPA telescope for SSA (Space Situational Awareness) optical surveys installed in western Australia. The SST has a 3.5 m diameter aperture and a 3.5° diameter field of view. It features a three–mirror Mersenne–Schmidt design which is capable of wide–field imaging with fast focal ratios.

SS–TEC ..... Satellite–to–Satellite TEC (Total Electron Content) of the ionosphere (refractive GPS signal measurements between a GPS receiver on a satellite and the GPS constellation spacecraft)

SSTI ..... Small Spacecraft Technology Initiative (a NASA program started in 94)

SSTL ..... Surrey Satellite Technology Ltd (University of Surrey, Guildford, UK). SSTL is a commercial company whose principal shareholder is the University of Surrey. SSTL was set up in 1985 to provide a commercial outlet for the University's S/C engineering research.
In April 2008, EADS Astrium NV acquired SSTL from the University of Surrey (approval from the European Commission was given in Dec. 2008). SSTL will remain an independent U.K. company with its individual brand, although it will have access to EADS Astrium's research and development, design, manufacturing, and test facilities, as well as its deeper corporate coffers.

SSTO ..... SuperSynchronous Transfer Orbit. – By selecting the SSTO (i.e., an apogee > higher than GEO), the propellant costs to GEO are significantly reduced. The overall strategy to transfer from the SSTO to GEO is to perform a bum at apogee to raise the perigee to geosynchronous. A retrograde burn at the perigee of this ITO (Intermediate Transfer Orbit) then lowers the apogee down to geosynchronous.

SST–US LLC ... Surrey Satellite Technology US LLC. SST–US is located in Englewood, CO, USA. The company, a wholly owned subsidiary of Surrey Satellite Technology Limited (SSTL), was established in 2008 to address the United States market and its customers for the provision of small satellite solutions, applications and services.

SSTV ..... Slow Scan TV (a method of transmitting pictures by firstly converting the picture elements to a series of varying audio "tones". These "tones are then transmitted usually on SSB or sometimes on VHF FM).

SSU ..... Stratospheric Sounding Unit (UK sensor on NOAA S/C)

STA ..... Science and Technology Agency (of Japan)

STA ..... Space Transportation Association [Washington DC, In March 1998, a NASA study on space tourism was released ("General Space Travel and Tourism"). In response to the report's findings, STA has created a new "Space Travel und Tourism Division" (under DOC coordination) to promote public and private space travel]

STABLE ..... Suppression of Transient Accelerations By Levitation Evaluation (Shuttle payload)

STADAN ..... Space Tracking and Data Acquisitions Network (NASA/GSFC)

STALO ..... Stable Local Oscillator

STAR ..... Satellite Technology For The Asia–Pacific Region. The STAR program is an international initiative to develop small satellites in collaboration with engineers and researchers from the Asia–Pacific region. The STAR program was started in 2008 with offices at JAXA.

STAR ..... Synthetic Thinned Aperture Radiometry

STAR–Dundee . STAR–Dundee (since 2002, Dundee, Scotland, UK) is an engineering company that specialises in spacecraft onboard data–handling network technology (SpaceWire, SpaceFibre).

STARE ..... Southern Tropical Atlantic Regional Experiment (campaign)

STARNAV ..... Star Navigation Experiment (Shuttle Spacehab experiment to validate a new algorithm for S/C attitude control)

STARSEM ..... A European–Russian payload launch organization (since 1996, Evry, France) that brings together all key players involved in the production and operation of Soyuz launch vehicles (launches from Baikonur).

STAP ..... Space–Time Adaptive Processing (in radar systems)

Starlette ..... CNES 'Solid Earth' mission, a passive satellite for geodetic studies with SLR observations (G.19)

STARLink ..... Satellite Telemetry and Return Link (ER–2 telemetry link, see R.81)

STAR–LITE ... Spectrograph/Telescope for Astronomical Research (Shuttle payload)

START ..... System for Analysis, Research and Training (WCRP, IGBP, HDP)

State Center Priroda Moscow; Scientific and production enterprise for Earth remote sensing, commercial distributor of imagery; participation in programs: Resurs–F1, –F2, Salyut, MIR

STC ..... Sensitive Time Control (SAR antenna parameter)

STC ..... Star Tracker Camera

STCE ..... Solar–Terrestrial Center of Excellence, Brussels, Belgium. STCE is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

STCUI–RAS ... Scientific Technological Center of Unique Instruments – Russian Academy of Sciences (Moscow)

STDN ..... Standard Tracking and Data Network (NASA)

STEDI ..... Student Explorer Demonstration Initiative (P.26)
Stella ..... CNES experiment on−board Spot−3 for gravity field studies of the Earth (G.20)
STEM ..... Science Technology Engineering Mathematics. A U.S. education coalition to support STEM programs for teachers and students at the U. S. Department of Education, NSF (National Science Foundation), and other agencies that offer STEM related programs.
STEM ..... Storable Tubular Extendible Mast (deployable space structure, like booms, multi−element antennas, etc.)
STE−QUEST .. Space−Time Explorer and Quantum Test of the Equivalence Mission (an ESA class M mission proposal for Cosmic Vision 2015−2025). STE−QUEST is a proposed satellite mission to test the Einstein Equivalence Principle to high precision and search for new fundamental constituents and interactions in the Universe. It will contain an atom clock and an atom interferometer.
Stentor ..... Satellite de Télécommunications pour Expérimenter de Nouvelles Technologies en Orbite [a French GEO communication satellite program initiated by DGA (Defence Procurement Agency), France Telecom, and French industry (Alcatel Space, EADS, Astrium)].
STEP ..... Satellite Test of the Equivalence Principle, an ESA/NASA program proposal (1989). A MiniSTEP mission resulted due to economic constraints.
STEP ..... Science and Technology for Environmental Protection (CEC program)
STEP ..... Solar−Terrestrial Energy Program (International Program)
STEP ..... Space Test Experiment Platform (a minisatellite bus of TRW Inc. and of OSC for the DoD STP program)
STEP ..... Stratosphere Troposphere Exchange Project (campaign)
STERAO ..... Stratosphere−Troposphere Experiments: Radiation, Aerosols, and Ozone (campaign)
STEREO ..... Solar−Terrestrial Relations Observatory, M.30
STEX ..... Sensor Technology Experiment (Shuttle)
STEX ..... Space Technology Experiment (USA, NRO satellite launched Oct. 3, 1998)
STFC ..... Science and Technology Facilities Council (UK). STFC is responsible for the development of the UK ground based astronomy and space science strategy, exploitation of the data from space science missions.
STG−ET ..... Simulationsanlage für Treibstrahlen Göttingen − Elektrische Triebwerke (as of Oct. 2011, a DLR vacuum chamber in Göttingen, Germany dedicated for spacecraft electric propulsion research) [7352)]
STI−VAST ..... Space Technology Institute of VAST (Vietnam Academy of Science and Technology), Hanoi, Vietnam (created in Nov. 2006)
STI ..... SpaceTech International (since 2004, Immenstaad, Germany)
STIB ..... Stratosphere Troposphere Interactions and the Biosphere (Program)
STICS ..... Satellite / Terrestrial Integrated Mobile Communication System
STIS ..... Space Telescope Imaging Spectrograph (new Hubble sensor since Feb. 1997)
STJ ..... Superconducting Tunnel Junction
STK ..... Satellite Tool Kit (a physics−based software package from Analytical Graphics, Inc. that allows engineers and scientists to perform complex analysis of land, sea, air, and space assets, and share results in one integrated solution)
STL−1 ..... Space Tissue Loss−1 (Shuttle experiment)
STOIC ..... Stratospheric Ozone Intercomparison Campaign
STORM−FEST . Stormscale Operational and Research Meteorology − Fronts Experiment Systems Test (campaign)

7352) "Simulating space in Göttingen," DLR, Oct. 27, 2011, URL: http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid−10081/151_read−1792/year−2011/

STP ..... Space Test Program [of DoD, the USAF manages STP; As of 2001, STP has flown more than 420 experiments on more than 130 missions (STEP, POAM−III on SPOT−4, FORTE, REX−II, ARGOS are some current missions of STP)]. − STP's predecessor, the SESP (Space Experiments Support Program), launched its first mission in June of 1967. Today the STP is managed under the Air Force's Space and Missile Systems Center (SMC) Advanced Systems and Development Directorate (SMC/AD). [7353)]

STP ..... Solar Terrestrial Probes (NASA program with such missions as TIMED, SOLAR−B, STEREO, MMS)

STP ..... Solar Thermal Propulsion

STPSat−1 ..... Space Test Program Satellite−1 (of DoD)

STP−1 ..... Space Test Payload−1 (Shuttle)

STRAT ..... Stratospheric Tracers of Atmospheric Transport (campaign)

STREAM ..... Stratosphere and Troposphere Experiments by Aircraft Measurements (campaign)

STRS ..... Space Telecommunications Radio System − a NASA open architecture program for SDR (Software Defined Radio)

STS ..... Space Transport System (Shuttle)

STSat−1 ..... Science and Technology Satellite (of KAIST/SatReC, Korea)

STSI ..... Space Telescope Science Institute (Baltimore, MD, since 1981), also referred to as **STScI**. STScI is operating the science data centerof the Hubble Space Telescope. In the future, STScI will also be responsible for JWST science and mission operations, as well as for JWST ground station development. Note: STSI is managed by AURA (Association of Universities for Astronomy Research) under contract to NASA.
STScI is expanding the frontiers of space astronomy by hosting the science operations center of the Hubble Space Telescope, the science and operations center for the James Webb Space Telescope, and the science operations center for the future Nancy Grace Roman Space Telescope. STScI also houses the Barbara A. Mikulski Archive for Space Telescopes (MAST) which is a NASA−funded project to support and provide to the astronomical community a variety of astronomical data archives, and is the data repository for the Hubble, Webb, Kepler, K2, TESS missions and more.

STSP ..... Solar Terrestrial Science Program (ESA). STSP comprises the SOHO and CLUSTER missions

STSS ..... Space Tracking and Surveillance System (a program of the US DoD). STSS will be a constellation of satellites with both missile warning and tracking capability. When the constellation is fully deployed, STSS will provide stereo (two−satellite) coverage for determining target position information. STSS is being designed for an operational capability after 2012.

SUCCESS ..... Subsonic aircraft: Contrail and Clouds Effects Special Study (campaign)

SUMMiT ..... Sandia Ultra−planar Multi−level MEMS Technology (a MEMS fabrication process developed at Sandia National Laboratories, Albuquerque, NM)

SunSpace ..... SunSpace and Information Systems (Pty) Ltd. is a commercial affiliate company of Stellenbosch University, Stellenbosch, South Africa (since 2000). SunSpace developed SumbandilatSat.

SUNY ..... State University of New York (Albany, Binghamton, Brockport, Buffalo, Stony Brook, etc.)

7353) Barbara Manganis Braun, Sam Myers Sims, James McLeroy, Ben Brining, "Breaking (Space) Barriers for 50 Years: The Past, Present, and Future of the DoD Space Test Program," Proceedings of the 31st Annual AIAA/USU Conference on Small Satellites, Logan UT, USA, Aug. 5−10, 2017, paper: SSC17−X−02, URL: http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=3668&context=smallsat

SUPARCO ..... Space and Upper Atmosphere Research Commission (Karachi, Pakistan)
SuperDARN .... Super Dual Auroral Radar Network (an international mostly ground–based distributed radar network for studying the Earth's upper atmosphere, ionosphere, and connection into space). Super DARN consists of twenty 16 element phased array antennas at both the northern and southern Polar Regions. They operate in the HF band between 8 and 20 MHz and are used to monitor polar convection by measuring coherent scatter echoes from irregularities in the ionosphere. – The TIMED mission of NASA and the CLUSTER mission of ESA are also contributors to SuperDARN. Coordinated observations since 1993.
SuperMOCA .... Space Project Mission Operations Control Architecture (a NASA program)
SURFSAT–1 ... Summer Undergraduate Research Fellowship Satellite (NASA/JPL)
SUVE ..... Solar Ultraviolet Experiment (Shuttle experiment)
SVAT ..... Soil–Vegetation–Atmosphere Transfer (models)
SVFE ..... Shuttle Vibration Forces Experiment (Shuttle payload on STS–90 and STS–96)
SVGA ..... Super Video Graphics Adapter
SVHS ..... Super Video Home System (a tape recorder system)
SVI ..... Spectral Vegetation Index
SVLBI ..... Space – Very Long Baseline Interferometry (conducted from satellites). SVLBI is an aperture synthesis technique utilizing an array of radio telescopes which is composed of ground telescopes and space orbiting telescopes. It can achieve much higher resolution than the ground–only VLBI.
SVM ..... Support Vector Machine. SVMs represent a new generation learning system based on recent advances in statistical learning theory. SVMs deliver state–of–the–art performance in real–world applications. The SVM technology has found broad application in general machine learning and classification tasks as well as onboard remote sensing.
SVN ..... Satellite Vehicle NAVSTAR (a GPS series numbering system)
SVS ..... Space Vision System (Shuttle camera system for ISS assembly)
SWADE ..... Surface Wave Dynamics Experiment (campaign)
SWAS ..... Submillimeter Wave Astronomy Satellite (NASA/GSFC)
SWE ..... Snow Water Equivalence
SWE ..... Space Weather (ESA)
SWF ..... Secure World Foundation. SWF is an endowed, private operating foundation that promotes cooperative solutions for space sustainability and the peaceful uses of outer space. The Foundation acts as a research body, convener and facilitator to promote key space security and other space related topics and to examine their influence on governance and international development. [7354)]
SWENET ..... Space Weather European Network [an ESA program, started its operations in the spring of 2006, for SSA (Space Situational Awareness) services]. As of 2012 opening of SWE portal.
SWH ..... Significant Wave Height (altimetry)
Swift ..... A NASA astronomy mission (a multi–wavelength observatory) to study GRBs (Gamma–Ray Burst)
SWIMSAT ..... Surface Waves Investigation and Monitoring from SATellite (a French proposal submitted to ESA in Oct. 2001)
SWIR ..... Short Wave Infrared (spectrum, from about 1.3 μm to 3 μm)
SWOT ..... Surface Water Ocean Topography (a wide swath altimetry mission of NASA)
SWPC ..... Space Weather Prediction Center, NOAA facility in Boulder, CO, USA

7354) https://swfound.org/about–us/who–we–are/

SwRI ..... Southwest Research Institute (San Antonio, Texas, an independent, nonprofit, applied research and development organization with more than 2,700 employees)
SWUIS ..... Southwest Ultraviolet Imaging System (Shuttle payload)
System F6 ..... A DARPA program called "fractionated spacecraft". F6 stands for: future, fast, flexible, fractionated, and free flying. The objective is to create a "self−forming network of spacecraft nodes" that together act like a single satellite.
SZ ..... Shenzhou (divine ship). The Chinese Shenzhou program is a manned spacecraft project which started in 1992 (first manned flight Oct. 15, 2003). Four unmanned missions took place: SZ−1 (launch Nov. 20, 1999); SZ−2 (launch Jan. 9, 2001); SZ−3 (launch March 25, 2002); SZ−4 (launch Dec. 29, 2002).
SZA ..... Solar Zenith Angle (SZA is the altitude of the sun, the angle between the horizon and the centre of the sun's disc)

T

TACAN ..... Tactical Air Communication and Navigation System (a navigation aid, primary Shuttle navigation device for landing, TACAN navigation is provided for Shuttle within 300 miles of the landing site)
TACCAR ..... Time−Averaged Clutter−Coherent Airborne Radar [a radar technique developed at MIT/LL in the early 1950s (to automatically compensate for the Doppler shift of the clutter echo)]
TADT ..... Telemetry Aided Doppler Tracking (developed at JHU/APL). The technique performs radiometric Doppler navigation in deep space without the use of coherency. The technique enables completely independent and modular receiver and transmitter development, and highly integrated avionics architecture, leading to significant cost savings for some mission profiles. TADT was first deployed as a demonstration on the NASA TIMED Mission, designed, built, and operated by JHU/APL.
TAI ..... International Atomic Time (standard). A time scale calculated at the BIPM (Bureau International des Poids et Mesures) using, in 2000, data from some two hundred atomic clocks in over fifty national laboratories. The scale unit of TAI is kept as close as possible to the SI second by using data from those national laboratories which maintain the best primary caesium or cesium (Cs) standards.
TAMEX ..... Taiwan Area Mesoscale Experiment (campaign)
TANGO ..... Telecommunications Advanced Networks for GMES Operations [an ESA project, led by Astrium, to integrate satellite communication services for the GMES (Global Monitoring for Environment and Security) community]
TANS ..... Trimble Advanced Navigation Sensor ('TANS Vector' is a solid state GPS attitude−determination and position−location system)
TAO ..... Terrestrial, Atmospheric and Oceanic Sciences (bi−monthly academic journal of Taiwan
TAO ..... Tropical Atmospheric Ocean (TOGA campaign)
TAS ..... Technology Applications and Science (Shuttle payload)
TAS ..... Thales Alenia Space. TAS is a Joint Venture between Thales (67%) and Leonardo−Finmeccanica (33%). TAS is a global technology leader for the Defence & Security and the Aerospace & Transport markets.
TAS−E ..... Thales Alenia Space, Espania (a subsidiary of TAS, since 1988)
TAS−F ..... Thales Alenia Space, France
TAS−I ..... Thales Alenia Space, Italia
TAS−ETCA .... Thales Alenia Space, Belgium
TAS ..... Thallium Arsenic Selenide (Tl_3AsSe_3)
TBD ..... To be defined (or: To be determined)

TCCON ..... Total Carbon Column Observing Network [(a global network of ground−based FTS (Fourier Transform Spectrometers) that record direct solar spectra in the near−infrared].

TCIPO ..... TOGA/COARE International Project Office (at UCAR, Boulder, CO)

TCM ..... Trellis Coded Modulation (a modulation scheme which allows highly efficient transmission of information over band−limited channels)

TCP/IP ..... Transmission Control Protocol/Internet Protocol (first introduced in 1969). Over the years, TCP/IP has become the dominant approach to linking computers around the world. TCP/IP represents a communication framework for other protocols such as: email, FTP, HTTP, SSH (Secure Shell), voice over IP, other multimedia protocols, teleoperation of remote systems.
Note: the TCP/IP represents two layers of protocol: the TCP part and the lower level IP part. IP deals with how the data gets routed around the network. TCP deals with making sure that all the packets arrive and are in the correct order. TCP implies a two−way connection and a higher level of communications overhead to assure that all the packets arrive and are in the correct order.

TCS ..... Thomson−CSF Semiconducteurs Spécifiques, Orsay, France. Note: In Dec. 2000, Thomson CSF changed its name to **THALES Group**

TCS ..... Trajectory Control Sensor (Shuttle payload)

TCXO ..... Temperature Controlled Crystal Oscillator

T&DR ..... Tracking and Data Relay (NOAA)

T−DAB ..... Terrestrial − Digital Audio Broadcast

TDI ..... Time Delay Integration (a cumulative exposure concept for CCD imaging which integrates a pixel's electron charges to suppress the readout noise) observation mode

TDL ..... Tunable Diode Laser (spectrometer; TDLs are suited for detection of trace gases by optical absorption)

TDLAS ..... Tunable Diode Laser Absorption Spectrometer

TDMA ..... Time Division Multiple Access (modulation scheme)

TDRSS ..... Tracking and Data Relay Satellite System (NASA)

TEA ..... Transverse Excitation Atmospheric (pressure) laser

TEAMS ..... Technology Experiments Advancing Missions in Space (Shutte)

TEC ..... Thermoelectric Cooler

TEC ..... Total Electron Content (of ionosphere)

Technion ..... Israel Institute of Technology, Haifa, Israel

TEDS Radio .... TETRA Enhanced Data Service Radio

TEKES ..... National Technology Agency of Finland (Helsinki). TEKES is the main public financing and expert organization for research and technological development in Finland.

Telespazio ..... Italian space company (since 1962) with HQ in Rome. Telespazio maintains a space center in Fucino, Italy for civilian uses.

TEMISAT ..... Telespazio Micro Satellite (see E.8)

TeO_2 ..... Tellurium dioxide

TerraServer ..... A joint venture of Aerial Images Inc., Raleigh, NC; Microsoft Corp., Redmond, WA; Compaq Computer Corp., Houston, TX; and Eastman Kodak Co., Rochester, NY. TerraServer is a commercial service of spaceborne and airborne imagery provision via internet. The imagery offered comes from a variety of sources (commercial and institutional).

TERRIERS .... Tomographic Experiment using Radioactive Recombinative Ionospheric EUV (STEDI mission, P.26.2)

TERS ..... Tropical Earth Resources Satellite [a joint program conceived by the Netherlands (NIVR) and Indonesia (LAPAN) in 1985, the program got stalled after phase A because of a lack of funds]

TERSS ..... Tasmanian Earth Resources Satellite Station (Hobart, Australia)

TES ..... Technology Experiment Satellite (ISRO) with a mass of 1108 kg in sun−synchronous orbit (launch Oct. 22. 2001 from SHAR, India). TES carries experiments in the fields of Earth observation and communications. Imagery of 1 m spatial resolution is obtained.
TES ..... Thermal Energy Storage (Shuttle payload)
Tesat−Spacecom Tesat−Spacecom GmbH, Backnang, Germany; builder of satellite communication subsystems and payloads (TWTAs, SILEX, LCTs, etc.). TESAT is the former Bosch Satcom, former Bosch Telecom, former ANT Nachrichtentechnik, former AEG Telefunken, former AEG Fernmeldetechnik (1949). — Now, Tesat−Spacecom is a subsidiary of Airbus Defence and Space.
TESEO ..... Treaty Enforcement Services using Earth Observation (ESA program)
TES ..... Transition−Edge Sensor (superconducting TES technology represents a significant advance in infrared imaging)
TETRA ..... Terrestrial Trunked Radio, (the first truly open standard for the digital mobile radio system)
TFC ..... Thin Film on CMOS (technology)
TFOV ..... Total Field of View
TGARSS ..... Transactions on Geoscience and Remote Sensing (IEEE publication)
TGDF ..... Turbulent Gas−Jet Diffusion Flames (Shuttle Experiment)
TGF ..... Terrestrial Gamma−ray Flash (a new type of transient event in Earth's atmosphere above thunderstorms, first recorded from the Compton Gamma Ray Observatory (CGRO) satellite of NASA in 1994)
Thales−SESO .. Thales−Société Européenne de Systèmes Optiques, (Aix en Provence, France). SESO was aqcuired by Thales in 2010.
THEA ..... Thousand Element Array [an international project; a phased−array ground−based radio telescope demonstrator with 256 broadband receiving elements in preparation for SKA (Square Kilometer Array), designed and located at Astron, Dwingeloo, The Netherlands]
THEOS ..... Thailand Earth Observation System (an optical imaging S/C)
TID ..... Total Ionizing Dose (of an electronic component, measured in kRad). TID refers to the material demage caused by ionizing radiation sources. Quantified by deposited energy per mass for a given material with units of Gray (SI) or Rad.
TIFF ..... Tagged Image File Format (a raster format in pixel representation used for scanned images)
TIFR ..... TATA Institute of Fundamental Research, Mumbai (Bombay), India
TIMED ..... Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics (C.31)
TiN ..... Titanium nitride
TIP ..... TIROS (or Telemetry) Information Processor (on−board POES S/C, also a downlink data stream of NOAA S/C)
TIPPs ..... Trans−Ionospheric Pulse Pairs (These strange signals, observed on ALEXIS, are the most intense radio sources from Earth which can be much stronger than typical lightning)
TIR ..... Thermal Infrared (spectrum, from 6 μm to about 14 μm)
TIRA ..... Tracking and Imaging Radar. TIRA is an experimental facility for the development and investigation of radar techniques for the detection and reconnaissance of objects in space (provides ad hoc orbit information on non−cooperative targets) . The TIRA system acquires radar data at 22.5 cm (L−band) and 1.8 cm (Ku−band) wavelengths. It is located at the FGAN−FHR site, in Wachtberg near Bonn, Germany (50.6166°N 7.1296°E). TIRA is operated by FGAN. TIRA has a parabolic dish antenna of 34 m diameter, housed in a 47 m diameter radome. The antenna can be turned at a speed of 24°/s (in azimuth). [7355)]

7355) "Space observation radar TIRA," Fraunhofer−FHR, URL: http://www.fhr.fraunhofer.de/en/the_institute/technical−equipment/Space−observation−radar−TIRA.html

Apart from debris tracking campaigns, the radar also conducts regular 'beam park' experiments, where the beam is pointed in a fixed direction for 24 hours, so that it scans 360° in a narrow strip of the sky during a full Earth rotation, detecting objects that move through the beam. In such experiments, TIRA can detect debris and determine coarse orbit information for objects of diameters down to 2 cm at 1000 km range.

TIROS ..... Television and Infrared Observation Satellite (US Environmental/Meteorological Remote Sensing Program; TIROS 1–10 = 1st generation, ESSA 1–9 = 2nd generation, ITOS (TIROS–M) = 3rd generation,)

TIROS–N ..... TIROS–NOAA (4th generation TIROS satellite series, starting with NOAA–6, –7, –8, etc.)

TKSC ..... Tsukuba Space Center, located Tsukuba Science City, Japan (since 1972)

TLD ..... Thermoluminescent Dosimeter (Shuttle payload)

TLE ..... Transient Luminous Event (such as lightning)

TLE ..... Two Line Elements (used for early orbit determination)

TLM ..... Telemetry (also abbreviated as TM)

TMA ..... Three Mirror Anastigmatic (telescope off–axis design method). Note: the term 'anastigmatic' refers to lenses that are able to form approximately point images of target (object) points.

TMIBD ..... Thermocapillary Migration and Interaction of Bubbles and Droplets (Spacelab experiment)

TMIP ..... TeleMedicine Instrumentation Pack (Shuttle payload)

TMSAT ..... Thai MicroSatellite, was renamed to **Thai–Paht–1** (F.62.15)

TMT ..... Thirty–Meter Telescope [a collaborative PPP project of CalTech, the University of California, AURA (Association of Universities for Research in Astronomy), and ACURA (Association of Canadian Universities for Research in Astronomy)]. The TMT is a ground–based facility, the telescope design is segmented (492 hexagonal–shaped mirror segments), operations are planned to start in 2016. Note: The TMT's AO (Adaptive Optics) system was successfully tested and is ready to become actual hardware as of May 2009. The AO component, known as the Tip–Tilt Stage, will work in tandem with a deformable mirror to correct for the blurring of Earth's atmosphere.

TNC ..... Terminal Node Controller (a communication concept first developed by the amateur radio community in 1980).

TNO/FEL ..... Netherlands Organization for Applied Scientific Research/Physics and Electronics Laboratory (The Hague and Delft, The Netherlands)

TNO/TPD ..... TNO/TPD (Delft) is one of 14 institutes of TNO in the field of optical instrumentation. Note: As of 2005, TNO/TPD was renamed "TNO Science and Industry"

TNSC ..... Tanegashima Space Center (JAXA's launch site at Tanegashima Island, Japan, located at 30.4° N, 131.0° E)

TOA ..... Top–of–Atmosphere

TOF ..... Time–of–Flight (measurement)

TOGA ..... Tropical Oceans and Global Atmosphere Experiment (Program)

TOGA/COARE . Tropical Oceans and Global Atmosphere Experiment / Coupled Ocean Atmosphere Response Experiment

TOGA/TAO .... TOGA/Tropical Atmosphere–Ocean (array of wind and upper ocean thermistor chain moorings in the Tropical Pacific)

TOGA/WOCE .. TOGA/World Ocean Circulation Experiment

TOMS ..... NASA missions (C.32)

TOPEX/Poseidon Topography Experiment for Ocean Circulation (NASA/CNES EO Mission)

TOPS ..... Terrain Observation with Progressive Scan (a novel SAR operations mode based on ScanSAR) Note: the terms TOPS and SAR is simply contracted to **TOPSAR**
TOS ..... The Oceanography Society (USA, since 1988)
TOS ..... TIROS Operational System (NOAA)
TOVS ..... TIROS Operational Vertical Sounder (NOAA, a three instrument system consisting of : HIRS−2; SSU; and the MSU, TOVS data since 1979); Note: ATOVS = Advanced TOVS (a NOAA/NESDIS processing system)
TPCE ..... Tank Pressure Control Equipment (Shuttle payload)
TPF ..... Terrestrial Planet Finder (planned NASA mission)
TPF ..... Two Phase Flow (Shuttle payload)
TPFLEX ..... Two−Phase Fluid Loop Experiment (Shuttle payload)
TPFO ..... TOPEX/POSEIDON Follow−On (mission, was renamed to Jason)
T−POD ..... Tokyo − Picosatellite Orbital Deployer (a smallsat deployer system developed by ISSL of the University of Tokyo, Japan)
TRAC ..... Triangular Rollable And Collapsible) mast, [a deployable boom concept invented and developed at AFRL (Air Force Research Laboratory)]
TRACE−A ..... Transport and Atmospheric Chemistry near the Equator − Atlantic (campaign)
TRAGEX ..... Trace Gas Exchange: Mid−Latitude Terrestrial Ecosystems and Atmosphere (IGBP/IGAC program)
TRANSHAB .... An inflatable system NASA is considering for use on the ISS starting in 2004
TREE ..... Tropical Rain−Forest Ecology Experiment (campaign)
TREES ..... Tropical Ecosystem Environment Observation by Satellites (Joint CEC, JRC and ESA program
TRIAD ..... Transit−Improved DISCOS (US Navy S/C built by APL) J.7
TriDAR ..... Triangulation +LIDAR − a 3D sensor and efficient model based tracking algorithms to provide 6 degree of freedom (6DOF) relative pose information in realtime. The active vision system for rendezvous & docking was developed by Netec and CSA (Canada) and was first flown on STS−128 in Aug. 2009
TRIO ..... Temperature RIO (Remote Input/Output), a smart sensor chip (a multiplexed ADC+other)
TRIPS ..... Tera−op, Reliable, Intelligently adaptive Processing System (a new computer architecture, developed at the University of Texas, Austin, TX). The TRIPS prototype was introduced in May 2007. TRIPS is a demonstration of a new class of processing architectures called Explicit Data Graph Execution (EDGE).
TRL ..... Technology Readiness Level. TRL is a measure to assess the maturity of evolving technologies (materials, components, devices, etc.) prior to incorporating that technology into a system or subsystem.
TRL−1 = Basic principles observed and reported
TRL−6 = System/subsystem model or prototype demonstration in a relevant environment (ground or space)
TRL−9 = Actual system "flight proven" through successful mission operations.
TRM ..... Transmit Receive Module (element of a SAR antenna)
TRMM ..... Tropical Rainfall Measuring Mission (NASA−NASDA Mission)
TRSC ..... Thailand Remote Sensing Center, Bangkok
TRW ..... Thompson, Ramo and Wooldridge [TRW Space & Electronics Group is located at Redondo Beach, CA; TRW HQs in Cleveland, OH]. Manufacturer of communication satellites (TDRS, Odyssey series), military spacecraft (STEP, AXAF, etc.), and remote sensing satellites (Lewis, EOS/PM−1, TOMS/EP, KOMPSAT−1, ROCSat−1, Aqua, Terra,

	Chandra X−Ray Observatory, etc.). Note: Los Angeles based Northrop Grumman purchased TRW in Dec. 2002.
TSAT	Transformational Communications Satellite (of DoD)
TSF	Télécoms Sans Frontières (TSF), with HQs in Pau, France, was founded in 1998 as the world's first NGO focusing on emergency−response technologies. During humanitarian crises TSF gives affected people the possibility to contact their loved ones and begin to regain control of their lives. In parallel, TSF builds rapid−response communications centers for local and international relief workers. From its early days, these activities have been the core of TSF identity, but throughout the years, TSF has evolved to adapt its solutions to support vulnerable groups in a wide range of rapid−onset disasters and complex humanitarian crises. [7356]
TSI	Total Solar Irradiance
TSIM	Total Solar Irradiance Mission
TSLC	Taiyuan Satellite Launch Center (China)
TsNIIMASH	Central Research Institute of Machine Building, Korelev (Moscow Region), Russia (launch vehicle provider)
TsSKB−Progress	the Russian acronym for "Central Specialized Design Bureau Progress," Samara Space Center (on the Volga River, 1000 km southeast of Moscow), builder of Resurs−F (and Resurs−DK) satellite series. Also builder of the famous Soyuz rocket series.
TSS−1R	Tethered Satellite System (ASI payload on Shuttle)
TsUP	Russian MCC (Mission Control Center) near Moscow. TsUP has controlled the Russian Manned Mission Program since about 1970 (including MIR, ISS, etc. as well as normal EO missions).
TT&C	Telemetry, Tracking & Command (Data for S/C Operations)
TTE	Time−Triggered Ethernet. TTE is based on the well−established 802.3 Ethernet Standard from which it inherited PHY layer and MAC frame format as a baseline for functionality. Two additional standards describe other crucial aspects of TTE: 1) ARINC 664 P7 which introduces concept of message exchange using virtual links (VLs) and provides description of Rate Constrain (RC) traffic class. 2)SAE AS6802 which defines mechanism of time synchronization between all network nodes and introduces Time Triggered (TT) traffic class. [7357] TTE is considered as a successor of the well−known avionics bus MIL−STD−1533B.
TTFM	Two−Tone Frequency Modulation (a measurement technique for trace gases)
TTL	Transistor−Transistor Logic (semiconductor technology of the 1960s and 1970s − the microprocessor revolution began in 1973)
TUB	Technical University of Berlin, Germany
TUBSAT	Technical University of Berlin Satellite (P.31)
TÜBITAK UZAY	TUBITAK−UZAY (Scientific and Technological Research Council of Turkey − Space Technologies Research Institute), Ankara, Turkey (since 1984). In 2206, the former BILTEN was renamed to UZAY (Space Technologies Research Institute). TÜBITAK itself was founded in 1963; it is the leading agency for management, funding and conduct of research in Turkey.
TUD	Technical University of Denmark (Lyngby, Denmark)
TUFI	Toughened Uni−Piece Fibrous Insulation (Shuttle payload)
TUI	Tethers Unlimited Inc., Bothell,WA, USA (since 1994)
TUK	Turk Uzay Kurumu (Turkish Space Agency, since 2004)

7356) https://www.tsfi.org/en/who−are−we

7357) Tomasz Szewczyk, Farid Guettache, Vangelis Kollias, Cristina Plettner, Arne Schramm, Erik Stallkamp, "Overview of activities involving Time Triggered Ethernet technology carried out by ESA ESTEC," Proceedings of DASIA (DAta Systems In Aerospace) 2016, Tallinn, Estonia, 10–12 May 2016 (ESA SP−736, August 2016)

TVA ..... Tennessee Valley Authority (USA)
TWSTFT ..... Two−Way Satellite Time and Frequency Transfer (an accurate time measurement technique)
TWTA ..... Traveling Wave Tube Amplifier (communication, amplification of a microwave frequency)
TX/RX ..... Transmitter/Receiver (or tranmit/receive)
Tyvak ..... Tyvak Nanosatellite Systems Inc. A small business company (nanosatellite and microsatellite services) in Irvine, CA, USA (since 2011).

U

UAE ..... United Arab Emirates. UAE is located in the Southeast of the Arabian Peninsula, bordering Oman and Saudi Arabia. In December 1971, the UAE became a federation of six emirates − Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al−Quwain, and Fujairah, while the seventh emirate, Ras Al Khaimah, joined the federation in 1972. The capital city is Abu Dhabi, located in the largest and wealthiest of the seven emirates.
UAESA ..... United Arab Emirates Space Agency. UAESA is a federal agency that was created under Federal Law by Decree No. 1 of 2014. The space sector includes all projects, activities and programs related to outer space.
UAH ..... University of Alabama in Huntsville, AL
UARP ..... Upper Atmospheric Research Program (NASA)
UARS ..... Upper Atmosphere Research Satellite (NASA satellite, launch: Sept. 1991) C.35
UART ..... Universal Asynchronous Receiver/Transmitter
UAS ..... Unmanned Aircraft System. A UAS is an unmanned aircraft and the equipment to control it remotely.
UAV ..... Unmanned Aerial Vehicle (PERSEUS, CONDOR, etc.)
UC ..... University of California [a nine campus university across the state, UCLA (Los Angeles), UCB (Berkeley), UCSD (San Diego), UCSB (Santa Barbara), UCI (Irvine), UCR (Riverside), UCSC (Santa Cruz), UCD (Davis), etc.]
UCAR ..... University Corporation for Atmospheric Research (Boulder, CO, UCAR is sponsored by NSF − there are over 60 member institutions in UCAR)
UCB/SSL ..... University of California, Berkeley/Space Sciences Laboratory (since 1959)
UCCS ..... University of Colorado at Colorado Springs
UCL ..... University College London (UK)
UCLA ..... University of California, Los Angeles
UDP/IP ..... User Datagram Protocol/Internet Protocol. Note: UDP/IP does not need any handshaking to transfer data. TCP/IP requires bi−directional handshaking prior to data transfer.
UFO ..... UHF Follow−On (US DoD communication satellite series for tactical communications). The constellation, consisting of eight active spacecraft plus an in−orbit spare, supports the Navy's global communications network, serving ships at sea and a variety of other US military fixed and mobile terminals.
UHB ..... User Home Base
UHECRs ..... Ultrahigh Energy Cosmic Rays
UHF ..... Ultra High Frequency (300 − 3000 MHz band)
UHMWPE ..... Ultra High Molecular Weight Polyethylene (a very tough fabric)
UIT ..... Ultraviolet Imaging Telescope (part of ASTRO−1 payload on Shuttle)
UIT ..... Union Internationale des Télécommunications
UKAEA ..... United Kingdom Atomic Energy Authority
UKDoE ..... United Kingdom Department of the Environment

UKMO ..... United Kingdom Meteorological Office (same as BMO, HQs and Hadley Centre for Climate Prediction & Research are located in Bracknell, Remote Sensing Instrumentation branch in Farnborough)
UKS ..... United Kingdom Subsatellite (S/C of the AMPTE mission, M.4.2)
UKSA ..... United Kingdom Space Agency (since April 1, 2010 – up to this point UK space policy has been split between government departments). UKSA is replacing the former BNSC (British National Space Centre).
ULA ..... United Launch Alliance (since Dec. 2006). ULA is a joint venture between Boeing and Lockheed Martin that operates space launch systems using the Atlas V, Delta II, and Delta IV. – The newest versions of the Delta and Atlas rockets – known as EELV's (Evolved Expendable Launch Vehicles) have had nearly flawless records of success since being introduced some dozen years ago by the companies individually, before the ULA merger.
ULE® ..... Ultra Low Expansion (glass produced by Corning, with a low coefficient of thermal expansion)
ULF ..... Ultra Low Frequency. The designation ULF usually refers to waves with frequencies less than 1 Hz. Waves with frequencies in the mHz range have scale sizes comparable to the size of Earth's magnetosphere and are therefore strongly affected by the magnetospheric structure.
ULF ..... Utility and Logistics Flight (Shuttle missions to ISS)
ULIRGs ..... Ultra–Luminous IR Galaxies
ULX ..... Ultra–Luminous X–ray source (black hole or pulsar)
UMRR ..... Universal Medium Range Radar
UMTS ..... Universal Mobile Telecommunications System (standard, 3rd generation system, defined in Europe)
UNAM ..... Universidad Nacional Autónoma de México, Mexico City
UNAM–CE .... Universidad Nacional Autónoma de México – Centro de Ecologica, Mexico
UNAM–IG .... Universidad Nacional Autónoma de México – Institoto de Geologica
UNAVCO ..... University Navstar Consortium (a US Earth sciences community initiative to foster GPS applications in particular in the area of surveying). UNAVCO is located in Boulder, CO, a university–governed non–profit consortium supporting geoscience research for the US National Science Foundation and NASA. UNAVCO maintains more than 1500 continuously operating GNSS reference stations around the globe.
UNCED ..... United Nations Conference on Environment & Development
UNDP ..... United Nations Development Programme
UNAVCO ..... University NAVSTAR Consortium (USA)
UNCOPUOS–STSC UN Committee on the Peaceful Uses of Outer Space–Scientific and Technical Subcommittee
UNEP ..... United Nations Environmental Programme (since 1972)
UNEP/GRID ... UNEP Global Resource Information Database
UNESCAP ..... United Nations Economic and Social Commission for Asia and the Pacific, Bangkok, Thailand
UNESCO ..... United Nations Educational Scientific and Cultural Organization (based in Paris, France)
UnESS ..... University Earth System Science (a NASA initiative with the objective to involve the student community in Earth science projects)
UNEX ..... University–class Explorer [(mission) – A NASA program supporting university–designed/developed missions. The UNEX program is designed to provide frequent flight opportunities for highly focused and relatively inexpensive science missions whose total cost to NASA is limited to $13 million. The program is managed by NASA/GSFC.]. The first UNEX mission to orbit was CHIPSat (launch Jan. 13, 2003), a microsatellite of UCB (University of California at Berkeley).

UNFCCC ..... United Nations Framework Convention on Climate Change (Kyoto Protocol, Copenhagen Conference), established in 1994.

UNFCCC/COP21 United Nations Framework Convention on Climate Change/Conference of Parties−21 (Paris, Nov. 30 − Dec. 11, 2015). To limit the increase in the globally average temperatures to less than 2°C above pre−industrial levels, the 21st session of the Conference of the Parties (COP21) of the UNFCCC implemented the Paris Agreement, an ambitious global effort to reduce GHG (Greenhouse Gas) emission. Parties to the 2015 Paris Agreement defined nationally determined contributions (NDCs) to a global GHG emissions reduction effort. [7358)]

UNH ..... University of New Hampshire, Durham, NH

UNISEC ..... University Space Engineering Consortium (since 2002), a non−profit Japanese organization with the objective to support practical space development activities in universities and colleges

UNISPACE ..... United Nations Conference on the Exploration of the Committee on the Peaceful Uses of Outer Space (UNISPACE−III took place in Vienna, Austria (July 19−30, 1999 − the first two UNISPACE conferences were held in 1968 and 1982)

United Solar .... United Solar Power Corporation of Troy, MI (called United Solar) was founded in 1990 by Energy Conversion Devices Inc. (ECD) and Canon Inc. (UNI−Solar as of 2000). Manufacturer of PV devices, developer of FTFPV (Flexible Thin−Film Photovoltatics).

UNOLS ..... University National Oceanographic Laboratory System (USA)

UNOOSA ..... United Nations Office for Outer Space Affairs (Vienna, Austria)

UNOSAT ..... UN Institute for Training and Research (UNITAR) Operational Satellite Applications Program − implemented in cooperation with the European Organization for Nuclear Research (CERN). UNOSAT is a humanitarian rapid mapping service, created in 2003, used by the UN relief and coordination agencies.

UNP ..... University Nanosatellite Program (USA, since 1998). The UNP is a partnership between the Air Force Office of Scientific Research (AFOSR), the Air Force Research Laboratory (AFRL), and the American Institute of Aeronautics and Astronautics (AIAA). The objective is to help train engineering students at US universities in satellite design, fabrication, and testing by requiring them to build the satellite themselves through the mentorship of their faculty at the university. [7359)] [7360)]

UN−REDD .... United Nations − collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries. UN−REDD was launched in 2008. The UN−REDD Program supports nationally−led REDD+ processes and promotes the informed and meaningful involvement of all stakeholders, including Indigenous Peoples and other forest−dependent communities, in national and international REDD+ implementation. [7361)]
REDD+MRV (Reducing Emissions from Deforestation and forest Degradation+Measurement, Reporting and Verification)

UNS ..... Universal Navigation System

7358) "Roadmap for implementation of a constellation architecture for monitoring carbon dioxide and methane from space," The Joint CEOS/CGMS Working Group on Climate (WGClimate)Document Reference WGCL/REP/20/1168457Version 2.3, 6March2020, URL: https://ceos.org/observations/documents/CEOS_CGMS_GHG_Constellation_Roadmap_V2.3_cleaned.pdf

7359) David Voss, Jared Clements, Kelly Cole, Melody Ford, Christopher Handy, Abbie Stovall, "Real Science, Real Education: The University Nanosat Program," Proceedings of the 25th Annual AIAA/USU Conference on Small Satellites, Logan, UT, USA, Aug. 8−11, 2011, paper: SSC11−XII−1

7360) Kelly Alexander, "University Nanosat Program," 9th Annual Spring CubeSat Developer's Workshop, Cal Poly State University, San Luis Obispo, CA, USA, April 18−20, 2012, URL: http://mstl.atl.calpoly.edu/~bklofas/Presentations/DevelopersWorkshop2012/Alexander_UNP.pdf

7361) http://www.un−redd.org/AboutUN−REDDProgramme/tabid/102613/Default.aspx

UN−SPIDER . . . United Nations − Platform for Space−based Information for Disaster Management and Emergency Response (since 2007)
UoSAT . . . . . University of Surrey Satellite (UK, F.62)
UPC . . . . . Universidad Politècnica de Catalunya, Barcelona (Spain)
UPM . . . . . Universidad Politècnica de Madrid (Spain)
UQPSK . . . . . Unbalanced Quadrature Phase−Shift Keying (technique)
URE . . . . . User Range Error (of GPS position service)
URFC . . . . . Unitized Regenerative Fuel Cell [URFC is generically a "water−based" technology for space applications (with options for S/C propulsion, power, energy storage)]
URL . . . . . Uniform Resource Locator (WWW) for 'file:', 'http:', 'news:', and 'telnet:'
Ursa . . . . . Ursa Space Systems Inc. is a US−based company (Ithaca, NY) that delivers reliable global economic intelligence. Ursa produces valuable insights for customers, derived from satellite imagery, using space−based data from radar satellites to collect information about activities on the Earth.
URSI . . . . . Union Radio Scientifique Internationale (International Union of Radio Science), Secretariat at Ghent University, Belgium
USA . . . . . United States of America
USA . . . . . United Space Alliance LLC [of Houston, TX, a joint venture of Rockwell International (now The Boeing Company) and Lockheed Martin] − USA is the NASA prime contractor for all Space Shuttle operations/management at MSFC and at KSC, since Oct. 1996)
USACE . . . . . US Army Corps of Engineers
USAF . . . . . US Air Force
USAFA . . . . . United States Air Force Academy (Colorado Springs, CO)
USAFB . . . . . US Air Force Base
USAF/PL . . . . . USAF/Phillips Laboratory, Kirtland AFB, Albuquerque, NM [part of AFRL (Air Force Research Laboratory), note: in 1998 the Phillips Laboratory was renamed: "Phillips Research Site"]
USAF/RL . . . . . USAF/Rome Laboratory, Griffiss AFB, Rome, NY [part of AFRL]
USAF/SMC . . . . . USAF/Space & Missile Systems Center (see SMC/TE)
USAKA . . . . . U.S. Army Kwajalein Atoll (launch site in the central Pacific Ocean)
USArray . . . . . United States Seismic Array (within the framework of EarthScope)
USART . . . . . Universal Synchronous/Asynchronous Receiver/Transmitter (chip)
USASMDC/ARSTRAT US Army Space and Missile Defense Command/Army Forces Strategic Command, Huntsville, AL (Redstone Arsenal)
USB . . . . . Unified S−band. Refers to the NASA and NOAA TT&C de−facto communication link standard in use (S−band on frequencies around 2.2. GHz). The system was developed at JPL combining telemetry, tracking (ranging), command, voice and TV transmission functions into a single antenna.
USB . . . . . Universal Serial Bus (connectors)
USCG . . . . . US Coast Guard
USCON−CICTUS Universidad de Sonora − Centro de Investigaciones Cientificas y Tecnologicas de la Universidad de Sonora, Hermosillo, Mexico
USDA . . . . . US Department of Agriculture
USDA/ARS . . . . . USDA/Agricultural Research Service (Beltsville, MD and Tucson, AZ)
USEF . . . . . Institute for Unmanned Space Experiment Free Flyer; USEF is of Tokyo, Japan (since 1986) USEF's organizational goal is to promote space utilization and the industrialization of space.
USEPA . . . . . US Environmental Protection Agency
USES . . . . . Universal Source Encoder for Space (a NASA developed chipset)
USFS . . . . . US Forest Service
USFWS . . . . . US Fish and Wildlife Service

USGCRP . . . . . US Global Change Research Program (since 1990). USGCRP sponsors global change research in a large number of institutions (over 300).
USGIF . . . . . United States Geospatial Intelligence Foundation (since 2003)
USGS . . . . . United States Geological Survey (the science and technology agency of the Department of the Interior, DOI; USGS was established in 1879). The mission of USGS is to provide geologic, topographic, and hydrographic information to contribute to the management of the Nation's natural resources.
USML . . . . . US Microgravity Laboratory (Shuttle payload)
USMP . . . . . US Microgravity Payload (Shuttle payload)
USN . . . . . Universal Space Network. USN is a US service provider in space operations and GNS (Ground Network Services) providing global coverage. The USN (also called SN) is composed of the TRDRS constellation and their associated ground stations, providing communication services to some of NASA's most storied spacecraft, including the ISS (International Space Station). In total, 40 NASA missions rely on the Space Network, including the Hubble Space Telescope. An average of 28 TB of information are transmitted across the network every day.
USNO . . . . . United States Naval Observatory (Washington DC, established in 1830)
USO . . . . . Ultra Stable Oscillator (onboard reference clock)
USRA . . . . . Universities Space Research Association, Columbia, MD [a nonprofit corporation organized in 1969 by NAS (National Academy of Sciences) at the request of NASA; as of 1995 there are 78 member universities]
USRP2 . . . . . Universal Software Radio Peripheral 2. USRP2 is an extremely flexible USB device that connects a PC to the RF world. It can be programmed to transmit or receive any signal which is within the frequency range and bandwidth of the radio and antennas. The USRP2 uses modular daughterboards which allow it to communicate over a wide range of frequencies. A combination of three USRP2s with different daughterboards would permit communications in all five of the amateur satellite bands.
USS . . . . . Unique Support Structure (Shuttle)
USSF . . . . . United States Space Force. The USSF is a new branch of the Armed Forces. It was established on December 20, 2019 with enactment of the Fiscal Year 2020 National Defense Authorization Act. The USSF was established within the Department of the Air Force, meaning the Secretary of the Air Force has overall responsibility for the USSF, under the guidance and direction of the Secretary of Defense. — The USSF is a military service that organizes, trains, and equips space forces in order to protect U.S. and allied interests in space and to provide space capabilities to the joint force. USSF responsibilities include developing military space professionals, acquiring military space systems, maturing the military doctrine for space power, and organizing space forces to present to our Combatant Commands. [7362)]
USSPACECOM . U.S. Space Command. The USSPACECOM was formally established on 29 August 2019 as the 11th Unified Combatant Command at the direction of the President of the United States, Donald Trump. John W. Raymond, US Air Force General, is the congressionally confirmed commander. [7363)]
USSPACECOM is a critical step that underscores the importance of the space domain and its strategic contributions to U.S. national security. The USSPACECOM establishment will accelerate the United States' space capabilities to address rapidly evolving threats to U.S. space assets and the importance of deterring potential adversaries from putting

7362) "U.S. Space Force Fact sheet," USSF, 20 December 2019, URL: https://www.spaceforce.mil/About-Us/Fact-Sheet
7363) "United States Space Command is Formally Established," Satnews Daily, 29 August 2019, URL: http://www.satnews.com/story.php?number=1658047349

critical U.S. space systems at risk. — The USSPACECOM mission is to deter aggression and conflict, defend U.S. and allied freedom of action, deliver space combat power for the Joint/Combined force, and develop joint warfighters to advance U.S. and allied interests in, from, and through the space domain.
USSPACECOM is a Geographic Combatant Command with a global Area of Responsibility defined as the area surrounding the earth at altitudes equal to or greater than 100 km above mean (average) sea level. The new command is globally integrated with the other geographic combatant commands and prepared to support its partners to meet today's threat on a global scale.
CFSCC (Combined Force Space Component Command) will plan and execute space operations through four distinct and geographically dispersed operations centers, including: the Combined Space Operations Center (CSpOC) at Vandenberg AFB, Calif.; Missile Warning Center (MWC) at Cheyenne Mountain Air Force Station, Colo.; Joint Overhead Persistent Infrared Center (JOPC) at Buckley AFB, Colo.; and Joint Navigation Warfare Center (JNWC) at Kirtland AFB, N. M. Additionally, the CFSCC will execute tactical control over globally dispersed Air Force, Army, and Navy space units that command satellites in every orbital regime. [7364)]

USSR . . . . . Union of Soviet Socialist Republics (former)

USSS . . . . . University Space Systems Symposium (a forum for Japanese and US universities to develop and extend collaborative projects involving the design, fabrication, and operation of aerospace systems, USSS started in 1998)

USSTRATCOM . United States Strategic Command (one of nine Unified Combatant Commands of DoD).

US TRANSCOM U.S. Transportation Command

USU/SDL . . . . . Utah State University / Space Dynamics Laboratory (Logan, UT, Bedford, MA, and Albuquerque, NM). SDL is a non−profit organization owned by USU.

USWRP . . . . . US Weather Research Program

UTA . . . . . University of Texas at Austin

UTA/CSR . . . . . UTA/Center for Space Research (since 1981)

UTC . . . . . Universal Time Coordinated (since 1972)

U−TEP . . . . . Urban −Thematic Exploitation Platform. An ESA online TEP (Thematic Exploitation Platform) as of November 2016. [7365)]
The black−on−white GUF (Global Urban Footprint) map is a portrait of the human presence on Earth in 2012, to a maximum resolution of 12 m, covering even single houses.

UTIAS/SFL . . . . . University of Toronto, Institute for Aerospace Studies/Space Flight Laboratory, Toronto, Canada

UTIAS/MSTC . . University of Toronto, Institute for Aerospace studies / Microsatellite Science and Technology Center, Toronto, Canada (since 2010, funding was provided by the Canada Foundation for Innovation and the Ontario Ministry of Research and Innovation) [7366)]

UTJ . . . . . Ultra Triple Junction (solar cells of SpectroLab with an efficiency of 28.3%)

7364) "Combined Force Space Component Command Established at Vandenberg AFB," Space Daily, 4 September 2019, URL: http://www.spacedaily.com/reports/Combined_Force_Space_Component_Command_Established_at_Vandenberg_AFB_999.html

7365) "New map offers precise snapshot of human life on Earth," ESA, Nov. 18, 2016, URL: http://m.esa.int/Our_Activities/Observing_the_Earth/New_map_offers_precise_snapshot_of_human_life_on_Earth

7366) Robert E. Zee, "Microsatellite Science and Technology Center: Canada's Center for Microspace Innovation," Proceedings of ASTRO 2010, 15th CASI (Canadian Aeronautics and Space Institute) Conference, Toronto, Canada, May 4−6, 2010, URL: ftp://casi:ASTRO2010@astroconference.ca/../Papers/052_Zee_ASTRO2010.pdf

UTM ..... Universal Transverse Mercator (coordinate reference system for large−scale maps)
UV ..... Ultra Violet (spectral range from 0.01 − 0.38 μm)
UVCS ..... Ultraviolet Coronal Spectrometer (a SAO instrument flown on the SPARTAN−201 series)
UVPI ..... Ultraviolet Plume Instrument (Shuttle experiment)
UVSTAR ..... Ultraviolet Spectrograph Telescope for Astronomical Research (Shuttle payload)
UWB ..... Ultra Wideband (involves multi−octave frequency coverage of a sensor such as a radar system for the purpose of ground penetration). UWB radar systems use signals with a bandwidth >25% of the center frequency. − UWB data transmission standard is IEEE 802.15.3. It has very good characteristics such low power consumption, high precision ranging measurement, concealment transmission, and carrier free.

V

V−2 ..... Vengeance−2 (Vergeltung−2) a German rocket during WW2. V−2 was a liquid fuel rocket with a mass of about 12900 kg. The V−2 attack on London started in Sept. 1994. V−2 was preceded by a smaller V−1, a pilotless pulse−jet propelled flying bomb of about 2200 kg mass at launch.
VACNT ..... Vertically Aligned CNT (Carbon Nanotubes)
VAFB ..... Vandenberg Air Force Base, Vandenberg, CA
VASIMR ..... VAriable Specific Impulse Magnetoplasma Rocket (engine, a high power electric spacecraft propulsion system, capable of Isp/thrust modulation at constant power).
VAST ..... Vietnam Academy of Science and Technology (since 1975, Hanoi, Vietnam)
VBR ..... Variable Bit Rate
VBS ..... Vision Based Sensor
VCL ..... Vegetation Canopy Lidar Mission
VCM ..... Variable Coding and Modulation. VCM (Variable Coding and Modulation) and ACM (Adaptive Coding and Modulation) modes, which allow optimizing bandwidth utilization by dynamically changing transmission parameters.
VCO ..... Voltage Controlled Oscillator
VCOS ..... VLSI Chips−on−Silicon
VCR ..... Video Cassette Recorder (also: Video Color Recorder)
VCS ..... Voice Command System (Shuttle)
VCSEL ..... Vertical Cavity Surface−Emitting Laser−diode (type of semiconductor diode laser; the cavity is perpendicular to the wafer plane, thus the optical beam is guided in the vertical direction). Note: The acronym is also given as **VECSEL** (Verical External Cavity Surface Emitting Laser).
VCSI ..... Von Braun Center for Science Innovation (Huntsville, AL). A not−for−profit R&D (Research & Development) center.
VCXO ..... Voltage Controlled Crystal Oscillator (onboard clock)
VDA ..... Vapor Deposited Aluminum (an insulation layer in spacecraft design)
VDA ..... VHF Collection System Antenna (NOAA)
VDC ..... Volt Direct Current
VDES ..... VHF Data Exchange System. In 2016, **VDES** is the new and evolving ITU (International Telecommunication Union) standard to succeed AIS (Automated Information Service). [7367)]
VENTEX ..... Venting Experiment (campaign)

7367) "Technical characteristics for a VHF data exchange system in the VHF maritime mobile band — M Series Mobile, radiodetermination,amateur and related satellite services," Recommendation ITU−R M.2092−0 (10/2015), URL: https://www.itu.int/dms_pubrec/itu−r/rec/m/R−REC−M.2092−0−201510−I!!PDF−E.pdf

VERSIM ..... VLF/ELF Remote Sensing of Ionospheres and Magnetospheres. VERSIM is an international group of scientists interested in studying the behavior of the magnetosphere and ionosphere by means of ELF (300 Hz − 3 kHz) and VLF (3−30 kHz) radio waves. VERSIM was set up by IAGA/URSI in 1975.

VFT−1 ..... Visual Function Tester−1 (Shuttle experiment)

VGA ..... Video Graphics Array

VGOS ..... VLBI Global Observing System (IAU, 2015). TheVGOS will be realized in the next years and replace the legacy system eventually.

VH ..... Vertical transmit − Horizontal receive polarization

VHDL ..... VHSIC (Very High Speed Integrated Circuit) Hardware Description Language

VHF ..... Very High Frequency (30 − 300 MHz band)

VHiSSI ..... Very High Speed Serial Interface (a European Commission Framework 7 project). The VHiSSI chip integrates a complete SpaceFibre protocol engine, together with the physical layer interfaces, in a radiation tolerant chip manufactured by a European foundry.

VHS ..... Video Home System

VHTS ..... Very High Throughput Satellite

VI ..... Vegetation Index

Viking ..... Swedish satellite mission for the study of the Earth's magnetosphere, M.33

VIR ..... Visible Infrared (spectrum)

VIS ..... Visible (spectrum 0.4 − 0.7 μm)

VISTA ..... Visible and Infrared Survey Telescope for Astronomy (ESO, a 4 m aperture telescope, at the Paranal Observatory in Chile, built by a consortium of the UK, since 2009)

VITA ..... Volunteers in Technical Assistance (a humanitarian organization in Arlington, VA, USA, providing communication services on a global scale)

VITO ..... Vlaamse instelling voor technologisch onderzoek (Flemish institute for technological research), located in northern Belgium. One of its centers is the image processing/archiving center of the VEGETATION instrument on the SPOT missions.

viz. ..... Latin, a contraction of the term "videlicet," to wit; an adverb ; as follows [syn: namely, that is to say]

VLA ..... Very Large Array (USA), an aperture synthesis array, was built by the National Radio Astronomy Observatory (NRAO) near Socorro, New Mexico (USA) in a Y−shape consisting of 27 antennas.
Note: In January 2012, the VLA received a new name. It is now called the "**Karl G. Jansky Very Large Array**" to honor the founder of radio astronomy. [7368)]
Each antenna is 25 m in diameter. The data from the antennas is combined electronically to give the resolution of an antenna 36 km across. Thanks to channel 37 (band allocation from 608−614 MHz), radio astronomers keep tabs on everything from the Sun to pulsars to the lonely spaces between the stars. This particular frequency, squarely in the middle of the UHF TV broadcast band, has been reserved for radio astronomy since 1963, when astronomers successfully lobbied the FCC to keep it TV−free. [7369)]

7368) Nancy Atkinson, "Iconic Telescope Array Gets a New Name," Universe Today, Jan. 11, 2012, URL: http://www.universetoday.com/92520/iconic−telescope−array−gets−a−new−name/

7369) Bob King, "The Curious Channel 37 — Must−see TV For Radio Astronomy," Universe Today, May 1, 2013, URL: http://www.universetoday.com/101885/the−curious−channel−37−must−see−tv−for−radio−astronomy/

Figure 1626: Photo of the VLA system near Socorro, New Mexico (image credit: NRAO/AUI and NRAO)

VLBA ..... Very Long Baseline Array, USA (a continent−wide radio−telescope system, to make a direct trigonometric measurement of the distance). VLBA uses 10 radio telescopes across the continental USA and employs observatories in Saint Croix in the U.S. Virgin Islands, and Mauna Kea, Hawaii. This is effectively the longest radio interferometer in the world with a baseline of over 8,600 km and a resolution of under one milliarcsecond at 4 to 0.7 cm wavelengths. VLBA is a facility of NSF (National Science Foundation), operated under cooperative agreement by AUI (Associated Universities, Inc.).

VLBI ..... Very Long Baseline Interferometry (predominantly used in the radio astronomy and geodesy community). VLBI is used for the determination of the angular position of interplanetary probes.

VLCC ..... Visible Light Communications Consortium (since Nov. 2003). The VLCC is aiming to publicize and standardize the visible light communication technology.

VLDS ..... Very Large Data Store

VLEO ..... Very Low Earth Orbit

VLF ..... Very Low Frequency (frequency band of 10 − 30 kHz)

VLS ..... Veiculo Lancador de Satellites (Brazil's launch vehicle). Note: The first two VLS flights, in Nov. 1997 and Dec. 1998, were failures. On Aug. 22, 2003, a VLS rocket exploded on the launch pad as it was being prepared for an upcoming launch.

VLSI ..... Very Large Scale Integration (solid−state technology)

VLT ..... Very Large Telescope [of ESO (European Southern Observatory) in Chile, consisting of four telescopes (each 8.2 m in diameter), the telescopes are separately mounted and idely spaced for resolutions of up to 2 marcsec (milliarcseconds) over a FOV of about 1 arcsec, interferometric applications of VLT]. Operations of VLT started in 2002. The VLT is regarded the world's most advanced optical instrument.

VLWIR ..... Very Long Wavelength Infrared (14−30 μm)

VMEbus ..... VersaModule Eurocard bus (ISO/IEC15776 standard, 1998). A high−performance bus (co−designed by Motorola, and based on Motorola's 1981 Versa−Bus standard) for constructing versatile industrial and mil-

itary computers, where multiple memory, peripheral, and even microprocessor cards could be plugged in to a passive "rack" or "card cage" to facilitate custom system designs. Typical data transfer rate of 50 MByte/second (64 bits wide).

VMOC . . . . . Virtual Mission Operation Center (a platform independent facility of NASA/GSFC, support of distributed spacecraft command and control). VMOC is also a US intergovernmental initiative (including DoD) to exploit IP (Internet Protocol) based systems in space. – VMOC is a software based platform to incubate, mature, and transition new and relevant technologies and concepts of operations via continuous operational experimentation. The original VMOC concept began in 2000. – The VMOC capability allows cross–system queuing of dissimilar mission unique systems through the use of a common security scheme and published APIs (Application Programming Interfaces). [7370)]

VNIIEF . . . . . All–Russian Federal Nuclear Center (Moscow, since 1946)

VNIIEM . . . . . All–Russian Scientific and Research Institute of Electromechanics (Moscow; S/C builder/integrator, Meteor series, Okean series, Resurs series, GOMS, etc. also referred to as: NPP VNIIEM). Background: the enterprise was funded in 1941, in 1944 it was named "Science and Research Institute #627" or NII–627. In 1953, NII–627 was renamed to VNIIEM. In the early 1960s, VNIIEM began to develop meteorological spacecraft, using an innovative electromechanical stabilization system. – In Nov. 1992, the Istra Branch of VNIIEM separated to become an independent enterprise, NII of Electromechanics (NIIEM). Since May 1998, VNIIEM reports to the Russian Space Agency (RKA).

VNIR . . . . . Visible Near Infrared (spectral range 0.4 – 1.3 μm)

VNSC . . . . . Vietnam National Satellite Center, Hanoi, Vietnam (since 2011). VNSC is a research center under VAST (Vietnam Academy of Science and Technology).

VOC . . . . . Volatile Organic (carbon) Compounds

VoIP . . . . . Voice over IP (Internet Protocol)

VORTEX . . . . . Verification of the Origins of Rotation in Tornados Experiment (campaign)

VORTEX . . . . . Vortex Ring Transit Experiment (G–93R Shuttle payload on STS–88)

Voyager Space . . Voyager Space Holdings, a company that has acquired several space ventures, is taking a majority stake in commercial space station company NanoRacks, the two firms announced Dec. 23, 2020. [7371)]
Voyager announced it would take a majority stake in XO Markets, the parent company of NanoRacks. The companies did not disclose terms of the agreement. "Voyager is contributing capital in this transaction and future based on needs, allowing us to meet future demands," Jeff Manber, chief executive of NanoRacks, said in response to questions about the specifics of the agreement.

VOXEL . . . . . Volumetric Picture Element (a volume element, representing a value on a regular grid in 3D space). A voxel represents a single sample, or data point, on a regularly spaced, three dimensional grid.

VPN . . . . . Virtual Private Network

VRA . . . . . VHF Realtime Antenna (NOAA)

VRAM . . . . . Video RAM

VRTE . . . . . Vented Tank Resupply Experiment (Shuttle payload)

VSAT . . . . . Very Small Aperture Terminal (small ground antenna for satellite communication)

7370) Eric Miller, Phillip E. Paulsen, Michael Pasciuto, "Autonomous Satellite Operations Via Secure Virtual Mission Operations Center," Proceedings of IGARSS (IEEE International Geoscience and Remote Sensing Symposium) 2010, Honolulu, HI, USA, July 25–30, 2010, URL: http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20110006377_2011004943.pdf

7371) Jeff Foust, "Voyager Space Holdings to acquire majority stake in Nanoracks," SpaceNews, 23 December 2020, URL: https://spacenews.com/voyager–space–holdings–to–acquire–majority–stake–in–nanoracks/

VSC ..... Valencia Space Consortium, Valencia, Spain (VSC is the new home of ESA's high power radio frequency laboratory. VSC is a non−profit organization set up in 2010 by Valencia's two universities, its regional government and municipality)

VSCMG ..... Variable Speed Control Moment Gyroscope

VSE ..... Vision for Space Exploration (this represents the US civilian space effort, outlined by President George W. Bush in January 2004). VSE foresees placing permanent bases on the Earth's Moon and eventually on Mars. − A key element of NASA's VSE is the Manned Exploration Vehicle, called **Orion** (named after the constellation Orion), an advanced crew capsule design utilizing state−of−the−art technology that will succeed the Space Shuttle in transporting a new generation of human explorers to and from the International Space Station, the Moon, and eventually to Mars and beyond. On Aug. 31, 2006, NASA announced that the Lockheed Martin team was selected to design and build Orion. Note: **Orion** was initially known as **CEW** (Crew Exploration Vehicle) and renamed by NASA on August 22, 2006. [7372)]
The Orion crew vehicle will be the primary payload of the Ares I rocket designed to reach LEO for rendezvous with the International Space Station (ISS) − or an Earth Departure Stage and lunar lander. The first Orion launch with humans onboard is planned for no later than 2014.

VSOP ..... VLBI Space Observatory Program (of ISAS, Japan). VSOP−1 is a satellite launched Feb. 12, 1997 as MUSES−B. After launch the spacecraft was renamed to HALCA (Highly Advanced Laboratory for Communications and Astronomy). As of 2003, a next generation S/C is planned, called VSOP−2.

VSWR ..... Voltage Standing Wave Ratio

VT ..... Virtual Terminal

VTT ..... Technical Research Center of Finland, (Espoo, Helsinki, Finland). VTT is a contract research organization.

VUV ..... Vacuum Ultraviolet (radiation). Refers to radiation in the spectral range of $10 < \lambda < 200$ nm. Any work in this region requires evacuated equipment.

VV ..... Vertical transmit − Vertical receive polarization

VWC ..... Vegetation Water Content

VZLU A. S. .... Aeronautical Research and Test Institute (a non−profit research organization located in Prague – Letňany, Czech Republic)

W

W3C ..... World−Wide Web Consortium (since 1994)

WAAS ..... Wide Area Augmentation System (FAA). WAAS is the US space−based augmentation system that provides DGPS service over a very large geographical area (USA) by using a satellite broadcast of separate corrections for GPS clock, orbital data and ionospheric delay.

WAC ..... Wide−Angle Camera

WADGPS ..... Wide Area Differential GPS

WAIS ..... West Antarctic Ice Sheet Project (campaign)

WARC ..... World Administrative Radio Conference (of ITU)

WATS ..... Water−Vapor and Wind in Atmospheric Troposphere and Stratosphere (a proposed ESA mission as of 2001)

WAU ..... Wageningen Agricultural University, The Netherlands

WBVTR ..... Wideband Video Tape Recorder (on Landsat−1 to −3 series)

WBP ..... Water−Based Propulsion (see Glossary)

WCASP ..... World Climate Applications and Services Programme (WMO)

WCC ..... World Climate Conference (WCC−1 in 1979, WCC−2 in 1990)

7372) http://www.nasa.gov/mission_pages/exploration/mmb/orion_announcement.html

WCDMA ..... Wideband CDMA (Code Division Multiple Access). WCDMA is an ITU standard derived from Code−Division Multiple Access (CDMA); it is officially known as IMT−2000 direct spread. WCDMA is a third−generation (3G) mobile wireless technology that promises much higher data speeds to mobile and portable wireless devices than commonly offered in today's market.
WCDMP ..... World Climate Data and Monitoring Programme (WMO)
WCIRP ..... World Climate Impact Assessment and Response Strategies Programme (UNEP)
WCP ..... World Climate Program (WMO is the lead agency of WCP)
WCRP ..... World Climate Research Programme (since 1980, jointly sponsored by WMO, ICSU, and IOC)
WDC ..... World Data Center
WDCGG ..... World Data Center for Greenhouse Gases (of WMO)
WDM ..... Wavelength Division Multiplexing (optical high−rate transmission technology)
WDMA ..... Wavelength Division Multiple Access (scheme)
WEFAX ..... Weather Facsimile (NOAA broadcast service of GOES S/C; transmission of environmental data in WEFAX format to ground stations)
WENPEX ..... Western North Pacific Cloud−Radiation Experiment (campaign)
WEOS ..... Whale Ecology Observation Satellite (microsatellite of Japan)
WESTEX ..... West Coast Ship Tracks Experiment (campaign)
WEU ..... Western European Union (with HQ in Brussels; WEU has 10 member states: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal, Spain, and UK)
WFE ..... Wave Front Error (optics systems)
WFF ..... Wallops Flight Facility (of NASA/GSFC, founded in 1945 by NACA)
WFOV ..... Wide Field of View (of a sensor)
WIGOS ..... WMO Integrated Global Observing System (WIGOS is a future observing framework proposed by the WMO). The 16th World Meteorological Congress (2011) decided to implement WIGOS.
WGS84 ..... World Geodetic System − 1984 (DoD reference ellipsoid for GPS, etc. GPS positions are computed in WGS84, the system has been adopted internationally as the single worldwide datum for marine navigation)
WHRC ..... Woods Hole Research Center (Woods Hole, MA, USA)
WHOI ..... Woods Hole Oceanographic Institution, (Woods Hole, MA, USA − a marine science non−profit research facility founded in 1930)
Wi−Fi ..... Wi−Fi (Wireless Fidelity) is a trademark of the Wi−Fi Alliance for certified products based on the IEEE 802.11 standards. This certification warrants interoperability between different wireless devices. A Wi−Fi enabled device such as a PC, game console, mobile phone, MP3 player or PDA can connect to the Internet when within range of a wireless network connected to the Internet. The coverage of one or more interconnected access points is referred to as a "hotspot". The Wi−Fi technology offers the capability of setting up mesh networks.
WIGOS ..... WMO Integrated Global Observing System. WIGOS is an integrated, comprehensive, and coordinated system which is comprised of the present WMO global observing systems, in particular of the in situ and space−based components of GOS (Global Observing System), GAW (Global Atmosphere Watch), WHYCOS (WMO Hydrological Observing Systems, including the World Hydrological Cycle Observing System) and the observing component of GCW (Global Cryosphere Watch), including their surface−based and spaceborne components. [7373]

7373) "The WMO Integrated Global Observing System (WIGOS)," WMO, URL: http://www.wmo.int/pages/prog/www/wigos/index_en.html

WiMAX . . . . . Worldwide Interoperability for Microwave Access (a wireless broadband technology based on the IEEE 802.16 standard). WiMAX can operate on a point−to−point basis with about 30 Mbit/s over distances of 30 km. The future mobile WiMAX offers the full mobility of cellular networks at true broadband speeds.

WIMPs . . . . . Weakly Interacting Massive Particles. WIMPS are among the leading candidates for dark matter.

WIND . . . . . NASA/GSFC Solar−Terrestrial Mission (M.34)

WINDEX . . . . . Window Experiment (Shuttle)

WINDOS . . . . . Western Indian Ocean Study (campaign)

WISE . . . . . Wide−field Infrared Survey Explorer (a NASA MIDEX astronomy mission, all−sky survey in wavelengths at: 3.3, 4.7, 12 and 23 μm)

WISP . . . . . Winter Icing and Storms Project (campaign)

WITTEX . . . . . Water Inclination Topography and Technology Experiment (JHU/APL)

WL . . . . . Werkstofflabor (materials laboratory on Shuttle D2 mission)

WLAN . . . . . Wireless Local Area Network (RF bands are used)

WLC . . . . . White Light Coronograph (instrument flown on SPARTAN−201 series)

WMO . . . . . World Meteorological Organization (an agency of the United Nations, located in Geneva, Switzerland, since 1951). WMO promotes international cooperation to enable operational weather, climate, and hydrology activities. Major science and technical programs of WMO are: WWW (World Weather Watch), WCRP (World Climate Research Program), GAW (Global Atmosphere Watch), HWRP (Hydrology and Water Resources Program), GCOS (Global Climate Observing System), GOOS (Global Ocean Observing System). As of January 2013, the WMO membership is: 191 States and Territories.

WMSCC . . . . . World Meteorological Service Computing Center

WOCE . . . . . World Ocean Circulation Experiment (Program)

WorldDEM^{TM} . . WorldDEM^{TM} is a global DEM (Digital Elevation Model) of unprecedented quality, accuracy, and coverage. WorldDEM was made available by Airbus Defence and Space (former EADS Astrium GEO−Information Services) starting in April 2014. WorldDEM is based on data acquired by the German high−resolution radar satellites TerraSAR−X and TanDEM−X. The combined processing of these various data takes ensure the global consistency and quality of the final WorldDEM product.

WORF . . . . . Window Observational Research Facility (of ISS delivered by STS−114)

WPLTN . . . . . Western Pacific Laser Tracking Network (a ground network for SLR in the Pacific region) WPLTN coordinates the activities of SLR stations in China, Japan, Australia, and Eastern Russia.

WPAN . . . . . Wireless Personal Area Network

WPT . . . . . Wireless Power Transmission. WPT consists of converting dc power into microwave power at the transmitting end, forming the microwave power into electronically steerable microwave beams, and capturing the microwave power and converting it back into dc power at the receiving end.

w.r.t . . . . . with respect to

WRAS . . . . . Wideband Radiator Antenna Subsystem (Galileo navigation antenna, Europe)

WRC . . . . . World Radiocommunication Conference (of ITU, Geneva, Switzerland, see also WARC)

WRMC . . . . . World Radiation Monitoring Center (Zürich, Switzerland)

WRS . . . . . Worldwide Reference System (a global indexing scheme of the Landsat program which is based on nominal scene centers defined by path and row coordinates; the Aqua mission adopted the same scheme)

WSA ..... World Space Alliance. A partnership initiated in 2016 with ESA and SAP (German−based multinational software corporation) for climate and environmental monitoring. The objective is to identify new ways and means to promote the development of innovative business ideas enriched with Earth observation data. The companies Airbus DS, the Environmental Systems Research Institute and GeoVille joined the Partnership in 2019. − By integrating satellite data from the Copernicus Sentinels, ESA Earth observation missions and satellite data provided by the WSA partners onto the SAP cloud platform, the partnership allows easy access, networking and commercial distribution of data and products worldwide. [7374)]

WSAN ..... Wireless Sensor and Actor Network (refers to a group of sensors and actors linked by wireless medium to perform distributed sensing and actuation tasks)

WSe_2 ..... Tungsten Diselenide, a 2−dimensional atomic crystal categorized as a transition metal dichalcogenide (TMD).

WSN ..... Wireless Sensor Network

WSF ..... Wake Shield Facility (Shuttle payload, a retrievable platform)

WSLC ..... Wenchang Satellite Launch Center, Hainan,China. Hainan is China's southernmost province, an island located east of Vietman in the South China Sea.

WSMC ..... Western Space and Missile Center (of USAF at Vandenberg, CA)

WSN ..... Wireless Sensor Network [i.e. a network technology, where all nodes (either moving or stationary) can both provide and relay data]. WSN is a new technology for space exploration that has yet to prove the numerous advantages one can expect: low cost, accurate measurements over a large surface or volume, short setup time of a mission, high reliability through redundancy.

WSOA ..... Wide Swath Ocean Altimeter (a concept design of NASA/JPL for wide−swath altimetry observations which was cancelled in the spring of 2005 due to budget problems)

WSTF ..... White Sands Test Facility (White Sands, NM), a facility of NASA/JSC

WTA ..... World Teleport Association (since 1985). WTA has been the only trade association that focuses on the business of satellite communications from the ground up. At the core of its membership are the world's most innovative operators of teleports, from independents to multinationals, niche service providers to global hybrid carriers.

WUPPE ..... Wisconsin Ultraviolet Photo Polarimeter Experiment (part of ASTRO−1 payload on Shuttle)

WV ..... Water Vapor (in the 5.7 − 7.1 μm water vapor absorption band)

WW−II ..... World War II (1939−1945)

WWLAN ..... Wireless Wide Area LAN

WWLLN ..... World−Wide Lightning Location Network (a network composed of about twenty sensors at VLF which are distributed all around the world). WWLLN is operated by LF−EM in New Zealand partnering with the University of Washington in Seattle. It is a network of lightning location sensors at VLF (3–30 kHz)

WWRP ..... World Weather Research Program (of WMO)

WWW ..... World Weather Watch (WMO Program)

WWW ..... World Wide Web (a wide−area client/server architecture for exchanging hypermedia across the Internet network). WWW offers platform independence and the use of different communication protocols, such as: FTP (File Transfer Protocol), HTTP (HyperText Transfer Protocol), and SMTP (Simple Mail Transfer Protocol). The WWW was developed/demonstrated at CERN (Tim Berners−Lee, et. al.), it started its

7374) "World Space Alliance continues to strengthen," ESA, 27 September 2019, URL: http://www.esa.int/Our_Activities/Observing_the_Earth/World_Space_Alliance_continues_to_strengthen

life in 1989. The Internet with its communication protocols is part of the overall WWW architecture.

X

XCO_2 ..... Averaged mole fraction of CO_2 (Carbon Dioxide)
XeCl ..... Xenon Chloride laser
XENITH ..... Xenon Ion Thruster (a commercial ion propulsion system built around the ultra high−efficient T6 ion thruster developed by QinetiQ)
XEUS ..... X−ray Evolving Universe Spectroscopy (an ESA mission in planning as of 2002 − a potential follow−on mission to XMM−Newton). The XEUS mission concept uses ISS to construct the large mirror satellite (X−ray mirror of 10 m diameter) in orbit.
XIPS ..... Xenon Ion Propulsion System (on platform HS702 of Hughes Space and Communications Company, Los Angeles, CA)
XML ..... eXtensible Markup Language (a document markup language for the creation of hierarchical information structures)
XMM ..... X−Ray Multi−Mirror Mission (of ESA), launch Dec. 10, 1999. Note: XMM was officially renamed to "XMM−Newton" in Feb. 2000
XNAV ..... X−ray Source−based Navigation (also: X−ray Pulsar−Based Navigation) for Autonomous Position Determination (a US DARPA−led technology program and initiative with NASA cooperation). Provision of a future GPS−free, autonomous spacecraft navigation capability
XPD ..... X−ray Photoelectron Detection
XPOD ..... Experimental Push Out Deployer − a CubeSat/nanosat deployment system developed by UTIAS/SFL (University of Toronto, Institute for Aerospace studies/Space Flight Laboratory), Toronto, Canada
XRD ..... X−Ray Diffraction
XRF ..... X−Ray Fluorescence (spectrometry)
XRT ..... X−Ray Telescope (Spacelab−2 sensor, energy detection 2.5−25 keV)
XSCC ..... Xian Satellite Control Center, in the central Shaanxi Province of China
XSLC ..... Xichang Satellite Launch Center, located in the southwestern Sichuan Province of China
XSS ..... Experimental Spacecraft System (US AFRL microsatellite demonstration series). In conjunction with the Air Force Space Command, Air Force Space and Missiles Systems Center, the Naval Research Laboratory, and industry, missions are underway to actively evaluate future applications of microsatellite technologies to include: inspection; rendezvous and docking; repositioning; and techniques for close−in proximity maneuvering around on orbit assets.
XTCE ..... XML Telemetric & Command Exchange (XTCE is an information model for spacecraft telemetry and commanding data). Using XTCE the format and content of a space systems command and telemetry links can be readily exchanged between spacecraft operators and manufacturers.
XTED ..... eXtended Transducer Electronic Datasheet. For instance, for SPA (Space Plug−and−play Avionics) the datasheet is XTED.
XTI ..... Cross−Track Interferometry
XTJ ..... NeXt Triple Junction (solar cells of SpectroLab with an efficiency of 29.5%)
XTR ..... Transmitter
XUV ..... Extreme Ultra Violet (same as EUV, i.e. 1 − 130 nm spectral range)

Y

YAG ..... Yttrium Aluminum Garnet (a type of solid−state crystal laser)
YBCO ..... Yttrium−Barium−Copper−Oxide ($YBa_2Cu_3O_7$), also simply referred to as: YBaCuO (a semiconducting detector material used in

broadband microbolometer applications in the FIR spectral range). YBCO has also a great potential in the field of magnet technology (superconducting magnets)

YBLCO ..... Yttrium−Barium−Lanthanum−Copper−Oxide

YEBES ..... Radiotelescope of Spain, located 50 km north−east of Madrid at an altitude of ∼1000 m. The telescope is a Nasmyth−Cassegrain single dish antenna of 40 m ∅. The instrument is equipped with receivers in bands from 2 to 100 GHz. The radio telescope runs since 2008 as a member of the networks of Very Long Baseline Interferometry (VLBI) studies for astronomy (EVN, GMVA, RadioAstron) and geodesy (IVS).

YES ..... Young Engineers' Satellite (ESA student program with payload building experience, YES1 launch Oct. 30, 1997, YES2 in preparation with a projected launch on a Russian Foton−M3 spacecraft in 2006)

YLF ..... Yttrium Lithium Fluoride (a laser type)

YUZHNOYE ... State Design Office Yuzhnoye, Dniepropetrosvk, Ukraine (since 1954), builders of two launch vehicles: Zenit and Cyclone; builders of OKEAN series satellites. Also developers of Intercosmos spacecraft; of the 25 S/C in the Intercosmos program, 22 were built by Yuzhnoye.

Z

ZAMG ..... Zentralanstalt für Meteorologie und Geodynamik, with HQs at Vienna, Austria, since 1851 (Austrian Institute for Meteorology and Geodynamics)

ZARM ..... Zentrum für angewandte Raumfahrttechnologie und Mikrogravitation (Center of Applied Space Technology and Microgravity − since 1985), an institute of the University of Bremen, Bremen, Germany. ZARM has a **Drop Tower**, 146 m in height, providing 4.74 s of weightlessness in drop mode (high quality 10^{-6} g, deceleration of up to 50 g). [7375)]

ZBLAN ..... ZBLAN (**Z**rF_4−**B**aF_2−**L**aF_3−**A**lF_3−**N**aF) are heavy metal glasses, discovered in 1975 by Poulain and Lucas at the University of Rennes in France. ZBLAN has a broad optical transmission window extending from 0.3 − 7 μm , low refractive index (1.50), a relatively low glass transition temperature (Tg) of 260 °C, low dispersion and a low and negative dn/dT (temperature dependence of refractive index). ZBLAN glass fibers are valuable for advanced communications, medical, and manufacturing technologies using lasers.

Zero2Infinity .... A private Spanish company (since 2009) that designs and operates high−altitude balloons to provide access to near space and low Earth orbit using balloon−borne spacecraft and a balloon−borne launcher. The company is headquartered in, Barcelona, Spain. − The company developed **Bloostar**, a two−stage craft (which consists of a balloon and a rocket) is one of the latest technologies seeking to drastically reduce the costs of launching people and payloads into space. [7376)]

Zerodur® ..... A glass ceramic manufactured by Schott in Mainz, Germany, using a process known as controlled volume crystallization. The thermal expansion of this glass ceramic material is even lower than ULE®, recording a value of 0 ± 0.10 x 10^{-6}/K. −This property of a coefficient of expansion of nearly zero makes the material ideal for applications requiring the highest precision in fields such as astronomy, IC lithography, the semiconductor industry, metrology, and flat panel display production. In the material's most recent milestone, ESO (European Southern Ob-

7375) Claus Lämmerzahl, "DropTES − a new Fellowship Program of UNOOSA at the Bremen Drop Tower," Proceedings of the 51st Session of Scientific & Technical Subcommittee of UNCOPUOS, Vienna, Austria, Feb. 11−22, 2014, URL: http://www.unoosa.org/pdf/pres/stsc2014/tech−39E.pdf

7376) Matt Williams, "Zero2Infinity Successfully Test Launches Its Bloostar Prototype," Universe Today, March 16, 2017, URL: http://www.universetoday.com/134408/zero2infinity−successfully−test−launches−bloostar−prototype/

servatory) selected ZERODUR for the ELT (Extremely Large Telescope) project. [7377)]

Z/I Imaging ..... Zeiss/Intergraph Imaging GmbH, Oberkochen, Germany (a joint venture of Carl Zeiss and Intergraph in the field of airborne geo−information systems like RMK, DMC, GIS solutions, photogrammetry, Earth imaging tools, etc.). As of Oct. 2002, Intergraph Corporation of Huntsville, ALA, acquired ownership of Z/I Imaging.

ZOA ..... Zenith Observation Angle

ZTD ..... Zenith Total Delay [a GPS data estimate used for IWV (Integrated Water Vapor) determination]

ZUP ..... Flight Control Center, Kaliningrad, Russia (TT&C function for MIR station along with RKK Energia)

7377) "Zerodur has been Schott's material answer for astronomy applications for 50 years," Space Daily, 8 June 2018, URL: http://www.spacedaily.com/reports/ZERODUR_has_been_SCHOTTs_material_answer_for_demanding_high_tech_and_astronomy_applications_for_50_years__999.html