Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
AATSR Advanced Along-Track Scanning Radiometer BNSC	Envisat	Operational	Imaging multi-spectral radiometers (vis/IR) & Multiple direction/polarisation radiometers	Measurements of sea surface temperature, land surface temperature, cloud top temperature, cloud cover, aerosols, vegetation, atmospheric water vapour and liquid water content.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS–NIR: 0.555 µm, 0.659 µm, 0.865 µm SWIR: 1.6 µm MWIR: 3.7 µm TIR: 10.85 µm, 12 µm IR ocean channels: 1 km x 1 km Visible land channels: 1 km x 1 km 500 km Sea surface temperature: <0.5K over 0.5° x 0.5° (lat/long) area with 80% cloud cover Land surface temperature: 0.1K (relative)
ABI Advanced Baseline Imager NOAA	GOES-R GOES-S	Being developed	Imaging multi-spectral radiometers (vis/IR)	Detects clouds, cloud properties, water vapour, land and sea surface temperatures, dust, aerosols, volcanic ash, fires, total ozone, snow and ice cover, vegetation index.	Waveband: Spatial resolution: Swath width: Accuracy:	16 bands in vis, NIR and IR ranging from 0.47 µm to 13.3 µm 0.5 km in 0.64 µm band 2.0 km in long wave IR and in the 1.378 µm band 1.0 km in all others Varies by product
ACC Accelerometer ESA	Swarm	Being developed	Precision orbit and space environment	Measurement of the spacecraft non-gravitational accelerations, linear accelerations range: ± 2*10–4 m/s2; angular measurement range: ± 9.6* 10–3 rad/s2; measurement bandwidth: 10–4 to 10–2 Hz; Linear resolution: 1.8*10–10 m/s2; angular resolution: 8*10–9 rad/s2	Waveband: Spatial resolution: Swath width: Accuracy:	N/A 0.1 nm/s^2 N/A overall instrument random error: <10–8 m/s^2
ACE-FTS Atmospheric Chemistry Experiment (ACE) Fourier Transform Spectrometer CSA	SCISAT-1	Operational	Atmospheric chemistry	Measure and understand the chemical processes that control the distribution of ozone in the Earth's atmosphere, especially at high altitudes.	Waveband: Spatial resolution: Swath width: Accuracy:	SWIR – TIR: 2–5.5 µm, 5.5–13 µm (0.02 cm^{-1} resolution)
ACRIM III Active Cavity Radiometer Irradiance Monitor NASA	ACRIMSAT	Operational	Earth radiation budget radiometer	Measurements of solar luminosity and solar constant. Data used as record of time variation of total solar irradiance, from extreme UV through to infrared.	Waveband: Spatial resolution: Swath width: Accuracy:	UV – MWIR: 0.15–5 µm 5° FOV 71 mins per orbit of full solar disc data 0.1% of full scale
A-DCS4 ARGOS-Data Collection System NOAA	MetOp-A, MetOp-B, MetOp-C, NOAA-N', NPOESS-1, NPOESS-2, NPOESS-3, NPOESS-4	Operational	Data collection	Data collection and communication system for receiving and retransmitting data from ocean and land-based remote observing platforms/transponders.	Waveband: Spatial resolution: Swath width: Accuracy:	UHF
AIRS Atmospheric Infrared Sounder NASA	Aqua	Operational	Atmospheric temperature and humidity sounders	High spectral resolution measurement of temperature and humidty profiles in the atmosphere. Long-wave Earth surface emissivity. Cloud diagnostics. Trace gas profiles. Surface temperatures.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS–TIR: 0.4–1.7 µm, 3.4–15.4 µm, Has approximately 2382 bands from VIS to TIR 1.1° (13X13 Km at nadir) ± 48.95° Humidity: 20% Temperature: 1 K

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
AIS (RCM) Automated Identification System (RADARSAT Constellation) CSA	RADARSAT Constellation-1, RADARSAT Constellation-2, RADARSAT Constellation-3	Being developed	Communications	Ship identification (name, location, heading, cargo etc.).	Waveband: Microwave: 162 MHz Spatial resolution: N/A Swath width: 800 km Accuracy:
ALADIN Atmospheric Laser Doppler Instrument ESA	ADM-Aeolus	Being developed	Lidars	Global wind profiles (single line-of-sight) for an improved weather prediction.	Waveband: UV: 355 nm Spatial resolution: One wind profile every 200 km along track, averaged over 50 km Swath width: Along line 285 km parallel to satellite ground track Accuracy: Wind speed error below 2 m/s
ALI Advanced Land Imager NASA	NMP EO-1	Operational	High resolution optical imagers	Measurement of Earth surface reflectance. Will validate new technologies contributing to cost reduction and increased capabilities for future missions. ALI comprises a wide field telescope and multi-spectral and panchromatic instrument.	Waveband: 10 bands: VIS&NIR: 0.480–0.690 µm, 0.433–0.453 µm, 0.450–0.515 µm, 0.525–0.605 µm, 0.630–0.690 µm, 0.775–0.805 µm, 0.845–0.890 µm, 1.200–1.300 µm SWIR: 1.550–1.750 µm, 2.080–2.350 µm Spatial resolution: PAN: 10 m VNIR&SWIR: 30 m Swath width: 37 km Accuracy: SNR at 5% surf refl Pan: 220 Multi 1: 215 Multi 2: 280 Multi 3: 290 Multi 4: 240 Multi 4': 190 Multi 5': 130 Multi 5: 175 Multi 7: 170 (prototype instrument exceeds ETM+ SNR by a factor of 4–8)
ALT Altimeter NOAA	HY-2A	Being developed	Radar altimeters	Global ocean topography, sea level and gravity field measurements.	Waveband: 13.58 GHz and 5.25 GHz Spatial resolution: 16 km Swath width: 16 km Accuracy: < 4 cm
AltiKa Ka-band Altimeter CNES	SARAL	Being developed	Radar altimeters	Sea surface height.	Waveband: 35.5–36 GHz Spatial resolution: Swath width: Accuracy:
Altimeter (OCEANSAT-3) Ku-band Altimeter ISRO	OCEANSAT-3	Being developed	Radar altimeters	Mainly sea state applications including SWH, Geoid etc., establishment of global databases.	Waveband: 1306 GHz Spatial resolution: 1 km Swath width: 1500 m Accuracy:
AMI/SAR/Image Active Microwave Instrumentation. Image Mode ESA	ERS-2	Operational	Imaging microwave radars	All-weather images of ocean, ice and land surfaces. Monitoring of coastal zones, polar ice, sea state, geological features, vegetation (including forests), land surface processes, hydrology.	Waveband: Microwave: 5.3 GHz, C-band, VV polarisation bandwidth 15.5 ± 0.06 MHz Spatial resolution: 30 m Swath width: 100 km Accuracy: Landscape topography: 3 m Bathymetry: 0.3 m Sea ice type: 3 classes

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
AMI/SAR/Wave Active Microwave Instrumentation. Wave mode ESA	ERS-2	Operational	Imaging microwave radars	Measurements of ocean wave spectra.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 5.3 GHz (C-band), VV polarisation 30 m Sea surface wind speed: 3 m/s Significant wave height: 0.2 m
AMI/Scatterometer Active Microwave Instrumentation. Wind mode ESA	ERS-2	Operational	Scatterometers	Measurements of wind fields at the ocean surface, wind direction (range 0–360°), wind speed (range 1–30 m/s).	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 5.3 GHz (C-band), VV polarisation Cells of 50 km x 50 km at 25 km intervals 500 km Sea surface wind speed: 3 m/s Sea ice type: 2 classes
AMR Advanced Microwave Radiometer NASA	Jason-2 (aka OSTM)	Operational	Imaging multi-spectral radiometers (passive microwave)	Altimeter data to correct for errors caused by water vapour and cloud-cover. Also measures total water vapour and brightness temperature.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 18.7 GHz, 23.8 GHz, 34 GHz 41.6 km at 18.7 GHz, 36.1 km at 23.8 GHz, 22.9 km at 34 GHz 120° cone centred on nadir Total water vapour: 0.2 g/cm^2 Brightness temperature: 0.15 K
AMSR-2 Advanced Microwave Scanning Radiometer-2 JAXA	GCOM-W1, GCOM-W2, GCOM-W3	Approved	Imaging multi-spectral radiometers (passive microwave)	Measurements of water vapour, cloud liquid water, precipitation, winds, sea surface temperature, sea ice concentration, snow cover, soil moisture.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 6.925 GHz, 7.3 GHz, 10.65 GHz, 18.7 GHz, 23.8 GHz, 36.5 GHz, 89.0 GHz 5–50 km (dependent on frequency) 1450 km Sea surface temparature: 0.5 K Sea ice cover: 10% Cloud liquid water: 0.05 kg/m^2 Precipitation rate: 10% Water vapour: 3.5 kg/m^2 through total column Sea surface wind speed 1.5 m/s
AMSR-E Advanced Microwave Scanning Radiometer-EOS JAXA (NASA)	Aqua	Operational	Imaging multi-spectral radiometers (passive microwave)	Measurements of water vapour, cloud liquid water, precipitation, winds, sea surface temperature, sea ice concentration, snow cover and soil moisture.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 6.925 GHz, 10.65 GHz, 18.7 GHz, 23.8 GHz, 36.5 GHz, 89.0 GHz 5–50 km (dependent on frequency) 1445 km Sea surface temparature: 0.5K Sea ice cover: 10% Cloud liquid water: 0.05 kg/m^2 Precipitation rate: 10% Water vapour: 3.5 kg/m^2 through total column Sea surface wind speed 1.5 m/s
AMSU-A Advanced Microwave Sounding Unit-A NOAA (BNSC)	Aqua, MetOp-A, MetOp-B, MetOp-C, NOAA-15, NOAA-16, NOAA-17, NOAA-18	Operational	Atmospheric temperature and humidity sounders	All-weather night-day temperature sounding to an altitude of 45 km.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 15 channels, 23.8–89.0 GHz 48 km 2054 km Temperature profile: 2 K Humidity: 3 kg/m^2 Ice & snow cover: 10%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
AMSU-B Advanced Microwave Sounding Unit-B NOAA (BNSC)	NOAA-15, NOAA-16, NOAA-17	Operational	Atmospheric temperature and humidity sounders	All-weather night-day humidity sounding.	Waveband: Microwave: 89 GHz, 150 GHz 183.3± 1.0 GHz (2 bands) 183.3± 3.0 GHz (2 bands) 183.3± 7.0 GHz (2 bands) Spatial resolution: 16 km Swath width: 2200 km Accuracy: Humidity profile: 1 kg/m^2
APS Aerosol Polarimetry Sensor NOAA	Glory, NPOESS-1,	Proposed	Multiple direction/polarisation radiometers	Global distribution of natural and anthropogenic aerosols for quantification of the aerosol effect on climate, the anthropogenic component of this effect, and the long-term change of this effect caused by natural and anthropogenic factors.	Waveband: 9 bands: VIS and SWIR: 0.412 µm, 0.488 µm, 0.555 µm, 0.672 µm, 0.910 µm, 0.865 µm, 1.378 µm, 1.610 µm, 2.250 µm Spatial resolution: 10 km Swath width: 10 km Accuracy: AOT Ocean .02, land .04
Aquarius NASA (CONAE)	SAC-D	Being developed	Scatterometers	Understanding ocean circulation, including measurements of sea surface salinity, global water cycle and cliamte interaction, soil moisture measurements over Argentina.	Waveband: L-band (1.413–1.260 GHz) Spatial resolution: 100 km Swath width: 390 km Accuracy: . 2 psu
ARGOS CNES (NASA)	MetOp-A, MetOp-B, MetOp-C, NOAA-15, NOAA-16, NOAA-17, NOAA-18, NOAA-N', SARAL	Operational	Data collection	Location data by doppler measurements.	Waveband: Spatial resolution: Swath width: Accuracy:
Arina Roscosmos	Resurs DK 1	Operational	Space environment	Insights into electromagnetic field variations as the precursors of Earth quakes.	Waveband: Spatial resolution: Swath width: Accuracy:
ASAR Advanced Synthetic-Aperture Radar ESA	Envisat	Operational	Imaging microwave radars	All-weather images of ocean, land and ice for monitoring of land surface processes, sea and polar ice, sea state, and geological and hydrological applications. Has 2 stripmap modes (Image and Wave (for ocean wave spectra)) and 3 ScanSAR modes.	Waveband: Microwave: C-band, with choice of 5 polarisation modes (VV, HH, VV/HH, HV/HH, or VH/VV) Spatial resolution: Image, wave and alternating polarisation modes: approx 30 m x 30 m Wide swath mode: 150 m x 150 m Global monitoring mode: 950 mm x 950 m Swath width: Image and alternating polarisation modes: up to 100 km Wave mode: 5 km Wide swath and global monitoring modes: 400 km or more Accuracy: Radiometric resolution in range: 1.5–3.5 dB Radiometric accuracy: 0.65 dB

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
ASAR (image mode) Advanced Synthetic Aperture Radar (Image mode) ESA	Envisat	Operational	Imaging microwave radars	All-weather images of ocean, land and ice for monitoring of land surface processes, sea and polar ice, sea state, and geological and hydrological applications.	See above.
ASAR (wave mode) Advanced Synthetic Aperture Radar Wave mode) ESA	Envisat	Operational	Imaging microwave radars	Measurements of ocean wave spectra.	See above.
ASCAT Advanced Scatterometer EUMETSAT (ESA)	MetOp-A, MetOp-B, MetOp-C	Operational	Scatterometers	Sea ice cover, sea ice type and wind speed over sea surface measurements. Air pressure over ocean, polar ice contours, ice/snow imagery, soil moisture.	Waveband: Microwave: C-band, 5.256 GHz Spatial resolution: Hi-res mode: 25–37 km Nominal mode: 50 km Swath width: Continuous 2 x 500 km Accuracy: Wind speeds in range 4–24 m/s: 2 m/s and direction accuracy of 20º
ASM Absolute Scalar Magnetometer CNES	Swarm	Being developed	Magnetic field	Absolute calibration of Vector Field Magnetometer on board Swarm satellites.	Waveband: N/A Spatial resolution: 0.1 nT Swath width: N/A Accuracy: 0.1 nT
ASTER Advanced Spaceborne Thermal Emission and Reflection Radiometer NASA (METI (Japan))	Terra	Operational	High resolution optical imagers	Surface and cloud imaging with high spatial resolution, stereoscopic observation of local topography, cloud heights, volcanic plumes, and generation of local surface digital elevation maps. Surface temperature and emissivity.	Waveband: VIS–NIR: 3 bands in 0.52–0.86 µm SWIR: 6 bands in 1.6–2.43 µm TIR: 5 bands in 8.125–11.65 µm Spatial resolution: VNIR: 15 m, stereo: 15 m horizontally and 25 m vertical SWIR: 30 m TIR: 90 m Swath width: 60 km Accuracy: VNIR and SWIR: 4% (absolute) TIR: 4 K Geolocation: 7 m
ATCOR Atmospheric correction ISRO	RESOURCESAT-3	Proposed	TBD	Atmospheric correction.	Waveband: Spatial resolution: Swath width: Accuracy:
ATLID ATmospheric LIDar ESA	EarthCARE	Approved	Lidars	Derivation of cloud and aerosol properties – Measurement of molecular and particle backscatter in Rayleigh, co-polar and cross-polar Mie channels.	Waveband: Laser at 355 nm Spatial resolution: 300 m horizontal (TBC) Swath width: Accuracy:
ATMS Advanced Technology Microwave Sounder NASA (NOAA)	NPOESS-1, NPOESS-3, NPOESS-4, NPP	Being developed	Atmospheric temperature and humidity sounders	Collects microwave radiance data that when combined with the CrIS data will permit calculation of atmospheric temperature and water vapour profiles.	Waveband: Microwave: 22 bands, 23–184 GHz Spatial resolution: 5.2º – 1.1º Swath width: 2300 km Accuracy: 0.75–3.60 K
ATOVS (HIRS/3 + AMSU + AVHRR/3) Advanced TIROS Operational Vertical Sounder NOAA	NOAA-15, NOAA-16	Operational	Atmospheric temperature and humidity sounders	Advanced TIROS Operational Vertical Sounder insturment suite.	Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
ATSR/M CNES	ERS-2	Operational	Imaging multi-spectral radiometers (passive microwave)	Belongs to ATSR payload on board ERS1 and ERS2.	Waveband: Spatial resolution: Swath width: Accuracy:
ATSR-2 Along Track Scanning Radiometer - 2 BNSC (CSIRO)	ERS-2	Operational	Imaging multi-spectral radiometers (vis/IR) & Multiple direction/polarisation radiometers	Measurements of sea surface temperature, land surface temperature, cloud top temperature and cloud cover, aerosols, vegetation, atmospheric water vapour and liquid water content.	Waveband: VIS–SWIR: 0.65 µm, 0.85 µm, 1.27 µm, 1.6 µm SWIR–TIR: 1.6 µm, 3.7 µm, 11 µm, 12 µm Microwave: 23.8 GHz, 36.5 GHz (bandwidth of 400 MHz) Spatial resolution: IR ocean channels: 1 km x 1 km Microwave near-nadir viewing: 20 km instantaneous field of view Swath width: 500 km Accuracy: Sea surface temperature to <0.5 K over 0.5° x 0.5° (lat/long) area with 80% cloud cover Land surface temperature: 0.1 K
AVHRR/3 Advanced Very High Resolution Radiometer/3 NOAA	MetOp-A, MetOp-B, MetOp-C, NOAA-15, NOAA-16, NOAA-17, NOAA-18, NOAA-N'	Operational	Imaging multi-spectral radiometers (vis/IR)	Measurements of land and sea surface temperature, cloud cover, snow and ice cover, soil moisture and vegetation indices. Data also used for volcanic eruption monitoring.	åWaveband: VIS: 0.58–0.68 µm NIR: 0.725–1.1 µm SWIR: 1.58–1.64 µm MWIR: 3.55–3.93 µm TIR: 10.3–11.3 µm, 11.5–12.5 µm Spatial resolution: 1.1 km Swath width: 3000 km approx, Ensures full global coverage twice daily Accuracy:
AVNIR-2 Advanced Visible and Near Infrared Radiometer type 2 JAXA	ALOS	Operational	High resolution optical imagers	High resolution multi-spectral imager for land applications which include environmental monitoring, agriculture and forestry, disaster monitoring.	Waveband: VIS: 0.42–0.50 µm, 0.52–0.60 µm, 0.61–0.69 µm NIR: 0.76–0.89 µm Spatial resolution: 10 m Swath width: 70 km Accuracy: Surface Resolution:10 m (Nadir)
AWiFS Advanced Wide Field Sensor ISRO	RESOURCE-SAT-1, RESOURCE-SAT-2	Operational	High resolution optical imagers	Vegetation and crop monitoring, resource assessment (regional scale), forest mapping, land cover/ land use mapping, and change detection.	Waveband: VIS: 0.52–0.59 µm, 0.62–0.68 µm NIR: 0.77–0.86 µm SWIR: 1.55–1.7 µm Spatial resolution: 55 m Swath width: 730 km Accuracy: 10 bit data
BBR (EarthCARE) BroadBand Radiometer (EarthCARE) ESA	EarthCARE	Approved	Earth radiation budget radiometers	Top of the atmosphere radiances and radiative flux.	Waveband: Shortwave channel: 0.2–4 µm Total channel 0.2–50 µm Spatial resolution: 10 x 10 km ground pixel size for each of the three views Swath width: Accuracy: flux retrieval accuracy 10 W/m^2
BlackJack GPS (TRSR) BlackJack Global Positioning System (Turbo Rogue Space Receiver) NASA	GRACE A, GRACE B	Operational	Precision orbit		Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
BRLK Synthetic Aperature Radar Roshydromet (Roscosmos)	Meteor-M N1, Meteor-M N2	Prototype	Imaging microwave radars	Microwave radar images for ice watch.	Waveband: X-band Spatial resolution: 400–700 m Swath width: 600 km Accuracy: 1 dB
C/X SAR SAR ISRO	DMSAR	Proposed	Imaging microwave radars	Disaster management, mainly to overcome problems of cloud during observation, most useful for flood and cyclone.	Waveband: C/X-band Spatial resolution: Swath width: Accuracy:
CALIOP Cloud-Aerosol Lidar with Orthogonal Polarization NASA	CALIPSO	Operational	Lidars	Two-wavelength, polarization lidar capable of providing aerosol and cloud profiles and properties.	Waveband: 532 nm (polarization-sensitive), 1064 nm, VIS – NIR Spatial resolution: Vertical sampling: 30 m, 0–40 km Swath width: 333 m along-track Accuracy: 5% (532 nm)
CARMEN-1 CNES (CONAE)	SAC-D	Being developed	Space environment	Studying space environment effects.	Waveband: Spatial resolution: Swath width: Accuracy:
C-band SAR C-band Synthetic Aperture Radar ESA	Sentinel-1 A, Sentinel-1 B, Sentinel-1 C	Being developed	Imaging microwave radars	Marine core services, land monitoring and emergency services. Monitoring sea ice zones and arctic environment. Surveillance of marine environment, monitoring land surface motion risks, mapping of land surfaces (forest, water and soil, agriculture), mapping in support of humanitarian aid in crisis situations.	Waveband: C-band: 5.405 GHz, HH, HV, VH, VV, Incidence angle: 20–45° Spatial resolution: Strip mode: 5 x 5 m Interferometric wide swath mode: 5 x 20 m extra-wide swath mode: 25 x 100 m (3 looks) wave mode: 5 x 20 m Swath width: Strip mode: 80 km Interferometric wide swath mode: 250 km extra-wide swath mode: 400 km Wave mode: sampled images of 20 x 20 km at 100 km intervals Accuracy: NESZ: –22 dB; PTAR: –25 dB; DTAR: –22 dB Radiometric accuracy 1 dB (3 sigma) Radiometric stability: 0.5 dB (3 sigma)
CCD (HJ, HY) CCD camera CAST	HJ-1A, HJ-1B	Being developed	High resolution optical imagers	Multi-spectral measurements of Earth's surface for natural enviroment and disaster applications.	Waveband: 0.43–0.90 µm (4 bands) Spatial resolution: 30 m Swath width: 360 km (per set) 720 km (two sets) Accuracy:
CCD camera Charged Coupled Device Camera ISRO	INSAT-2E, INSAT-3A	Operational	Imaging multi-spectral radiometers (vis/IR)	Cloud and Vegetation monitoring.	Waveband: VIS: 0.62–0.68 µm NIR: 0.77–0.86 µm SWIR: 1.55–1.69 µm Spatial resolution: 1 x 1 km Swath width: Normal: 6000 km (N–S) x 6000 km (E–W) anywhere on earth disc Programme: 6000 km (N–S) x (n x 300) km (E–W) : n and number of frames programmable Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
CCD High Resolution CCD Camera CAST (INPE)	CBERS-2, CBERS-2B	Operational	High resolution optical imagers	Measurements of cloud type and extent and land surface reflectance, and used for global land surface applications.	Waveband: VIS: 0.45–0.52 µm, 0.52–0.59 µm, 0.63–0.69 µm NIR: 0.77–0.89 µm PAN: 0.51–0.71 µm Spatial resolution: 20 m Swath width: 113 km Accuracy:
CERES Cloud and the Earth's Radiant Energy System NASA	Aqua, NPP, Terra, TRMM	Operational	Earth radiation budget radiometer	Long term measurement of the Earth's radiation budget and atmospheric radiation from the top of the atmosphere to the surface; provision of an accurate and self-consistent cloud and radiation database.	Waveband: 3 channels: 0.3–5 µm, 0.3–100 µm, 8–12 µm, UV-FIR Spatial resolution: 20 km Swath width: Accuracy: 0.5%, 1%, 1% (respectively for the 3 channels)
CHAMP GPS Sounder GPS TurboRogue Space Receiver (TRSR) NASA (DLR)	CHAMP	Operational	Atmospheric temperature and humidity sounders & precision orbit	Temperature and water vapour profiles.	Waveband: Spatial resolution: Swath width: Accuracy:
CHAMP Gravity Package (Accelerometer+GPS) STAR Accelerometer CNES (DLR)	CHAMP	Operational	Gravity instruments	Earth gravity field measurements.	Waveband: Spatial resolution: Swath width: Accuracy:
CHAMP Magnetometry Package (1 Scalar + 2 Vector Magnetometer) Overhauser Magnetometer and Fluxgate Magnetometer DLR	CHAMP	Operational	Magnetic field	Earth gravity field measurements.	Waveband: Spatial resolution: Swath width: Accuracy:
CHRIS Compact High Resolution Imaging Spectrometer ESA (BNSC)	PROBA	Operational	Imaging multi-spectral radiometers (vis/IR)	Supports a range of land, ocean and atmospheric applications, including agricultural science, forestry, environmental science, atmospheric science and oceanography.	Waveband: VIS – NIR: 400–1050 nm (63 spectral bands at a spatial resolution of 36 m; or 18 bands at full spatial resolution (18 m)) Spatial resolution: 36 m or 18 m depending on wavebands selected Swath width: 14 km Accuracy: S/N 200 at target albedo of 0.2. 12 bits digitisation
CMIS Conical-scanning Microwave Imager/Sounder NOAA	NPOESS-1, NPOESS-3, NPOESS-4	Being developed	Imaging multi-spectral radiometers (passive microwave) & Atmospheric temperature and humidity sounders	Collects microwave radiometry and sounding data. Data types include atmospheric temperature and moisture profiles, clouds, sea surface winds, and all-weather land/water surfaces.	Waveband: Microwave: 190 GHz Spatial resolution: 15–50 km depending on frequency Swath width: 1700 km Accuracy: Temperature Profiles to 1.6 K water vapour 20%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
COCTS China Ocean Colour & Temperature Scanner CAST	HY-1B, HY-1C, HY-1D	Operational	Ocean colour instruments	Ocean chlorophyll, ocean yellow substance absorbance, Sea-ice surface temperature.	Waveband: B1: 0.402–0.422 µm B2: 0.433–0.453 µm B3: 0.480–0.500 µm B4: 0.510–0.530 µm B5: 0.555–0.575 µm B6: 0.660–0.680 µm B7: 0.740–0.760 µm B8: 0.845–0.885 µm B9: 10.30–11.40 µm B10: 11.40–12.50 µm Spatial resolution: 1.1 km Swath width: 3083 km Accuracy:
CPR (Cloudsat) Cloud Profiling Radar NASA	CloudSat	Operational	Cloud profile and rain radars	Primary goal is to provided data needed to evaluate and improve the way clouds are represented in global climate models. Measures vertical profile of clouds.	Waveband: Microwave: 94 GHz Spatial resolution: Vertical: 500 m Cross-track: 1.4 km Along-track: 2.5 km Swath width: Instantaneous Footprint < 2 km Accuracy: Cloud liquid water content <=50% ice water content within +100%, –50% detect all single layer clouds with optical depth >=1.0
CPR (EarthCARE) Cloud Profiling Radar (EarthCARE) JAXA (NICT)	EarthCARE	Approved	Cloud profile and rain radars	Measurement of cloud properties, light precipitation, vertical motion.	Waveband: Microwave: 94 GHz Spatial resolution: 500 m horizontal Swath width: Accuracy:
CrIS Cross-track Infrared Sounder NOAA (NASA)	NPOESS-1, NPOESS-3, NPOESS-4, NPP	Prototype	Atmospheric temperature and humidity sounders	Daily measurements of vertical atmospheric distribution of temperature, moisture, and pressure.	Waveband: MWIR–TIR: 3.92–4.4 µm, 5.7–8.62 µm, 9.1–14.7 µm, 1300 spectral channels Spatial resolution: IFOV 14 km diameter, 1 km vertical layer resolution Swath width: 2200 km Accuracy: Temperature profiles: to 0.9 K Moisture profiles: 20–35% Pressure profiles: 1%
CSC FVM CSC fluxgate vector magnetometer DNSC	Ørsted (Oersted)	Operational	TBD	Measurements of the strength and direction of the Earth's magnetic field.	Waveband: Spatial resolution: Swath width: Accuracy:
CZI Coast region imager CAST	HY-1B, HY-1C, HY-1D	Operational	Imaging multi-spectral radiometers (vis/IR)	Imagery of coastal regions – estuaries, tidal regions, etc.	Waveband: B1: 0.433–0.453 m B2: 0.555–0.575 m B3: 0.655–0.675 m B4: 0.675–0.695 m Spatial resolution: 250 m Swath width: 500 km Accuracy:
DCP (SCD) Data Collecting Platform Transponder INPE (CAST)	SCD-1, SCD-2	Operational	Data collection	Data collection and communication.	Waveband: Spatial resolution: Swath width: Accuracy:
DCS (CAST) Data Collecting System Transponder (CAST) CAST	CBERS-2, CBERS-2B, CBERS-3	Operational	Data collection	Data collection and communication.	Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
DCS (GOES-R) Data Collection System (NOAA, GOES-R) NOAA	GOES-13, GOES-O, GOES-P, GOES-R, GOES-S	Approved	Data collection	Collects data on temperature (air/water), atmospheric pressure, humidity and wind speed/direction, speed and direction of ocean and river currents.	Waveband: Spatial resolution: Swath width: Accuracy:
DCS (NOAA) Data Collection System (NOAA) NOAA	GOES-11, GOES-12	Operational	Data collection	Collects data on temperature (air/water), atmospheric pressure, humidity and wind speed/direction, speed and direction of ocean and river currents.	Waveband: Spatial resolution: Swath width: Accuracy:
DCS (Roshydromet) Data Collection System Roshydromet (Roscosmos)	Elektro-L N1, Elektro-L N2, Elektro-L N3, Meteor-M N1, Meteor-M N2	Operational	Data collection	Collects data on temperature (air/water), atmospheric pressure, humidity and wind speed/direction, speed and direction of ocean and river currents.	Waveband: Spatial resolution: Swath width: Accuracy:
DCS (SAC-C) Data Collection System CONAE	SAC-C	Operational	Communications	DCS is able to receive data from 200 meteorological and environmental stations for re-transmission of all the data to Cordoba Ground Station.	Waveband: Spatial resolution: Swath width: Accuracy:
DCS (SAC-D) Data Collection System CONAE	SAC-D	Being developed	Communications	UHF 401.55 MHz uplink.	Waveband: Spatial resolution: Swath width: Accuracy:
DCS Data Collection System INPE	GPM-Br	Approved	Data collection	Support to Data Collection Platforms.	Waveband: Spatial resolution: Swath width: Accuracy:
DCS Data Collection System INPE (DLR)	MAPSAR	Approved	Data collection	Support to Data Collection Platforms.	Waveband: Spatial resolution: Swath width: Accuracy:
DMC Imager Disaster Management Constellation Imager BNSC	UK-DMC	Operational	High resolution optical imagers	Visible and NIR imagery in support of disaster management.	Waveband: VIS and NIR Spatial resolution: 32 m Swath width: 2 beams of 300 km Accuracy:
DMC-2 Imager Disaster Management Constellation Imager BNSC	UK-DMC2	Approved	High resolution optical imagers	Visible and NIR imagery in support of disaster management – part of the Disaster Management Constellation.	Waveband: VIS: 0.52–0.62 µm, 0.36–0.96 µm NIR: 0.76–0.9 µm Spatial resolution: 22 m Swath width: 660 km imaging swath Accuracy:
DORIS (SPOT) Doppler Orbitography and Radio-positioning Integrated by Satellite (on SPOT) CNES	SPOT-2, SPOT-4,	Operational	Precision orbit	Orbit determination.	Waveband: Spatial resolution: Swath width: Accuracy: Orbit error ~2.5 cm

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
DORIS-NG (SPOT) Doppler Orbitography and Radio-positioning Integrated by Satellite-NG (on SPOT) CNES	SPOT-5	Operational	Precision orbit	Precise orbit determination Real time onboard orbit determination (navigation).	Waveband: Spatial resolution: Swath width: Accuracy: Orbit error ~1 cm
DORIS-NG Doppler Orbitography and Radio-positioning Integrated by Satellite-NG CNES	CryoSat-2, Envisat, Jason-1, Jason-2 (aka OSTM)	Operational	Precision orbit	Precise orbit determination Real time onboard orbit determination (navigation).	Waveband: Spatial resolution: Swath width: Accuracy: Orbit error ~1 cm
DPR Dual-frequency Precipitation Radar JAXA (NASA)	GPM Core	Being developed	Cloud profile and rain radars	Measures precipitation rate classified by rain and snow, in latitudes up to 65º.	Waveband: Microwave: 3.6 GHz (Ku-band) 35.5 GHz (Ka-band) Spatial resolution: Range resolution: 4–5 km Horizontal Swath width: 245 km (Ku-band) 100 km (Ka-band) Accuracy: rainfall rate 0.2 mm/h
DRT-S&R ISRO	INSAT-3A, Kalpana	Operational	Communications	Relay of search and rescue information.	Waveband: Spatial resolution: Swath width: Accuracy:
ECHO-V Roscosmos	Kanopus-Vulkan	TBD	Space environment		Waveband: Ee 3–3 MeV, Ee 30–100 MeV Spatial resolution: Swath width: Accuracy:
EFI Electric Field Instrument ESA (CSA)	Swarm	Being developed	Gravity and space environment	Suprathermal ion imager and Langmuir probe to measure ion temp, electron temp, ion density, electron density, spacecraft potential and ion incident angle.	Waveband: N/A Spatial resolution: 0.3 mV/m Swath width: N/A Accuracy: ‹3 mV/m
EGG 3-Axis Electrostatic Gravity Gradiometer ESA	GOCE	Being developed	Gravity and precision orbit	The main objective of EGG is to measure the 3 components of the gravity-gradient tensor (i.e. gradiometer data).	Waveband: Spatial resolution: Swath width: Accuracy:
Envisat Comms Communications package on Envisat ESA	Envisat	Operational	Communications	Communication package onboard Envisat series satellites.	Waveband: Spatial resolution: Swath width: Accuracy:
ERM Earth Radiation Measurement NRSCC	FY-3A, FY-3B	Operational	Earth radiation budget radiometers	Measures Earth radiation gains and losses on regional, zonal and global scales.	Waveband: 0.2–3.8 μm, 0.2–50 μm Spatial resolution: 25 km Swath width: 2200 km Accuracy: DLR/DSR 10 W/m² net solar 3 W/m² OLR 5 W/m²
ERS Comms Communication package for ERS ESA	ERS-2	Operational	Communications	Communication package onboard ERS series satellites.	Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
ETM+ Enhanced Thematic Mapper Plus USGS	Landsat-7	Operational	Imaging multi-spectral radiometers (vis/IR)	Measures surface radiance and emittance, land cover state and change (eg vegetation type). Used as multi-purpose imagery for land applications.	Waveband: VIS–TIR: 8 channels: 0.45–12.5 μm Panchromatic channel: VIS 0.5–0.9 μm Spatial resolution: Pan: 15 m Vis–SWIR: 30 m TIR: 60 m Swath width: 185 km Accuracy: 50–250 m systematically corrected geodetic accuracy
EXIS Extreme Ultraviolet and X-ray Irradiance Sensors NOAA	GOES-R, GOES-S	Prototype	Other	Monitors the whole-Sun X-ray irradiance in two bands and the whole-Sun EUV irradiance in five bands.	Waveband: Spatial resolution: N/A Swath width: Accuracy:
FCI Flexible Combined Imager EUMETSAT (ESA)	MTG-I1, MTG-I2, MTG-I3, MTG-I4	Prototype	Imaging multi-spectral radiometers (vis/IR)	Measurements of cloud cover, cloud top height, precipitation, cloud motion, vegetation, radiation fluxes, convection, air mass analysis, cirrus cloud discrimination, tropopause monitoring, stability monitoring, total ozone and sea surface temparature.	Waveband: VIS: 0.56–0.71 μm, 0.5–0.9 μm (broadband) NIR: 0.74–0.88 μm SWIR 1.5–1.78 μm SWIR: 3.48–4.36 μm TIR: 5.35–7.15 μm, 6.85–7.85 μm, 8.3–9.1 μm, 9.38–9.94 μm, 9.8–11.8 μm, 11–13 μm, 12.4–14.46 μm Spatial resolution: 1 km (at SSP) for one broadband visible channel HRV 5 km (at SSP) for all other channels Swath width: Full Earth disc Accuracy: Cloud cover: 10% Cloud top height: 1 km Cloud top temparature: 1 K Cloud type: 8 classes Surface temparature: 0.7–2.0 K Specific humidity profile: 10% Wind profile (horizontal component): 2–10 m/s Long wave Earth surface radiation: 5 W/m^2
FJP Future Jason Payload CNES	Jason-3, Jason-CS	Proposed	Radar altimeters	Nadir viewing sounding radar for provision of real-time high precision sea surface topography, ocean circulation and wave height data.	Waveband: Microwave Spatial resolution: Swath width: Accuracy:
Geoton-L1 Roscosmos (Roshydromet)	Resurs DK 1	Operational	High resolution optical imagers	Multi-spectral images of land surfaces.	Waveband: 0.58–0.8 μm, 0.5–0.6 μm, 0.6–0.7 μm, 0.7–0.8 μm Spatial resolution: 1–3 m Swath width: 30 km within swath band 400 km Accuracy:
GERB Geostationary Earth Radiation Budget EUMETSAT (ESA)	Meteosat-10, Meteosat-11, Meteosat-8, Meteosat-9	Operational	Earth radiation budget radiometer	Measures long and short wave radiation emitted and reflected from the Earth's surface, clouds and top of atmosphere. Full Earth disc, all channels in 5 mins.	Waveband: UV–MWIR: 0.32–4.0 μm UV–FIR: 0.32–30 μm Spatial resolution: 44.6 km x 39.3 km Swath width: Full Earth disc Accuracy: Emitted radiation: 0.12–1.3 W/m^2 Reflectance: 1%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
GGAK-E Module for Geophysical Measurements Roshydromet (Roscosmos)	Elektro-L N1, Elektro-L N2, Elektro-L N3	Prototype	Space environment and magnetic field	Monitoring and forecasting of solar activity, of radiation and magnetic field in the near-Earth space, monitoring of natural and modified magnetosophere, ionosphere and upper atmosphere.	Waveband: Spatial resolution: Swath width: Accuracy:
GGAK-M Module for Geophysical Measurements (SEM) Roshydromet (Roscosmos)	Meteor-M N1	Prototype	Space environment and magnetic field	Space Environmental Monitoring (SEM).	Waveband: Spatial resolution: Swath width: Accuracy
GID-12T Roscosmos	Kanopus-Vulkan	TBD	Magnetic field and space environment		Waveband: 1200 MHz, 1600 MHz Spatial resolution: Swath width: Accuracy:
GLAS Follow-on Geoscience Laser Altimeter System (Follow-on) NASA	ICESat-II	Proposed	Lidars	Provision of data on ice sheet height/thickness, land altitude, aerosol height distributions, cloud height and boundary layer height.	Waveband: VIS–NIR: Laser emits at 1064 nm (for altimetry) and 532 nm (for atmospheric measurements) Spatial resolution: 66 m spots separated by 170 m Swath width: Accuracy: Aerosol profile: 20% Ice elevation: 20 cm Cloud top height: 75 m Land elevation: 20 cm geoid: 5 m
GLAS Geoscience Laser Altimeter System NASA	ICESat	Operational	Lidars	Provision of data on ice sheet height/thickness, land altitude, aerosol height distributions, cloud height and boundary layer height.	Waveband: VIS–NIR: Laser emits at 1064 nm (for altimetry) and 532 nm (for atmospheric measurements) Spatial resolution: 66 m spots separated by 170 m Swath width: Accuracy: Aerosol profile: 20% Ice elevation: 20 cm Cloud top height: 75 m Land elevation: 20 cm geoid: 5 m
GLM GEO Lightning Mapper NOAA	GOES-R, GOES-S	Being developed	Lightning imager	Detect total lightning flash rate over near full disc.	Waveband: Spatial resolution: 10 km Swath width: Accuracy: 70%
GMI GPM Microwave Imager INPE	GPM-Br	Proposed	Imaging multi-spectral radiometers (passive microwave)	Precipitation estimation.	Waveband: 10.65 GHz, 18.7 GHz, 23.8 GHz, 36.5 GHz, 89 GHz, 165.5 GHz, 183.31 GHz Spatial resolution: 26 / 15 / 12 / 11 / 6 / 6 / 6 km Swath width: 904 km Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
GMI GPM Microwave Imager NASA	GPM Constellation, GPM Core	Being developed	Imaging multi-spectral radiometers (passive microwave)	Measures rainfall rates over oceans and land, combined rainfall structure and surface rainfall rates with associated latent heating. Used to produce three hour, daily, and monthly total rainfall maps over oceans and land.	Waveband: Microwave: 10.65 GHz, 19.4 GHz, 21.3 GHz, 37 GHz and 85.5 GHz Spatial resolution: Horizontal: 36 km cross-track at 10.65 GHz (required – Primary Spacecraft, goal – Constellation Spacecraft) 10 km along-track and cross-track (goal – Primary Spacecraft) Swath width: 800 km (Primary Spacecraft) 1300 km (Constellation Spacecraft) Accuracy: NEDT 0.5 K–1.0 K
GOCI Geostationary Ocean Colour Imager KARI (NIES (Japan))	COMS-1, COMS-2	Operational	Ocean colour instruments	Ocean colour information, coastal zone monitoring, land resources monitoring.	Waveband: VIS – NIR: 0.40–0.88 µm (8 channels) Spatial resolution: 236 m x 360 m Swath width: 1440 km Accuracy:
GOES Comms Communications package on GOES NOAA	GOES-11, GOES-12, GOES-13, GOES-O, GOES-P	Operational	Communications		Waveband: Spatial resolution: Swath width: Accuracy:
GOLPE GPS Occultation and Passive reflection Experiment NASA (CONAE)	SAC-C	Operational	Atmospheric temperature and humidity sounders and precision orbit	Measurements of atmospheric effects on GPS signals, and precise positioning information to assist gravitational measurements.	Waveband: Spatial resolution: Swath width: Accuracy
GOME Global Ozone Monitoring Experiment ESA	ERS-2	Operational	Atmospheric chemistry	Measures concentration of O_3, NO, NO_2, BrO, H_2O, O_2/O_4, plus aerosols and polar stratospheric clouds, and other gases in special conditions.	Waveband: UV–NIR: 0.24–0.79 µm (resolution 0.2–0.4 nm) Spatial resolution: Vertical: 5 km (for O_3) Horizontal: 40 x 40 km to 40 x 320 km Swath width: 120–960 km Accuracy:
GOME-2 Global Ozone Monitoring Experiment - 2 EUMETSAT (ESA)	MetOp-A, MetOp-B, MetOp-C	Operational	Atmospheric chemistry	Measurement of total column amounts and stratospheric and tropospheric profiles of ozone. Also amounts of H_2O, NO_2, OClO, BrO, SO_2 and HCHO.	Waveband: UV–NIR: 0.24–0.79 µm (resolution 0.2–0.4 nm) Spatial resolution: Horizontal: 40 x 40 km (960 km swath) to 40 x 5 km (for polarization monitoring) Swath width: 120–960 km Accuracy: Cloud top height: 1 km (rms) Outgoing short wave radiation and solar irradiance: 5 W/m^2 Trace gas profile: 10–20% Specific humidity profile: 10–50 g/kg
GOMOS Global Ozone Monitoring by Occultation of Stars ESA	Envisat	Operational	Atmospheric chemistry	Stratospheric profiles of temparature and of ozone, NO_2, H_2O, aerosols and other trace species.	Waveband: Spectrometers: UV–Vis: 248–371 nm, 387–693 nm NIR: 750–776 nm, 915–956 nm Photometers: 644–705 nm & 466–528 nm Spatial resolution: 1.7 km vertical Swath width: Not applicable Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
GOX Global Positioning Satellite Occultation Experiment (GOX) NASA, NSPO (JPL)	COSMIC-1/ FORMOSAT-3 FM1, COSMIC-2/ FORMOSAT-3 FM2, COSMIC-3/ FORMOSAT-3 FM3, COSMIC-4/ FORMOSAT-3 FM4, COSMIC-5/ FORM COSMIC-6/ FORMOSAT-3 FM6	Operational	Atmospheric temperature and humidity sounders	Each instrument equipped with 4 GPS antennas to receive the L1 and L2 radio wave signals transmitted from the 24 US GPS satellites. Based on the signal transmission delay caused by the electric density, temperature, pressure, and water content in the ionosphere and atmosphere, information about ionosphere and atmosphere can be derived.	Waveband: L1/L2 Spatial resolution: Vertical: 0.3–1.5 m Horizontal: 300–600 km Swath width: Accuracy:
GPS (ESA) GPS Receiver ESA	GOCE	Being developed	Precision orbit	Satellite positioning.	Waveband: Spatial resolution: Swath width: Accuracy:
GPS Receiver (Swarm) GPSR (Swarm) ESA	Swarm	Being developed	Precision orbit		Waveband: Spatial resolution: L1 C/A code range error better than 0.5 m RMS; L1/L2 P-code range error better than 0.25 m RMS; L1 carrier phase error better than 5 mm Swath width: Accuracy:
GPS ROS GPS Radio Occultation Sensor ISRO	Megha-Tropiques	Being developed	Precision orbit	Enables measurement of water vapour and temperature profiles in the tropics.	Waveband: Spatial resolution: Swath width: Accuracy:
GPSP Global Positioning System Payload NASA	Jason-2 (aka OSTM)	Operational	Precision orbit	Precision orbit determination.	Waveband: Spatial resolution: Swath width: Accuracy:
GRAS GNSS Receiver for Atmospheric Sounding EUMETSAT (ESA)	MetOp-A, MetOp-B, MetOp-C	Operational	Atmospheric temperature, humidity sounders and precision orbit	GNSS receiver for atmospheric temperature and humidty profile sounding.	Waveband: Spatial resolution: Vertical: 150 m (trophosphere) 1.5 km (stratosphere) Horizontal: 100 km approx (troposphere) 300 km approx (stratosphere) Swath width: Altitude range of 5–30 km Accuracy: Temperature sounding to 1 K rms
HAIRS (aka KBR) High Accuracy Inter-satellite Ranging System (aka K-band Ranging System) NASA (DLR)	GRACE A, GRACE B	Operational	Gravity instruments	Inter-satellilte ranging system estimestes for global models of the mean and time variable Earth gravity field.	Waveband: Microwave: 24 GHz and 32 GHz Spatial resolution: 400 km horizontal, N/A vertical Swath width: N/A Accuracy: 1 cm equivalent water

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
High Resolution Panchromatic Camera CONAE	SARE-1	TBD	High resolution optical imagers		Waveband: Spatial resolution: Swath width: Accuracy:
HiRDLS High Resolution Dynamics Limb Sounder NASA (BNSC)	Aura	Operational	Atmospheric chemistry	Measures atmospheric temperature, concentrations of ozone, water vapour, methane, NO_x, N_2O, CFCs and other minor species, aerosol concentration, location of polar stratospheric clouds and cloud tops.	Waveband: TIR: 6.12–17.76 μm (21 channels) Spatial resolution: Vertical: 1 km Horizontal: 10 km Swath width: Accuracy: Trace gas: 10% Temparature: 1K Ozone: 10%
HiRI High Resolution Imager CNES	Pleiades 1, Pleiades 2	Being developed	High resolution optical imagers	Cartography, land use, risk, agriculture and forestry, civil planning and mapping, digital terrain models, defence.	Waveband: 4 bands + PAN: Near IR (0.77–0.91 μm) Red (0.61–0.71 μm) Green (0.50–0.60 μm) Blue (0.44–0.54 μm) Pan (0.47–0.84 μm) Spatial resolution: 0.70 m Swath width: 20 km swath at nadir Agile platform giving ±50° off-track Accuracy:
HIRS/3 High Resolution Infrared Sounder/3 NOAA	NOAA-15, NOAA-16, NOAA-17	Operational	Atmospheric temperature and humidity sounders	Provides atmospheric temperature profiles and data on cloud parameters, humidity soundings, water vapour, total ozone content, and surface temperatures.	Waveband: VIS–TIR: 0.69–14.95 μm (20 channels) Spatial resolution: 20.3 km Swath width: 2240 km Accuracy:
HIRS/4 High Resolution Infrared Sounder/4 NOAA	MetOp-A, MetOp-B, MetOp-C, NOAA-18, NOAA-N'	Operational	Atmospheric temperature and humidity sounders	Atmospheric temperature profiles and data on cloud parameters, humidity soundings, water vapour, total ozone content, and surface temperatures. Same as HIRS/3, with 10 km IFOV.	Waveband: VIS – TIR: 0.69–14.95 μm (20 channels) Spatial resolution: 20.3 km Swath width: 2240 km Accuracy:
HRG CNES	SPOT-5	Operational	High resolution optical imagers	High resolution multi-spectral mapper. 2 HRG instruments on this mission can be processed to produce simulated imagery of 2.5 m. Images are 60 km x 60 km in size.	Waveband: VIS: B1: 0.50–0.59 μm B2: 0.61–0.68 μm NIR: B3: 0.79–0.89 μm SWIR: 1.50–1.75 μm Panchromatic: 0.49–0.69 μm Spatial resolution: Panchromatic: 2, 5 m Multi-spectral: 10 m Swath width: 60 km (1 instrument) 117 km (2 instruments) Same as SPOT 4 with off-track steering capability (±27°) Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
HRMS High Resolution Multi-spectral Scanner CONAE	SAC-F	TBD	High resolution optical imagers	High resolution multi-spectral mapper. 2 HRG instruments on this mission can be processed to produce simulated imagery of 2.5 m. Images are 60 x 60 km in size.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS: B1: 0.50–0.59 µm B2: 0.61–0.68 µm NIR: B3: 0.79–0.89 µm SWIR: 1.50–1.75 µm Panchromatic: 0.49–0.69 µm Panchromatic: 5 m Multi-spectral: 10 m 60 km (1 instrument) 117 km (2 instruments) Same as SPOT 4 with off-track steering capability (±27°)
HRMX-TIR High Resolution Multi-Spectral TIR ISRO	GISAT	Proposed	Imaging multi-spectral radiometers (vis/IR)	Natural resources management purpose.	Waveband: Spatial resolution: Swath width: Accuracy:	3 bands: Band 1: 8.2–9.2 µm Band 2: 10.3–11.3 µm Band 3: 11.5–12.5 µm 1.5 km
HRMX-VNIR High Resolution Multi-Spectral VNIR ISRO	GISAT	Proposed	Imaging multi-spectral radiometers (vis/IR)	Natural resources management and disaster monitoring purpose.	Waveband: Spatial resolution: Swath width: Accuracy:	4 bands: Band 1: 0.45–0.52 µm Band 2: 0.52–0.59 µm Band 3: 0.62–0.68 µm Band 4: 0.77–0.86 µm 50 m
HRS High Resolution Stereoscopy CNES	SPOT-5	Operational	High resolution optical imagers	High resolution stereo instrument.	Waveband: Spatial resolution: Swath width: Accuracy:	Panchromatic: VIS 0.49–0.69 µm Panchromatic: 10 m Altitude: 15 m 120 km
HRTC High Resolution Panchromatic Camera CONAE	SAC-C	Operational	High resolution optical imagers	High resolution eath imagery to complement MMRS on the same mission.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS–NIR: 400–900 nm 35 m 90 km
HRV High Resolution Visible CNES	SPOT-2	Operational	High resolution optical imagers	2 HRV instruments on this mission provide 60 km x 60 km images for a range of land and coastal applications.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS: B1: 0.5–0.59 µm B2: 0.61–0.68 µm NIR: B3:0.79–0.89 µm Panchromatic: VIS 0.51–0.73 µm 10 m (panchromatic) or 20 m 117 km (i.e. 60 km + 60 km with 3 km overlap) Steerable up to ±27° off-track
HRVIR High Resolution Visible and Infrared CNES (SNSB)	SPOT-4	Operational	High resolution optical imagers	2 HRVIR instruments on this mission provide 60 km x 60 km images for a range of land and coastal applications.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS: B1: 0.50–0.59 µm B2: 0.61–0.68 µm NIR: 0.79–0.89 µm SWIR: 1.58–1.75 µm Panchromatic: (B2) 0.61–0.68 µm 10 m (0.64 µm) or 20 m 117 km (i.e. 60 km + 60 km with 3 km overlap) Steerable up to ±27° off-track

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
HSB Humidity Sounder/Brazil INPE (NASA)	Aqua	Operational	Atmospheric temperature and humidity sounders	Humidity soundings for climatological and atmospheric dynamics applications.	Waveband: Microwave: 5 discreet channels in the range of 150–183 MHz Spatial resolution: 13.5 km Swath width: 1650 km Accuracy: Temperature: 1.0–1.2 K coverage of land and ocean surfaces Humidity: 20%
HSC High Sensitivity Camera CONAE	SAC-D	Being developed	Lightning imager	High Sensitivity Camera (HSC) measures top of atmosphere radiance in the VIS & NIR spectral range measured by a high sensitivity sensor detects: urban lights, electric storms, polar regions, snow cover, forest fires.	Waveband: PAN (VIR–NIR): 450–900 nm Spatial resolution: 200–300 m Swath width: Min 700 km Accuracy:
HSI (HJ-1A) Hyper Spectrum Imager CAST	HJ-1A	Being developed	Imaging multi-spectral radiometers (vis/IR)	Hyperspectral measurements for environment and disaster management operations.	Waveband: 0.45–0.95 µm Spatial resolution: 100 m Swath width: 50 km Accuracy:
HSI Hyperspectral Imager DLR	EnMAP	Approved	Imaging multi-spectral radiometers (vis/IR)	Detailed monitoring and characterization of rock and soil targets, vegitation, inland and coastal waters on a global scale.	Waveband: 420–2150 nm Spatial resolution: GSD 30 m Swath width: 30 km Accuracy: 30 m (1 Pixel)
HSMS High Swath Multi-spectral Scanner CONAE	SAC-F	TBD	Imaging multi-spectral radiometers (vis/IR)	Detect urban lights, electric storms, polar regions, snow cover, forest fires.	Waveband: Spatial resolution: Swath width: Accuracy:
HSS Hyper-spectral Scanner CONAE	SAC-F	TBD	Imaging multi-spectral radiometers (vis/IR)		Waveband: Spatial resolution: Swath width: Accuracy:
HSTC High Sensitivity Technological Camera CONAE	SAC-C	Operational	Lightning imager	Monitors forest fires, electrical storms and geophysical studies of aurora borealis.	Waveband: PAN: VIS – NIR: 450–850 nm Spatial resolution: 300 m Swath width: 700 km Accuracy:
HYC HYperspectral Camera ASI	PRISMA	Approved	Imaging multi-spectral radiometers (vis/IR)	Pancromatic and Hyperspectral data for complex land ecosystem studies.	Waveband: VIS–NIR: 400–900 nm, 400–1000 nm SWIR: 900–2500 nm Spectral resolution 10 nm for 220 bands Spatial resolution: 30 m Swath width: 30 km Accuracy: 5%
Hyperion Hyperspectral Imager NASA	NMP EO-1	Operational	Imaging multi-spectral radiometers (vis/IR)	Hyperspectral imaging of land surfaces.	Waveband: VIS–NIR: 400–1000 nm NIR–SWIR: 900–2500 nm Spectral resolution 10 nm for 220 bands Spatial resolution: 30 m Swath width: 7.5 km Accuracy: SNR at 10% refl target: VIS: 10–40 SWIR: 10–20

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
HySI (IMS-1) Hyperspectral Imager (IMS-1) ISRO	IMS-1	Operational	Imaging multi-spectral radiometers (vis/IR)	Ocean and atmosphere study of Earth surface.	Waveband: Spatial resolution: Swath width: Accuracy:	64 bands of 8 nm seperation between 400–950 nm spectral range 505.6 m 125.5 km
HySI (TES-HYS) Hyperspectral Imager (TES-HYS) ISRO	TES-HYS	Being developed	Imaging multi-spectral radiometers (vis/IR)	Ocean and atmosphere study of Earth surface.	Waveband: Spatial resolution: Swath width: Accuracy:	200 channels of 5 nanometer width 15 m 30 km
HyS-SWIR Hyperspectral SWIR ISRO	GISAT	Proposed	Imaging multi-spectral radiometers (vis/IR)	Natural resources management purpose.	Waveband: Spatial resolution: Swath width: Accuracy:	150 bands in range 1.0 µm to 2.5 µm 192 m at nadir
HyS-VNIR Hyperspectral VNIR ISRO	GISAT	Proposed	Imaging multi-spectral radiometers (vis/IR)	Natural resources management purpose.	Waveband: Spatial resolution: Swath width: Accuracy:	60 bands in range 0.4 µm to 0.87 µm 320 m at nadir
IAP Instrument for plasma analysis CNES	DEMETER	Operational	Space environment	Density, temperatures, speeds of major ions.	Waveband: Spatial resolution: Swath width: Accuracy:	 Ion density: +5% Temperature: +5% Speed: +5%
IASI Infrared Atmospheric Sounding Interferometer CNES (EUMETSAT)	MetOp-A, MetOp-B, MetOp-C	Operational	Atmospheric temperature and humidity sounders and atmospheric chemistry	Measures tropospheric moisture and temperature, column integrated contents of ozone, carbon monoxide, methane, dinitrogen oxide and other minor gases which affect tropospheric chemistry. Also measures sea surface and land temperature.	Waveband: Spatial resolution: Swath width: Accuracy:	MWIR–TIR: 3.4–15.5 µm with gaps at 5 µm and 9 µm Vertical: 1–30 km Horizontal: 25 km 2052 km Temperature: 0.5–2 K Specific humidity: 0.1–0.3 g/kg Ozone, trace gas profile: 10%
ICARE Influence of Space Radiation on Advanced Components CNES (CONAE)	SAC-C, SAC-D	Operational	Space environment	Improvement of risk estimation models on latest generation of integrated circuits technology.	Waveband: Spatial resolution: Swath width: Accuracy:	
ICE Instrument for Electric Field CNES	DEMETER	Operational	Space environment	Electric field.	Waveband: Spatial resolution: Swath width: Accuracy:	DC to 3 MHz DC field +3 mV/m
IDP Instrument For Plasma Detection CNES	DEMETER	Operational	Space environment	Energy spectrum of electrons.	Waveband: Spatial resolution: Swath width: Accuracy:	

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
IIR Imaging infrared radiometer CNES	CALIPSO	Operational	Imaging multi-spectral radiometers (vis/IR)	Radiometer optimized for combined IIR/lidar retrievals of cirrus particle size.	Waveband: TIR: 8.7 µm, 10.5 µm, 12.0 µm (08.µm resolution) Spatial resolution: 1 km Swath width: 64 km Accuracy: 1 K
IKFS-2 Fourier spectrometer Roshydromet (Roscosmos)	Meteor-M N2	Prototype	Atmospheric temperature and humidity sounders	Atmospheric temperature/humidity profiles, data on cloud parameters, water vapour and ozone column amounts, water and surface temperatures.	Waveband: 5–15 µm more then 2000 spectral channels Spatial resolution: 35 km Swath width: 1000/2000 km Accuracy: 0.5 K
Imager (INSAT) Very High Resolution Radiometer ISRO	INSAT-3D	Being developed	Imaging multi-spectral radiometers (vis/IR)	Cloud cover, severe storm warnings/monitoring day and night (type, amount, storm features), atmospheric radiance winds, atmospheric stability rainfall.	Waveband: VIS: 0.55–0.75 µm SWIR: 1.55–1.7 µm MWIR: 3.80–4.00 µm, 6.50–7.00 µm TIR: 10.2–11.3 µm, 11.5–12.5 µm Spatial resolution: 1 x 1 km (VIS and SWIR) 4 x 4 km (MWIR, TIR) 8 x 8 km (in 6.50–7.00 µm) Swath width: Full Earth disc and space around, Normal Frame (50º N to 40º S and full E–W coverage) Program Frame (Programmable, E–W Full coverage) Accuracy:
Imager NOAA	GOES-11, GOES-12, GOES-13, GOES-O, GOES-P	Operational	Imaging multi-spectral radiometers (vis/IR)	Measures cloud cover, atmospheric radiance, winds, atmospheric stability, rainfall estimates. Used to provide severe storm warnings/ monitoring day and night (type, amount, storm features).	Waveband: GOES 8–12 N, O, P: VIS: 1 channel (8 detectors) IR: 4 channels: 3.9 µm, 6.7 µm, 10.7 µm, 12 µm GOES 12–Q: VIS: 1 channel (8 detectors) IR: 4 channels: 3.9 µm, 6.7 µm, 10.7 µm, 13.3 µm Spatial resolution: 1 km in visible 4 km in IR (8 km for 13.3 µm band (water vapour)) Swath width: Full Earth disc Accuracy:
IMAGER/MTSAT-2 Imager/MTSAT JMA	MTSAT-2	Operational	Imaging multi-spectral radiometers (vis/IR)	Measures cloud cover, cloud motion, cloud height, water vapour, rainfall, sea surface temparature and Earth radiation.	Waveband: VIS–SWIR: 0.55–0.90 µm MWIR–TIR: 3.5–4 µm, 6.5–7 µm, 10.5–11.3 µm, 11.5–12.5 µm Spatial resolution: Visible: 1 km TIR: 4 km Swath width: Full Earth disc every hour Accuracy:
IMSC Instrument Search Coil Magnetometer CNES	DEMETER	Operational	Magnetic field	Magnetic field.	Waveband: 10 Hz–17.4 kHz Spatial resolution: Swath width: Accuracy:
IMWAS Improved MicroWave Atmospheric Sounder NRSCC (CAST)	FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Approved	Atmospheric temperature and humidity sounders	Atmospheric sounding measurements.	Waveband: Microwave: 19.35–89.0 GHz (8 channels) Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
INES Italian Navigation Experiment ASI (CONAE)	SAC-C	Operational	Precision orbit	Composed of GPS Tensor and GNSS Lagrange Receiver to perform navigation experiment on precise orbit determination.	Waveband: Spatial resolution: Swath width: Accuracy:
IR (HJ-1B) Infrared Camera CAST	HJ-1B	Being developed	Imaging multi-spectral radiometers (vis/IR)	Infrared measurements for environment and natural disaster monitoring.	Waveband: 0.75–1.10 μm, 1.55–1.75 μm, 3.50–3.90 μm, 10.5–12.5 μm Spatial resolution: 300 m (10.5–12.5 m) 150 m (the other bands) Swath width: 720 km Accuracy:
IRAS InfraRed Atmospheric Sounder NRSCC (CAST)	FY-3A, FY-3B, FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Operational	Atmospheric temperature and humidity sounders	Atmospheric sounding for weather forecasting.	Waveband: VIS–TIR: 0.65–14.95 μm (26 channels) Spatial resolution: 14 km Swath width: Accuracy:
IR-MSS Infrared Multi-spectral Scanner CAST (INPE)	CBERS-2, CBERS-2B	Operational	High resolution optical imagers	Used for fire detection, fire extent and temperature measurement.	Waveband: VIS–NIR: 0.5–1.1 μm NIR–SWIR: 1.55–1.75 μm, 2.08–2.35 μm TIR: 10.4–12.5 μm Spatial resolution: Visible, NIR, SWIR: 78 m TIR: 156 m Swath width: 120 km Accuracy:
IRS CAST (INPE)	CBERS-3, CBERS-4	Being developed	High resolution optical imagers	Used for fire detection, fire extent and temperature measurement.	Waveband: VIS–NIR: 0.5–1.1 μm NIR–SWIR: 1.55–1.75 μm, 2.08–2.35 μm TIR: 10.4–12.5 μm Spatial resolution: Visible, NIR, SWIR: 78 m TIR: 156 m Swath width: 120 km Accuracy:
IRS Infrared Sounder EUMETSAT (ESA)	MTG S1/ Sentinel-4 A, MTG S2/ Sentinel-4 B, post-EPS/ Sentinel-5	Being developed	Atmospheric temperature and humidity sounders	Measurements of vertically resolved clear sky atmospheric motion vectors, temperature and water vapour profiles.	Waveband: LWIR: 700–1210 cm^{-1} MWIR: 1600–2175 cm^{-1} Spatial resolution: Horizontal: 4 km at SSP Vertical: 1 km Swath width: Full Earth disc Accuracy: clear sky AMVs: 2 m/s temperature profile: 1 K water vapour profile: 5%
ISL Langmuir probes CNES	DEMETER	Operational	Other	Density of the plasma and electron temperature.	Waveband: Spatial resolution: Swath width: Accuracy: Relative ion and electron density <5% Absolute temperature <5% Potential 10 mV Ion direction +15°
IST Italian Star Tracker ASI (CONAE)	SAC-C	Operational	Precision orbit	Test of a fully autonomous system for attitude and orbit determination using a star tracker.	Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
IVISSR (FY-2) Improved Multi-spectral Visible and Infrared Spin Radiometer (5 channels) NRSCC (CAST)	FY-2C, FY-2D, FY-2E, FY-2F	Operational	Imaging multi-spectral radiometers (vis/IR)	Meteorological.	Waveband: VIS–TIR: 0.5–12.5 μm (5 channels) Spatial resolution: 5 km Swath width: Full Earth disc Accuracy:
JAMI/MTSAT-1R Japanese Advanced Meteorological Imager JMA	MTSAT-1R	Operational	Imaging multi-spectral radiometers (vis/IR)	Measures cloud cover, cloud motion, cloud height, water vapour, rainfall, sea surface temparature and Earth radiation.	Waveband: VIS–SWIR: 0.55–0.90 μm MWIR–TIR: 3.5–4 μm, 6.5–7 μm, 10.5–11.3 μm, 11.5–12.5 μm Spatial resolution: Visible: 1 km TIR: 4 km Swath width: Full Earth disc every hour Accuracy:
JMR Jason Microwave Radiometer NASA	Jason-1, Jason-2 (aka OSTM)	Operational	Imaging multi-spectral radiometers (passive microwave)	Altimeter data to correct for errors caused by water vapour and cloud-cover. Also measures total water vapour and brightness temperature.	Waveband: Microwave: 18.7 GHz, 23.8 GHz, 34 GHz Spatial resolution: 41.6 km at 18.7 GHz 36.1 km at 23.8 GHz 22.9 km at 34 GHz Swath width: 120º cone centred on nadir Accuracy: Total water vapour: 0.2g/cm^2 Brightness temperature: 0.15 K
KMSS Multi-spectral Imager (VIS) Roshydromet (Roscosmos)	Meteor-M N1, Meteor-M N2	Being developed	High resolution optical imagers	Multi-spectral images of land and sea surfaces and ice cover.	Waveband: 0.4–0.9 μm, 6 channels Spatial resolution: 60–100 m Swath width: 900 km Accuracy:
Lagrange LABEN GNSS Receiver for Advanced Navigation, Geodesy and Experiments ASI	SAC-D	Being developed	Atmospheric temperature and humidity sounders	GPS Receiver including specialised version equipped with limb sounding antenna and dedicated signal tracking capability for meteorological, climate and space weather applications.	Waveband: Spatial resolution: Swath width: Accuracy:
Landsat Comms Communications package for Landsat USGS	Landsat-5, Landsat-7	Operational	Communications		Waveband: Spatial resolution: Swath width: Accuracy:
Laser Reflectors (ESA) Laser Reflectors ESA	CryoSat-2, GOCE	Being developed	Precision orbit	Measures distance between the satellite and the laser tracking stations.	Waveband: Spatial resolution: Swath width: Accuracy:
Laser Reflectors CNES	STARLETTE, STELLA	Operational	Precision orbit	Measures distance between the satellite and the laser tracking stations.	Waveband: Spatial resolution: Swath width: Accuracy:
L-band Radiometer Microwave radiometer NASA	SAC-D	Being developed	Imaging multi-spectral radiometers (passive microwave)	L-band passive microwave radiometer measures brightness temperature of ocean to retrieve salinity.	Waveband: L-band (1.4 GHz) Spatial resolution: 100 km Swath width: 300 km Accuracy: 0.2 psu

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
L-band Scatterometer (Aquarius) NASA (CONAE)	SAC-D	Being developed	Scatterometers	L-band scatterometer to provide roughness corection to brightness temperature.	Waveband: L-band (1.2 GHz) Spatial resolution: 100 km Swath width: 300 km Accuracy: 0.2 psu
LCCRA Laser Corner Cube Reflector Assembly ASI	LARES	Operational	Precision orbit	Accuracy measuments on Lense-Thirring effect and baseline tracking data for precision geodesy. Also for calibration of radar altimeter bias.	Waveband: Spatial resolution: Swath width: Accuracy: 2 cm overhead ranging
LEISA AC LEISA Atmospheric Corrector NASA	NMP EO-1	Operational	Imaging multi-spectral radiometers (vis/IR)	Corrects high spatial resolution multi-spectral imager data for atmospheric effects.	Waveband: 256 bands NIR–SWIR: 0.89–1.58 µm Spatial resolution: 250 m Swath width: 185 km Accuracy:
LI Lightning Imager EUMETSAT (ESA)	MTG-I1, MTG-I2, MTG-I3, MTG-I4	Being developed	Lightning imager	Real time lightning detection (cloud-to-cloud and cloud-to-ground strokes, with no discrimination between the two), lightning location.	Waveband: NIR neutral oxygen ligthning emission features at 777.4 nm Spatial resolution: 2 km at SSP <10 km at 45° N Swath width: 80% of visible earth disc, all EUMETSAT member states Accuracy: Lightning intensity: 50/10% hit rate/false alarm rate Lightning location: 50/10% HR/FAR (for isolated events 90% HR)
LIS Lightning Imager Sensor INPE	GPM-Br	Proposed	Lightning imager	Atmospheric electrical discharge imager.	Waveband: 0.7774 µm Spatial resolution: 3–6 km Swath width: 600 km Accuracy:
LIS Lightning Imager Sensor NASA	TRMM	Operational	Lightning imager	Global distribution and variability of total lightning. Data can be related to rainfall to study hydrological cycle.	Waveband: NIR: 0.7774 µm Spatial resolution: 4 km Swath width: FOV: 80 x 80° Accuracy: 90% day and night detection probability
LISS-III (IRS) Linear Imaging Self Scanner - III (IRS) ISRO	IRS-1D	Operational	High resolution optical imagers	Data used for vegetation type assessment, resource assessment, crop stress detection, crop production forecasting, forestry, land use and land cover change.	Waveband: VIS: Band 2: 0.52–0.59 µm Band 3: 0.62–0.68 µm NIR: Band 4: 0.77–0.86 µm SWIR: Band 5: 1.55–1.75 µm Spatial resolution: Bands 2, 3, 4: 23.5 m Band 5: 70.5 m Swath width: 141 km Accuracy:
LISS-III (RESOURCESAT) Linear Imaging Self Scanner - III (RESOURCESAT) ISRO	RESOURCESAT-1, RESOURCESAT-2	Operational	High resolution optical imagers	Data used for vegetation type assessment, resource assessment, crop stress detection, crop production forecasting, forestry, land use and land cover change.	Waveband: VIS: Band 2: 0.52–0.59 µm Band 3: 0.62–0.68 µm NIR: Band 4: 0.77–0.86 µm SWIR: Band 5: 1.55–1.75 µm Spatial resolution: 23.5 m Swath width: 141 km Accuracy:
LISS-IV Linear Imaging Self Scanner - IV ISRO	RESOURCESAT-1, RESOURCESAT-2	Operational	High resolution optical imagers	Vegetation monitoring, improved crop discrimination, crop yield, disaster monitoring and rapid assessment of natural resources.	Waveband: VIS: 0.52–0.59 µm, 0.62–0.68 µm NIR: 0.77–0.86 µm Spatial resolution: 5.8 m Swath width: 70 km Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
LM Lightning Mapper NRSCC	FY-4 O/A, FY-4 O/B, FY-4 O/C, FY-4 O/D, FY-4 O/E	Approved	Lightning imager	Lightning mapping for locating thunder storms in flooding season, CCD camear operating 0.77 μm to count flashes and intensity.	Waveband: 0.77 μm Spatial resolution: 10 km Swath width: Full Earth disc Accuracy:
LRA (LAGEOS) Laser Retroreflector Array ASI	LAGEOS-1, LAGEOS-2	Operational	Precision orbit	Baseline tracking data for precision geodesy. Also for calibration of radar altimeter bias. Several types used on various missions. (ASI involved in LAGEOS 2 development).	Waveband: Spatial resolution: Swath width: Accuracy: 2 cm overhead ranging
LRA Laser Retroreflector Array NASA (ASI)	Jason-1, Jason-2 (aka OSTM)	Operational	Precision orbit	Baseline tracking data for precision orbit determination and/or geodesy. Also for calibration of radar altimeter bias. Several types used on various missions. (ASI involved in LAGEOS 2 development).	Waveband: Spatial resolution: Swath width: Accuracy: 2 cm overhead ranging
LRIT Low-Rate Information Transmission NOAA	GOES-11, GOES-12, GOES-13, GOES-O, GOES-P, NOAA-N'	Operational	Communications	Follow-on from the Weather Facsimile (WEFAX) Processing System.	Waveband: Spatial resolution: Swath width: Accuracy:
MADRAS Microwave Analysis and Detection of Rain and Atmospheric Structures ISRO (CNES)	Megha-Tropiques	Being developed	Imaging multi-spectral radiometers (passive microwave)	To estimate rainfall, atmospheric water parameters and ocean surface winds in the equatorial belt.	Waveband: 18.7 GHz, 23.8 GHz, 36.5 GHz, 89 GHz, 157 GHz Spatial resolution: 40 km Swath width: 1700 km Accuracy:
MAESTRO Measurements of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation CSA	SCISAT-1	Operational	Atmospheric chemistry	Chemical processes involved in the depletion of the ozone layer.	Waveband: UV–NIR: 0.285–1.03 μm (1–2 nm spectral resolution) Spatial resolution: Approx 1–2 km vertical Swath width: Accuracy:
MAGIS Measurement of Atmospheric Gases using Infrared Spectrometer ISRO	ISTAG	Being developed	Atmospheric chemistry	To study the regional/global distribution of carbon monoxide (CO).	Waveband: Spatial resolution: Swath width: Accuracy:
Magnetometer (NOAA) Magnetometer NOAA	GOES-R, GOES-S	Approved	Magnetic field		Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
MAPI Multi-Angle Polarisation Imager ISRO	ISTAG	Being developed	Multiple direction/polarisation radiometers	Measurement of column integrated aerosol spectral optical depth.	Waveband: Spatial resolution: Swath width: Accuracy:
MAVELI Measurements of Aerosols by Viewing Earth's Limb ISRO	ISTAG	Being developed	Atmospheric chemistry	Vertical profiles of aerosols, ozone and water vapour in the free troposphere and stratosphere and cloud top height.	Waveband: Spatial resolution: Swath width: Accuracy: <1.0 K temperature 0.2 g/kg humidity
MBEI Multi-band Earth Imager NSAU	SICH-2	Being developed	High resolution optical imagers	Multi-spectral scanner images of land surface.	Waveband: VIS–NIR: 0.51–0.90 μm VIS: 0.51–0.59 μm, 0.61–0.68 μm; NIR: 0.80–0.89 μm Spatial resolution: 7.8 m Swath width: 46.6 km pointable ±35° from nadir Accuracy: 8 bits
MCP Meteorological Communications Package (MCP) EUMETSAT	MetOp-A, MetOp-B, MetOp-C	Operational	Communications	Meteorological Communications Package (MCP) onboard MetOp series satellites.	Waveband: Spatial resolution: Swath width: Accuracy:
MCSI Multiple Channel Scanning Imager NRSCC	FY-4 O/A, FY-4 O/B, FY-4 O/C, FY-4 O/D, FY-4 O/E	Approved	Imaging multi-spectral radiometers (vis/IR)	Multi-purpose visible/IR imagery and wind derivation.	Waveband: 12 channels from 0.55–13.8 μm Spatial resolution: 1 km VIS 2 km NIR 4 km TIR Swath width: Full Earth disc Accuracy:
MERIS Medium-Resolution Imaging Spectrometer ESA	Envisat	Operational	Imaging multi-spectral radiometers (vis/IR)	Main objective is monitoring marine biophysical and biochemical parameters. Secondary objectives are related to atmospheric properties such as cloud and water vapour and to vegetation conditions on land surfaces.	Waveband: VIS–NIR: 15 bands selectable across range: 0.4–1.05 μm (bandwidth programmable between 0.0025 and 0.03 μm) Spatial resolution: Ocean: 1040 m x 1200 m Land & coast: 260 m x 300 m Swath width: 1150 km global coverage every 3 days Accuracy: Ocean colour bands typical S:N = 1700
MERSI Moderate Resolution Spectral Imager NRSCC	FY-3A, FY-3B, FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Operational	Imaging multi-spectral radiometers (passive microwave)	Measurement of vegetation indexes and ocean colour.	Waveband: Spatial resolution: 250 m for broadband channels 1 km for narrowband channels Swath width: 2800 km Accuracy:
Meteosat Comms Communications package for Meteosat EUMETSAT	Meteosat-6, Meteosat-7	Operational	Communications	Communication package onboard Meteosat series satellites.	Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
MHS Microwave Humidity Sounder EUMETSAT	MetOp-A, MetOp-B, MetOp-C, NOAA-18, NOAA-N'	Operational	Atmospheric temperature and humidity sounders	Atmospheric humidity profiles, cloud cover, cloud liquid, water content, ice boundaries and precipitation data.	Waveband: Spatial resolution: Swath width: Accuracy: 10–20%	Microwave: 89 GHz, 166 GHz and 3 channels near 183 GHz Vertical: 3–7 km Horizontal: 30–50 km 1650 km Cloud water profile: 10 g/m^2 Specific humidity profile:
MI Meteorological Imager NRSCC	COMS-1	Approved	Imaging multi-spectral radiometers (passive microwave)	Continuous monitoring capability for the near-realtime generation of high resolution meteorological products and long-term change analysis of sea surface temperature and cloud coverage.	Waveband: Spatial resolution: Swath width: Accuracy:	1: VIS, 0.55–0.80 µm 2: SWIR: 3.50–4.00 µm 3: WV (Water Vapour): 6.50–7.00 µm 4: TIR1 (Thermal Infrared 1): 10.3–11.3 µm 5: TIR2 (Thermal Infrared 2): 11.5–12.5 µm VIS: 1 km IR: 4 km Full Earth disc
Microwave Radiometer (CONAE) MWR Radiometer (CONAE) CONAE	SAC-D	Being developed	Multiple direction/polarisation radiometers	Precipitation rate, wind speed, sea ice concentration, water vapour, clouds.	Waveband: Spatial resolution: Swath width: Accuracy:	(K-band) 23.8 GHz V Pol and 36.5 GHz H and V Pol Eight beams per frequency ‹ 47 km 380 km 1 K
MIPAS Michelson Interferometric Passive Atmosphere Sounder ESA	Envisat	Operational	Atmospheric temperature and humidity sounders and atmospheric chemistry	Data on stratosphere chemistry (global/polar ozone), climate research (trace gases/clouds), transport dynamics, tropospheric chemistry. Primary/secondary species: O_3, NO, NO_2, HNO_3, N_2O_5, $ClONO_2$, CH_4.	Waveband: Spatial resolution: Spectral resolution: Swath width: Accuracy:	MWIR–TIR: between 4.15 and 14.6 µm Vertical resolution: 3 km Vertical scan range 5–150 km Horizontal: 3 x 30 km 0.035 lines/cm Radiometric precision: 685–970 cm^{-1}: 1% 2410 cm^{-1}: 3%
MIRAS (SMOS) Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) ESA	SMOS	Being developed	Multiple direction/polarisation radiometers & Imaging multi-spectral radiometers (passive microwave)	Imaging multi-spectral radiometers (passive microwave) and multiple direction/polarisation radiometers.	Waveband: Spatial resolution: Swath width: Accuracy:	L-band 1.41 GHz 33–50 km depending on the position in the swath, resampled to 15 km grid Hexagon shape, nominal width 1050 km allowing a 3 day revisit time at the equator 2.6 K absolute accuracy, RMS 1.6–4 K depending on the scene and the position within the swath
MIRAS Multichannel Infrared Atmospheric Sounder NRSCC (CAST)	FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Prototype	Imaging multi-spectral radiometers (passive microwave)		Waveband: Spatial resolution: Swath width: Accuracy:	
MIREI Middle IR Earth Imager NSAU	SICH-2	Being developed	High resolution optical imagers	Scanner images of land surface in middle Infrared range.	Waveband: Spatial resolution: Swath width: Accuracy:	NIR: 1.55–1.7 µm 46.0 m 55.3 km pointable ±35° from nadir 8 bits

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
MIS Microwave Imager/Sounder NOAA	NPOESS-2, NPOESS-3	Being developed	Imaging multi-spectral radiometers (passive microwave)	Collects microwave radiometry and sounding data. Data types include atmospheric temperature and moisture profiles, clouds, sea surface winds, and all-weather land/water surfaces.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 190 GHz 15–50 km depending on frequency 1700 km Temperature Profiles to 1.6 K Water vapour 20%
MISR Multi-angle Imaging SpectroRadiometer NASA	Terra	Operational	Multiple direction/polarisation radiometers	Measurements of global surface albedo, aerosol and vegetation properties. Also provides multi-angle bidirectional data (1% angle-to-angle accuracy) for cloud cover and reflectances at the surface and aerosol opacities. Global and local modes.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS: 0.44 µm, 0.56 µm, 0.67 µm NIR: 0.86 µm 275 m, 550 m or 1.1 km Summation modes available on selected cameras/bands: 1 x 1, 2 x 2, 4 x 4, 1 x 4 1 pixel = 275 m x 275 m 360 km common overlap of all 9 cameras 0.03% hemispherical albedo 10% aerosol opacity 1–2% angle to angle accuracy in bidirectional reflectance
MLS (EOS-Aura) Microwave Limb Sounder (EOS-Aura) NASA	Aura	Operational	Atmospheric temperature and humidity sounders	Measures lower stratospheric temperature and concentration of H_2O, O_3, ClO, HCl, OH, HNO_3, N_2O and SO_2.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 118 GHz, 190 GHz, 240 GHz, 640 GHz and 2.5 THz 3 x 300 km horizontal 1.2 km vertical Limb scan 2.5–62.5 km Limb to limb Temparature: 4 K Ozone: 50%
MMP Magnetic Mapping Payload JPL, DNSC (CONAE)	SAC-C	Operational	Magnetic field	Measurement of the Earth's magnetic field with a vector and a scalar magnetometer.	Waveband: Spatial resolution: Swath width: Accuracy:	
MMRS Multi-spectral Medium Resolution Scanner CONAE	SAC-C	Operational	Imaging multi-spectral radiometers (vis/IR)	Applications related to agriculture, environment, forestry, hydrology, oceanography, mineralogy and geology, desertification, contamination and protection of ecosystems.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS–NIR: 480–500 nm, 540–560 nm, 630–690 nm, 795–835 nm SWIR: 1550–1700 nm 175 m 360 km
MOC Multi-spectral Optical Camera CONAE	SAC-E/ SABIA/ma	Approved	Imaging multi-spectral radiometers (vis/IR)	Sea and coastal studies.	Waveband: Spatial resolution: Swath width: Accuracy:	Optical and Thermal Infrared Cameras, up to 15 bands
MODIS MODerate-Resolution Imaging Spectroradiometer NASA	Aqua, Terra	Operational	Imaging multi-spectral radiometers (vis/IR) and ocean colour instruments	Data on biological and physical processes on the surface of the Earth and in the lower atmosphere, and on global dynamics. Surface temperatures of land and ocean, chlorophyll fluorescence, land cover measurements, cloud cover (day and night).	Waveband: Spatial resolution: Swath width: Accuracy:	VIS–TIR: 36 bands in range 0.4–14.4 µm Cloud cover: 250 m (day) and 1000 m (night) Surface temperature: 1000 m 2330 km Long wave radiance: 100 nW/m² Short wave radiance: 5% Surface temperature of land: <1 K Surface temperature of ocean: <0.2 K Snow and ice cover: 10%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
MOPITT Measurements Of Pollution In The Troposphere CSA (NASA)	Terra	Operational	Atmospheric chemistry	Measurements of CO in the troposphere.	Waveband: SWIR–MWIR: 2.3 µm, 2.4 µm, 4.7 µm Spatial resolution: CO profile: 4 km vertical 22 x 22 km horizontal CO, CH_4 column: 22x22 km horizontal Swath width: 616 km Accuracy: Carbon monoxide (4 km layers): 10%
MS (GISTDA) Multi spectral imager GISTDA	THEOS	Approved	Imaging multi-spectral radiometers (vis/IR)	THEOS MS consists of 4 spectral bands (R,G,B, NIR) with resolution 15 m and swath width at 90 km. The applications which are suitable for this instrument such as cartography, land use, land cover change management, agricultural and natural resources management, etc.	Waveband: 0.45–0.52 µm 0.53–0.60 µm 0.62–0.69 µm 0.77–0.90 µm Spatial resolution: 15 m Swath width: 90 km Accuracy:
MSC Multi-Spectral Camera KARI	KOMPSAT-2	Operational	High resolution optical imagers	High resolution imager for land applications of cartography and disaster monitoring.	Waveband: VIS–NIR: 0.50–0.92 µm VIS: 0.45–0.52 µm, 0.52–0.60 µm, 0.63–0.69 µm NIR: 0.76–0.90 µm Spatial resolution: Pan: 1 m VNIR: 4 m Swath width: 15 km Accuracy:
MSG Comms Communications package for MSG EUMETSAT	Meteosat-10, Meteosat-8, Meteosat-9	Operational	Communications	Communication package onboard MSG series satellites.	Waveband: Spatial resolution: Swath width: Accuracy:
MSI (BJ-1) Multi-spectral Imager NRSCC (CAST)	BJ-1	Operational	Imaging multi-spectral radiometers (vis/IR)	To provide multi-spectral analysis of hydrological, oceanographic, land use and meteorological parameters.	Waveband: Green 520–600 nm Red 630–690 nm NIR 760–900 nm Spatial resolution: 32 m Swath width: 600 km Accuracy: 800 m
MSI (EarthCARE) Multi Spectral Imager (EarthCARE) ESA	EarthCARE	Approved	Imaging multi-spectral radiometers (vis/IR)	Observation of cloud properties and aerosol (aerosols to be confirmed.	Waveband: VIS – NIR: Band1: VIS, 670 nm Band2: NIR, 865 nm Band3: SWIR–1, 1.67 µm Band4: SWIR–2, 2.21 µm Thermal Infrared: Band5: 8.8 µm Band6: 10.8 µm Band7: 12.0 µm Spatial resolution: 500 x 500 m Swath width: 150 km asymmetrically 35 km to 115 km versus nadir point Accuracy:
MSI (Sentinel-2) Multi-Spectral Instrument (Sentinel-2) ESA (EC)	Sentinel-2 A, Sentinel-2 B, Sentinel-2 C	Being developed	Imaging multi-spectral radiometers (passive microwave)	Monitoring of land surfaces for operational land services: land cover, land use, bio-geophysical products.	Waveband: 13 bands in the VNIR/SWIR Spatial resolution: 10 m for 4 bands in VNIR 60 m for 3 dedicated atmospheric correction bands 20 m for remaining bands Swath width: 290 km Accuracy: absolute radiometric accuracy for L1c data 3–5%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
MSI Multi Spectral Imager DLR	RapidEye	Approved	High resolution optical imagers	High resolution images with short observing cycle for commercial and scientific applications.	Waveband: 4 VIS + 1 NIR band: 440–510 nm, 520–590 nm, 630–685 nm, 690–730 nm, 760–850 nm Spatial resolution: 6.5 m Swath width: 78 km Accuracy: 2–3%
MSMR Multifrequency Scanning Microwave Radiometer ISRO	OCEANSAT-1	Operational	Imaging multi-spectral radiometers (passive microwave)	Sea surface temperature, ocean surface winds, cloud liquid water, precipitation over ocean.	Waveband: Microwave: 6.6 GHz, 10.6 GHz, 18 GHz, 21 GHz Spatial resolution: 40 m at 21 GHz to 120 m at 6.6 GHz Wind speed: 75 x 75 km Sea surface temperature: 146 x 150 km Swath width: 1360 km Accuracy: Sea surface temperature: 1.5K Sea surface wind speed: 1.5 m/s
MSS (Roscosmos) Multi-spectral film-making system Roscosmos (Roshydromet)	Kanopus-V N1	Prototype	High resolution optical imagers	Multi-spectral images of land and sea surfaces and ice cover.	Waveband: 0.5–0.6 µm, 0.6–0.7 µm, 0.7–0.8 µm, 0.8–0.9 µm Spatial resolution: 12 m Swath width: 20 km Accuracy:
MSS Multi-spectral Scanner USGS (NASA)	Landsat-5	Operational	Imaging multi-spectral radiometers (vis/IR)	Measures surface radiance. Data mostly used for land applications.	Waveband: VIS – NIR: 4 bands: 0.5–1.1 µm Spatial resolution: 80 m Swath width: 185 km Accuracy:
MSS-BIO Polyzonal scanning system of bioefficiency of sea water areas Roshydromet (Roscosmos)	Meteor-M N3	Being developed	Ocean colour instruments	Multi-spectral images sea surfaces for water areas bioefficiency.	Waveband: 0.41–0.9 µm Spatial resolution: 80 m, 300 m Swath width: 800 km, 3000 km Accuracy:
MSU-200 Multi-spectral high resolution electronic scanner (VIS) Roscosmos (Roshydromet)	Kanopus-V N1	Prototype	High resolution optical imagers	Multi-spectral images of land and sea surfaces and ice cover.	Waveband: 0.54–0.86 µm Spatial resolution: 25 m Swath width: 250 km Accuracy:
MSU-GS Multi-spectral scanning imager-radiometer Roshydromet (Roshydromet)	Elektro-L N1, Elektro-L N2, Elektro-L N3	Prototype	Imaging multi-spectral radiometers (vis/IR)	Measurements of cloud cover, cloud top height, precipitation, cloud motion, vegetation, radiation fluxes, convection, air mass analysis, cirrus cloud discrimination, tropopause monitoring, stability monitoring, total ozone and sea surface temparature.	Waveband: VIS: 0.5–0.65 µm, 0.65–0.8 µm (broadband) NIR: 0.9 µm MWIR: 3.5–4.01 µm TIR: 5.7–7.0 µm, 8 µm, 8.7 µm, 9.7 µm, 10.2–11.2 µm, 11.2–12.5 µm Spatial resolution: 1 km for VIS 4 km for IR channels Swath width: Full Earth disc Accuracy: VIS: 5% IR: 0.35 K

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
MSU-MR Images of clouds, snow, ice and land cover Roshydromet (Roscosmos)	Meteor-M N1, Meteor-M N2	Prototype	Imaging multi-spectral radiometers (vis/IR)	Images of clouds, snow, ice and land cover for derivation of Earth and atmosphere geophysical parameters.	Waveband: Visible: 0.5–0.7 μm NIR: 0.7–1.1 μm SWIR: 1.6–1.8 μm MWIR: 3.5–4.1 μm TIR: 10.5–11.5 μm, 11.5–12.5 μm Spatial resolution: 1 km Swath width: 3000 km Accuracy: VIS: 0.5% IR: 0.1 K
MTSAT Comms Communications package for MTSAT JMA	MTSAT-1R, MTSAT-2	Operational	Communications		Waveband: Spatial resolution: Swath width: Accuracy:
MTSAT DCS Data Collection System for MTSAT JMA	MTSAT-1R, MTSAT-2	Operational	Communications		Waveband: Spatial resolution: Swath width: Accuracy:
MTVZA Scanning microwave radiometer Roshydromet (Roscosmos)	Meteor-M N1, Meteor-M N2	Operational	Imaging multi-spectral radiometers (passive microwave)	Provision of atmospheric temperature and humidity profiles, detection of precipitation etc.	Waveband: 10.6–183.3 GHz, 26 channels Spatial resolution: 12–75 km Swath width: 2600 km Accuracy: 0.4–2.0 K depending on spectral band
MTVZA-OK Scanning microwave radiometer Roshydromet	Kanopus-Vulkan	Approved	Atmospheric temperature and humidity sounders	Multi-Spectral Scanner Images of Earth Surface.	Waveband: Microwave: 6.9 (V,H), 10.6 (V,H), 18.7 (V,H), 23.8 (V), 31.5 (V,H), 36.7 (V,H), 42 (V,H), 48 (V,H), 52.3–57.0 (V,H), 91 (V,H), 183.31 GHz VIS: 0.37–0.45 μm, 0.45–0.51 μm, 0.58–0.68 μm, 0.68–0.78 μm IR: 10.4–11.5 μm, 11.5–12.6 μm Spatial resolution: Microwave: 12 x 200 km Visible: 1.1 or 4.0 km IR: 1.1 or 4.0 km Swath width: 2000 km Accuracy:
MUX Multi-spectral CCD Camera CAST (INPE)	CBERS-3, CBERS-4	Being developed	Imaging multi-spectral radiometers (vis/IR)	Earth resources, environmental monitoring, land use.	Waveband: Spatial resolution: 20 m Swath width: Accuracy:
MVIRI Meteosat Visible and Infrared Imager EUMETSAT (ESA)	Meteosat-6, Meteosat-7	Operational	Imaging multi-spectral radiometers (vis/IR)	Measures cloud cover, motion, height, upper tropospheric humidity and sea surface temperature.	Waveband: VIS–NIR: 0.5–0.9 μm TIR: 5.7–7.1 μm (water vapour), 10.5–12.5 μm Spatial resolution: Visible: 2.5 km Water vapour: 5 km (after processing) TIR: 5 km Swath width: Full Earth disc in all three channels, every 30 minutes Accuracy: Cloud top height: 0.5 km Cloud top / sea surface temperature: 0.7 K Cloud cover: 15%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
MVIRS Moderate Resolution Visible and Infrared Imaging Spectroradiometer NRSCC (CAST)	FY-3F, FY-3G	Approved	Imaging multi-spectral radiometers (vis/IR)	Measures surface temparature and cloud and ice cover. Used for snow and flood monitoring and surface temperature.	Waveband: VIS – TIR: 0.47–12.5 μm (20 channels) Spatial resolution: Swath width: Accuracy:
MVISR (10 channels) Multi-spectral Visible and Infrared Scan Radiometer (10 channels) NRSCC (CAST)	FY-1D	Operational	Imaging multi-spectral radiometers (vis/IR)	To provide multi-spectral analysis of hydrological, oceanographic, land use and meteorological parameters. Global imager & SST. Ocean colour.	Waveband: 10 channels: VIS: 0.43–0.48 μm, 0.48–0.53 μm, 0.53–0.58 μm, 0.58–0.68 μm NIR: 0.84–0.89 μm NIR – SWIR: 0.90–0.965 μm, 1.58–1.68 μm, 3.55–3.93 μm TIR: 10.3–11.3 μm, 11.5–12.5 μm Spatial resolution: 1.1 km Swath width: 3200 km Accuracy:
MWAS MicroWave Atmospheric Sounder NRSCC (CAST)	FY-3A, FY-3B	Operational	Atmospheric temperature and humidity sounders	Meteorological applications.	Waveband: Microwave: 19.35–89.0 GHz (8 channels) Spatial resolution: Swath width: Accuracy:
MWHS MicroWave Humidity Sounder NRSCC (CAST)	FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Approved	Atmospheric temperature and humidity sounders	Meteorological applications.	Waveband: Microwave: 19.35–89.0 GHz (8 channels) Spatial resolution: 15 km at media 41 x 27 km at outer edge Swath width: 2700 km Accuracy: 0.1–0.9 km
MWR Microwave Radiometer ESA	Envisat, ERS-2	Operational	Imaging multi-spectral radiometers (passive microwave) and atmospheric temperature and humidity sounders	To provide multi-spectral analysis of hydrological, oceanographic, land use and meteorological parameters. Global imager & SST. Ocean colour.	Waveband: Microwave: 23.8 and 36.5 GHz Spatial resolution: 20 km Swath width: 20 km Accuracy: Temparature: 2.6 K
MWRI MicroWave Radiation Imager NRSCC (CAST)	FY-3A, FY-3B, FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Operational	Imaging multi-spectral radiometers (passive microwave)	All weather observations of precipitation, cloud features, vegetation, soil moinsture, sea ice, etc.	Waveband: 12 channels, 6 frequencies: 10.65 GHz, 18.7 GHz, 23.8 GHz, 36.5 GHz, 89 GHz, 150 GHz Spatial resolution: 7.5 x 12 km at 150 GHz to 51 x 85 km at 10.65 GHz Swath width: 1400 km Accuracy:
MWTS MicroWave Temperature Sounder NRSCC	FY-3A, FY-3B, FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Operational	Atmospheric temperature and humidity sounders	Temperature sounding in nearly all weather conditions.	Waveband: 50.3 GHz, 53.6 GHz, 54.94 GHz, 57.29 GHz Spatial resolution: 62 km Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
MxT Multi-spectral CCD Camera ISRO	IMS-1	Operational	Imaging multi-spectral radiometers (vis/IR)	Natural resources management.	Waveband: VIS: Band 1: 0.45–0.52 µm Band 2: 0.52–0.59 µm Band 3: 0.62–0.68 µm NIR: Band 4: 0.77–0.86 µm Spatial resolution: 37 m Swath width: 151 km Accuracy:
NigeriaSat Medium and High Resolution NigeriaSat Remote Sensing (Medium and High Resolution) NASRDA	NigeriaSat-2	Approved	High resolution optical imagers	High resolution images for monitoring of land surface and coastal processes and for agricultural, geological and hydrological applications.	Waveband: NIR: ~0.75 µm – ~1.3 µm VIS: ~0.40 µm – ~0.75 µm Spatial resolution: 2.5 PAN, 5 m multi-spectral (red blue green, NIR), 32 m multi-spectral (red, green, NIR) Swath width: 20 x 20 km , 300 x 300 km Accuracy: 25–35 m
NigeriaSat Medium Resolution NigeriaSat Remote Sensing (medium resolution) NASRDA	NigeriaSat-1	Operational	Imaging multi-spectral radiometers (vis/IR)	Medium resolution images for monitoring of land surface and coastal processes and for agricultural, geological and hydrological applications.	Waveband: NIR: ~0.75 µm – ~1.3 µm VIS: ~0.40 µm – ~0.75 µm Spatial resolution: 32 m multi-spectral (red, green, NIR) Swath width: 600 x 600 km Accuracy: 150–300 m
NIRST New Infrared Sensor Technology CONAE (CSA)	SAC-D	Being developed	Other	NIRST detects hot spots and High Temperature Events (HTE), caused by biomass fires, volcanic eruptions, and other phenomena in order to measure their temperatures, and their released energy over land (fires & volcanic events). Supplementary measurements of sea surface temperatures (SST) off the coasts of South America and other targets of opportunity with 180 km swath, overlapping the Aquarius inner beams.	Waveband: Infrared push-broom scanner based on 2 linear uncooled microbolometric arrays sensitive to Mid-Wave Infrared (3.8 µm) and Long-Wave Infrared (10.85 and 11.85 µm) spectral bands respectively Spatial resolution: Space resol: 350 m Less burned area detectable: 200 m^2 Swath width: Instant: 182 km Extended: 1000 km Accuracy: 0.5°C
NOAA Comms Communications package for NOAA NOAA	NOAA-15, NOAA-16, NOAA-17, NOAA-18, NOAA-N'	Operational	Communications		Waveband: Spatial resolution: Swath width: Accuracy:
NVK Low-frequency wave complex Roscosmos	Kanopus-Vulkan	TBD	Other		Waveband: 1 Hz – 25 kHz Spatial resolution: Swath width: Accuracy:
OBA Observador Brasileiro da Amazonia INPE	AMAZÔNIA-1	Approved	Imaging multi-spectral radiometers (vis/IR)	Used for fire extent detection and temperature measurement, coastal and vegetation monitoring, land cover and land use mapping.	Waveband: VIS: 0.45–0.50 µm, 0.52–0.57 µm, 0.63–0.69 µm NIR: 0.76–0.90 µm MWIR: 3.4–4.2 µm Spatial resolution: VIS–NIR: 100 m MIR: 300 m Swath width: 2200 km (equatorial belt from latitude 5°N to 15°S) Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
OCM (OCEANSAT-3) Ocean Colour Monitor (OCEANSAT-3) ISRO	OCEANSAT-3	Proposed	Ocean colour instruments	Ocean colour data, estimation of phytoplankton concentration, identification of potential fishing zones, assessment of primary productivity.	Waveband: 12 channel Spatial resolution: Swath width: Accuracy:
OCM Ocean Colour Monitor ISRO	OCEANSAT-1 OCEANSAT-2	Operational	Ocean colour instruments	Ocean colour data, estimation of phytoplankton concentration, identification of potential fishing zones, assessment of primary productivity.	Waveband: VIS–NIR: 0.40–0.88 µm (8 channels) Spatial resolution: 236 m x 360 m Swath width: 1440 km Accuracy:
OLCI Ocean and Land Colour Imager ESA (EC)	Sentinel-3 A, Sentinel-3 B, Sentinel-3 C	Approved	Imaging multi-spectral radiometers (passive microwave)	Marine and land services.	Waveband: 21 bands in VNIR/SWIR Spatial resolution: 300 m Swath width: 1270 km, across-track tilt 12.2° to the West Accuracy: 2% abs 0.1% rel.
OLI Operational Land Imager USGS (NASA)	LDCM	Being developed	Imaging multi-spectral radiometers (vis/IR)	Measures surface radiance and emittance, land cover state and change (eg vegetation type). Used as multi-purpose imagery for land applications.	Waveband: VIS–SWIR: 9 bands: 0.43–2.3 µm Spatial resolution: Pan: 15 m VIS–SWIR: 30 m Swath width: 185 km Accuracy: Absolute geodetic accuracy of 65 m Relative geodetic accuracy of 25 m (excluding terrain effects) Geometric accuracy of 12 m or better
OLS Operational Linescan System NOAA (DoD (USA))	DMSP F-14, DMSP F-15, DMSP F-16, DMSP F-17, DMSP F-18, DMSP F-19, DMSP F-20	Operational	Imaging multi-spectral radiometers (vis/IR)	Day and night cloud cover imagery.	Waveband: VIS–NIR: 0.4–1.1 µm TIR: 10.0–13.4 µm, 0.47–0.95 µm Spatial resolution: 0.56 km (fine) 5.4 km (stereo products) Swath width: 3000 km Accuracy:
OMI Ozone Measuring Instrument NIVR (Netherland) (NASA)	Aura	Operational	Atmospheric chemistry	Mapping of ozone columns, key air quality components (NO_2, SO_2, BrO, OClO and aerosols), measurements of cloud pressure and coverage, global distribution and trends in UV-B radiation.	Waveband: UV: 270–314 nm & 306–380 nm VIS: 350–500 nm Spatial resolution: 13 km x 24 km or 36 km x 48 km depending on the product. Also has zoom modes (13 km x 13 km) for example for urban pollution detection Swath width: 2600 km Accuracy:
OMPS Ozone Mapping and Profiler Suite NOAA	NPOESS-3, NPOESS-4, NPP	Being developed	Atmospheric chemistry	Measures total amount of ozone in the atmosphere and the ozone concentration variation with altitude.	Waveband: Nadir Mapper: UV 0.3–0.38 µm Nadir profiler: UV 0.25–0.31 µm Limb soundings: UV–TIR 0.29–10 µm Spatial resolution: Mapper: 50 km Profiler: 250 km Limb: 1 km vertical Swath width: Mapper: 2800 km Profiler: 250 km Limb: 3 vertical slits along track ± 250 km Accuracy: Total Ozone: 15 Dobson units Profile Ozone: 10% between 15 and 60 km, 20% between Tropopause and 15 km

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
OSIRIS Optical Spectrograph and Infrared Imaging System CSA (SNSB)	Odin	Operational	Atmospheric chemistry	Detects aerosol layers and abundance of species such as O_3, NO_2, OClO, and NO. Consists of spectrograph and IR imager. Measures temperature for altitudes above 30 km.	Waveband: Spatial resolution: Swath width: Accuracy:	Spectrograph: UV–NIR: 0.28–0.80 µm IR Imager, NIR: 1.26 µm, 1.27 µm, 1.52 µm Spectrograph 1 km at limb, Imager 1 km in vertical N/A, but measures in the altitude range 5–100 km Depends on species
Overhauser Magnetometer OM CNES	Ørsted (Oersted)	Operational	Magnetic field	Measurements of the strength of the Earth's magnetic field.	Waveband: Spatial resolution: Swath width: Accuracy:	
PALSAR Phased Array type L-band Synthetic Aperture Radar JAXA (METI (Japan))	ALOS	Operational	Imaging microwave radars	High resolution microwave imaging of land and ice for use in environmental monitoring, agriculture and forestry, disaster monitoring, Earth resource management and interferometry.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: L-band 1270 MHz (depending on looks, incident angle and bandwidth) Hi-res: 7–44 m or 14–88 m ScanSAR mode: 35–77 m or 70–154 m Polarimetry: 24–88 m High resolution mode: 70 km Scan SAR mode: 250–360 km Polarimetry: 30 km Surface Resolution: 10 m (Fine Mode) Surface Resolution: 100 m (Scan Mode) Radiometric: ±1 dB
Pamela Roscosmos	Resurs DK 1	Operational	Space environment	Cosmic ray research.	Waveband: Spatial resolution: Swath width: Accuracy:	
PAN (BJ-1) Panchromatic Imager NRSCC (CAST)	BJ-1	Operational	High resolution optical imagers	To provide panchromatica analysis of hydrological, oceanographic, land use and meteorological parameters.	Waveband: Spatial resolution: Swath width: Accuracy:	500–800 nm 4 m 24 km 100 m
PAN (Cartosat-1) Panchromatic sensor ISRO	CARTOSAT-1	Operational	High resolution optical imagers	High resolution stereo images for study of topography, urban areas, development of DTM, run-off models etc. Urban sprawl, forest cover/timber volume, land use change.	Waveband: Spatial resolution: Swath width: Accuracy:	Panchromatic VIS: 0.5–0.75 µm 2.5 m 30 km
PAN (Cartosat-2) Panchromatic Camera ISRO	CARTOSAT-2	Operational	High resolution optical imagers	High resolution stereo images for large scale (better than 1:0000) mapping applications, urban applications, GIS ingest.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS: 0.5–0.75 µm 1 m 10 km
PAN (Cartosat-3) Panchromatic sensor ISRO	CARTOSAT-3	Being developed	High resolution optical imagers	High resolution images for study of topography, urban areas, development of DTM, run-off models etc. Urban sprawl, forest cover/timber volume, land use change.	Waveband: Spatial resolution: Swath width: Accuracy:	Panchromatic VIS: 0.5–0.75 µm 0.3 m 6 km

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
PAN (GISTDA) Panchromatic imager GISTDA	THEOS	Approved	High resolution optical imagers	THEOS PAN is an optical instrument with resolution 2 m and swath width at 22 km. It can be used in several applications such as cartography, land use planning and management, national security, etc.	Waveband: 0.45–0.90 µm Spatial resolution: 2 m Swath width: 22 km Accuracy:
PAN (IRS-1C/1D) Panchromatic sensor ISRO	IRS-1D	Operational	High resolution optical imagers	High resolution stereo images for study of topography, urban areas, development of DTM, run-off models etc. Urban sprawl, forest cover/timber volume, land use change.	Waveband: Panchromatic VIS: 0.5–0.75 µm Spatial resolution: 5.8 m Swath width: 70 km at nadir Accuracy:
PAN CAMERA Pancromatic camera ASI	PRISMA	Approved	High resolution optical imagers	Pancromatic and Hyperspectral data for complex land ecosystem studies.	Waveband: Spatial resolution: 5 m Swath width: 30 km Accuracy: 5%
PAN Panchromatic and multi-spectral imager CAST	CBERS-3, CBERS-4	Being developed	High resolution optical imagers	Measurements of cloud type and extent and land surface reflectance, and used for global land surface applications.	Waveband: VIS: 0.52–0.59 µm, 0.63–0.69 µm NIR: 0.77–0.89 µm PAN: 0.51–0.85 µm Spatial resolution: 5 m panchromatic and 10 m multi-spectral Swath width: 60 km Accuracy:
PAN+MS (RGB+NIR) Ingenio PAN+MS (RGB+NIR) CDTI (ESA)	Ingenio (SEOSAT)	Approved	High resolution optical imagers	High resolution multi-spectral land optical images for applications in cartography, land use, urban management, water management, environmental monitoring, risk management and security.	Waveband: VIS+NIR band: 450–680 nm, 450–520 nm, 520–600 nm, 630–690 nm, 760–900 nm Spatial resolution: PAN: 2.5 m MS: 10 m Swath width: 60 km Accuracy:
Panchromatic High Sensitivity Camera CONAE	SARE-1	TBD	Imaging multi-spectral radiometers (vis/IR)		Waveband: Spatial resolution: Swath width: Accuracy:
PMR Passive Microwave Radiometer ISRO	OCEANSAT-3	Being developed	Imaging multi-spectral radiometers (passive microwave)	Mainly for ocean biology and sea state applications including SWH, geoid etc., establishment of global databases, meteorological applications.	Waveband: 18 GHz, 21 GHz, 37 GHz Spatial resolution: 20 km, 17 km, 10 km Swath width: 1500 km Accuracy:
POLDER-P POLarization and Directionality of the Earth's Reflectances (PARASOL version) CNES	PARASOL	Operational	Multiple direction/polarisation radiometers	Measures polarization, and directional and spectral characteristics of the solar light reflected by aerosols, clouds, oceans and land surfaces.	Waveband: VIS–NIR: 0.490 µm, 0.670 µm and 0.865 µm at 3 polarisations, and 0.49 µm, 0.565 µm, 0.763 µm, 0.765 µm, 0.91 µm and 1.02 µm with no polarisation Spatial resolution: 5.5 km x 5.5 km Swath width: 1600 km Accuracy: Radiation budget, land surface, Reflectance: 2%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
POSEIDON-2 (SSALT-2) Positioning Ocean Solid Earth Ice Dynamics Orbiting Navigator (Single frequency solid state radar altimeter) CNES	Jason-1	Operational	Radar altimeters	Nadir viewing sounding radar for provision of real-time high precision sea surface topography, ocean circulation and wave height data.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: Ku-band (13.575 GHz), C-band (5.3 GHz) Basic measurement: 1/sec (6 km along track) Raw measurement: 10/sec (600 m along track) On baseline Topex/Poseidon orbit (10 day cycle): 300 km between tracks at equator Sea level: 3.9 cm Significant waveheight: 0.5 m Horizontal sea surface wind speed: 2 m/s
POSEIDON-3 Positioning Ocean Solid Earth Ice Dynamics Orbiting Navigator (Single frequency solid state radar altimeter) CNES	Jason-2 (aka OSTM)	Operational	Radar altimeters	Nadir viewing sounding radar for provision of real-time high precision sea surface topography, ocean circulation and wave height data.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: Ku-band (13.575 GHz), C-band (5.3 GHz) Basic measurement: 1/sec (6 km along track) Raw measurement: 10 /sec (600 m along track) On baseline Topex/Poseidon orbit (10 day cycle): 300 km between tracks at equator Sea level: 3.9 cm Significant waveheight: 0.5 m Horizontal sea surface wind speed: 2 m/s
PR Precipitation Radar JAXA (NASA)	TRMM	Operational	Cloud profile and rain radars	Measures precipitation rate in tropical latitudes.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 13.796 GHz and 13.802 GHz Range resolution: 250 m Horizontal resolution: 4.3 km at nadir 215 km (post-boost: 245 km) Observable range: from surface to approx 15 km altitude Rainfall rate 0.7 mm/h at storm top
PREMOS PREcision Monitoring of Solar variability CNES	PICARD	Being developed	Earth radiation budget radiometer	Solar UV and visible flux in selected wavelength bands.	Waveband: Spatial resolution: Swath width: Accuracy:	UV: 230 nm, 311 nm, 402 nm VIS: 548 nm
PRISM Panchromatic Remote-sensing Instrument for Stereo Mapping JAXA	ALOS	Operational	High resolution optical imagers	High resolution panchromatic stereo imager for land applications which include cartography, digital terrain models, civil planning, agriculture and forestry.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS–NIR: 0.52–0.77 µm (panchromatic) 2.5 m 35 km (triplet stereo observations) 70 km (nadir observations)
PSA Panchromatic film-making equipment Roscosmos	Monitor-E	Operational	Imaging multi-spectral radiometers (vis/IR)	Earth surface monitoring.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS – NIR: 0.51–0.85 µm 8 m 90/780 km

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
PSS Panchromatic film-making system Roscosmos (Roshydromet)	Kanopus-V N1	Prototype	Imaging multi-spectral radiometers (vis/IR)	Panchromatic data for environmental monitoring, agriculture and forestry.	Waveband: 0.5–0.8 µm Spatial resolution: 2.5 m Swath width: 20 km Accuracy:
RA Radar Altimeter ESA	ERS-2	Operational	Radar altimeters	Measures wind speed, significant wave height, sea surface elevation, ice profile, land and ice topography, and sea ice boundaries.	Waveband: Microwave: Ku-band: 13.8 GHz Spatial resolution: Footprint is 16–20 km Swath width: Accuracy: Wave height: 0.5 m or 10% (whichever is smaller) Sea surface elevation: better than 10 cm
RA-2 Radar Altimeter - 2 ESA	Envisat	Operational	Radar altimeters	Measures wind speed, significant wave height, sea surface elevation, ice profile, land and ice topography, and sea ice boundaries.	Waveband: Microwave: 13.575 GHz (Ku-band) & 3.2 GHz (S-band) Spatial resolution: Swath width: Accuracy: Altitude: better than 4.5 cm, Wave height: better than 5% or 0.25 m
RAD Microwave radiometer NSOAS	HY-2A	Being developed	Imaging multi-spectral radiometers (passive microwave)	Ocean wind and temperature measurements.	Waveband: 6.6 GHz, 10.7 GHz, 18.7 GHz, 23.8 GHz, 37.0 GHz Spatial resolution: 100 km, 62 km, 36 km, 30 km, 18 km Swath width: 1600 km Accuracy: 1 K
Radar Altimeter NASA	GFO (GEOSAT Follow-on)	Operational	Radar altimeters	Ocran altimetry observations.	Waveband: 13.5 GHz Spatial resolution: 3.5 cm Swath width: Accuracy:
Radar/Radiometer NASA	SMAP	Proposed	Other	Soil moisture.	Waveband: Microwave Spatial resolution: Swath width: Accuracy:
RADARSAT DTT X-band (downlink of payload) CSA	RADARSAT-1	Operational	Communications		Waveband: Spatial resolution: Swath width: Accuracy:
RADARSAT TTC S-band (Tracking, Telemetry and Command) CSA	RADARSAT-1	Operational	Communications		Waveband: Spatial resolution: Swath width: Accuracy:
Radiomet Roscosmos (Roscosmos)	Meteor-M N2, Meteor-M N3	Approved	Atmospheric temperature and humidity sounders	Provision of high vertical resolution atmospheric temperature and humidity profiles.	Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
RASAT VIS Multi-spectral RASAT VIS Multi-spectral camera Tubitak	RASAT	Being developed	Imaging multi-spectral radiometers (vis/IR)	High resolution images for monitoring of land surface and coastal processes and for agricultural, geological and hydrological applications.	Waveband: Band 1: 0.42–0.55 µm Band 2: 0.55–0.63 µm Band 3: 0.58–0.73 µm Spatial resolution: 15 m Swath width: 30 km Accuracy:
RASAT VIS Panchromatic RASAR VIS Panchromatic camera Tubitak	RASAT	Being developed	Imaging multi-spectral radiometers (vis/IR)	High resolution images for monitoring of land surface and coastal processes and for agricultural, geological and hydrological applications.	Waveband: 0.42–0.73 µm Spatial resolution: 7.5 m Swath width: 30 km Accuracy:
RBE Roscosmos	Kanopus-Vulkan	TBD	Magnetic field and space environment		Waveband: 150 MHz, 400 MHz Spatial resolution: Swath width: Accuracy:
RCHA Roscosmos	Kanopus-Vulkan	TBD	Other		Waveband: 50 kHz – 15 MHz Spatial resolution: Swath width: Accuracy:
RDSA Multi-spectral Imager Roscosmos	Monitor-E	Operational	Imaging multi-spectral radiometers (vis/IR)	Multi-spectral Earth surface monitoring.	Waveband: VIS–NIR: 0.54–0.59 µm, 0.63–0.68 µm, 0.79–0.9 µm Spatial resolution: 20/40 m Swath width: 160/890 km Accuracy:
ROSA Radio Occultation Sounder for Atmospheric studies ISRO	OCEANSAT-2	Being developed	Atmospheric temperature and humidity sounders and precision orbit	It will provide vertical profiles of atmospheric density, refractivity, pressure, temperature and humidity upto height of 30 km.	Waveband: Frequency 1560–1590 MHz and 1212–1242 MHz Spatial resolution: Swath width: Accuracy: <1.0 K temperature 0.2 g/kg humidity
ROSA Radio Occultation Sounder for the Atmosphere ASI (CONAE)	SAC-D	Being developed	Atmospheric temperature and humidity sounders and precision orbit	Climate change studies.	Waveband: Spatial resolution: Swath width: Accuracy:
RRA Retroreflector Array CNES	Diademe 1&2	Operational	Precision orbit	Satellite laser ranging for geodynamic measurements.	Waveband: Spatial resolution: Swath width: Accuracy:
S&R (GOES) Search and Rescue NOAA	GOES-11, GOES-12, GOES-13, GOES-O, GOES-P	Operational	Other	Satellite and ground based system to detect and locate aviators, mariners, and land-based users in distress.	Waveband: Spatial resolution: Swath width: Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
S&R (NOAA) Search and Rescue Satellite Aided Tracking NOAA	MetOp-A, MetOp-B, NOAA-15, NOAA-16, NOAA-17, NOAA-18, NOAA-N'	Operational	Other	Satellite and ground based system to detect and locate aviators, mariners, and land-based users in distress.	Waveband: Spatial resolution: Swath width: Accuracy:
S&R (Roshydromet) Search and Rescue Roshydromet	Elektro-L N1, Elektro-L N2, Elektro-L N3	Being developed	Other	For emergency calls.	Waveband: Spatial resolution: Swath width: Accuracy:
SABER Sounding of the Atmosphere usingBroadband Emission Radiometry NASA	TIMED	Operational	Atmospheric temperature and humidity sounders and atmospheric chemistry	SABER provides measurements of the mesosphere and lower thermosphere globally to support investigations into the fundamental processes governing the energetics, chemistry, dynamics, and transport of the atmospheric region extending from 60 km to 180 km.	Waveband: NIR–FIR: 1.27–17 µm (10 channels) Spatial resolution: 2 km vertical resolution Swath width: Accuracy:
SAPHIR Sondeur Atmospherique du Profil'd'Humidite Intertropicale par Radiometrie CNES	Megha-Tropiques	Being developed	Atmospheric temperature and humidity sounders	Cross-track sounder with the objective of measuring water vapour profiles in the troposphere in six layers from 2–12 km altitudes.	Waveband: Microwave: 183.3 GHz (6 channels) Spatial resolution: 10 km Swath width: 2200 km Accuracy:
SAR (MAPSAR) Synthetic Aperture Radar (MAPSAR) INPE (DLR)	MAPSAR	Proposed	Imaging microwave radars	Multi-Application Purpose Radar.	Waveband: Spatial resolution: Swath width: Accuracy:
SAR (RADARSAT) Synthetic Aperture Radar (CSA) C-band CSA	RADARSAT-1	Operational	Imaging microwave radars	All-weather images of ocean, ice and land surfaces. Used for monitoring of coastal zones, polar ice, sea ice, sea state, geological features, vegetation and land surface processes.	Waveband: Microwave: C-band: 5.3 GHz, HH polarisation Spatial resolution: Standard: 25 x28 m (4 looks) Wide beam (1/2): 48–30 x 28 m/ 32–25 x 28 m (4 looks) Fine resolution: 11–9x9 m (1 look) ScanSAR (N/W): 50 x 50 m/ 100 x 100 m (2–4/4–8 looks) Extended (H/L): 22–19x2 m/ 63–28 x 28 m (4 looks) Swath width: Standard: 100 km Wide: 150 km Fine: 45 km ScanSAR Narrow: 300 km ScanSAR Wide: 500 km Extended (H): 75 km Extended (L): 170 km Accuracy: Geometric distortion: < 40 m Radiometric: 1.0 dB

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
SAR (RADARSAT-2) Synthetic Aperture Radar (CSA) C-band CSA	RADARSAT-2	Operational	Imaging microwave radars	All-weather images of ocean, ice and land surfaces. Used for monitoring of coastal zones, polar ice, sea ice, sea state, geological features, vegetation and land surface processes.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: C-band 5.405 GHz: HH, VV, HV, VH polarisation – includes fully polarimetric imaging modes, and left – and right – looking capability Standard: 25 x28 m (4 looks) Wide beam (1/2): 48–30 x 28 m/ 32–25 x 28 m (4 looks) Fine resolution: 11–9 x 9 m (1 look) ScanSAR (N/W): 50 x 50 m/ 100 x 100 m (2–4/4–8 looks) Extended (H/L): 22–19 x 28 m/ 63–28 x 28 m (4 looks) Ultrafine: 3 m Standard: 100 km (20–49°) Wide beam (1/2): 165 km/ 150 km (20–31/ 31–39°) Fine resolution: 45 km (37–48°) ScanSAR (W): 510 km (20–49°) Extended (H/L): 75 km/170 km (50–60/ 10–23°) Ultrafine: 10–20 km Geometric distortion: < 40 m Radiometric: 1.0 dB
SAR (RCM) Synthetic Aperture Radar (CSA RADARSAT Constellation) CSA	RADARSAT CONSTELLATION-1, RADARSAT CONSTELLATION-2, RADARSAT CONSTELLATION-3	Being developed	Imaging microwave radars	All-weather, C-band data to support ecosystem monitoring, maritime surveillance and disaster management.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: C-band 5.405 GHz: HH, VV, HV, VH polarisation – includes fully polarimetric imaging modes. Low Resolution: 100 x 100 m (8 looks) Medium Resolution: 50 x 50 m (4 looks) Medium Resolution Land: 16 x 16 m (4 looks) Medium Resolution Land ScanSAR: 30 x 30 m (4 looks) High Resolution: 5 x 5 m (1 look) Very High Resolution: 3 x 3 m (1 look) Ice-Oil Low Noise: 100 x 100 m (8 looks) Ship Detection Mode: Variable Low Resolution: 500 km Medium Resolution: 350 km Medium Resolution Land: 30 km Medium Resolution Land ScanSAR: 125 km High Resolution: 30 km Very High Resolution: 20 km Ice-Oil Low Noise: 350 km Ship Detection Mode: 350 km Radiometric Accuracy: 1.0 dB
SAR (RISAT) Synthetic Aperature Radiometer (RISAT) ISRO	RISAT-1	Being developed	Imaging microwave radars	Radar backscatter measurements of land, water and ocean surfaces for applications in soil moisture, crop applications (under cloud cover), terrain mapping etc.	Waveband: Spatial resolution: Swath width: Accuracy:	C-band (5.350 GHz) 3–6 m (FRS-1) 9–12 m (FRS-2) 25/50 m (MRS/CRS) 30 km (HRS) 30 km (FRS-1/FRS-2) 120/240 km (MRS/CRS)

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
SAR (Roshydromet) Synthetic Aperture Radar (CSA) C-band Roshydromet (Roscosmos)	Meteor-M N3	Being developed	Imaging microwave radars	High resolution microwave radar images for ice watch.	Waveband: Spatial resolution: Swath width: Accuracy:	X-band
SAR (SABRINA) Synthetic Aperature Radar (SABRINA) ASI	SABRINA	Approved	Imaging microwave radars	All-weather images of ocean, land and ice for monitoring of land surface processes, ice, environmental monitoring, risk management, environmental resources, maritime management, Earth topographic mapping and DEM, moving target indication.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: X-band, with choice of 4 polarisation modes (VV, HH, VV/HH, HV/HH)
SAR 2000 Multi-Mode Synthetic Aperture Radar ASI (MiD (Italy))	COSMO-SkyMed 1, COSMO-SkyMed 2, COSMO-SkyMed 3, COSMO-SkyMed 4	Operational	Imaging microwave radars	All weather images of ocean, land and ice for monitoring of land surface processes, ice, environmental monitoring, risk management, environmental resources, maritime management, earth topographic mapping.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: X-band, with choice of 4 polarisation modes (VV, HH, VV/HH, HV/HH) Single polarisation mode: Stripmap: few metres ScanSAR: from few tens to several tens of metres Frame: resolution: order of 1 m Two polarisation mode: PING PONG: few metres Single polarisation mode: Stripmap (40 x 40 km) ScanSAR (100 x 100 km or 200 x 200 km) Spotlight (10 x 10 km) Two polarisation mode: PING PONG (30 x 30 km)
SAR components testing CONAE	SARE-1	TBD	TBD		Waveband: Spatial resolution: Swath width: Accuracy:	
SAR L Synthetic Aperture Radiometer (L-band) ISRO	RISAT-L	Proposed	Imaging multi-spectral radiometers (passive microwave)	Studies related to soil moisture and ocean salinity.	Waveband: Spatial resolution: Swath width: Accuracy:	L-band
SAR-L (SAOCOM) Synthetic Aperture Radar (CONAE) CONAE	SAOCOM-1A, SAOCOM-1B, SAOCOM-2A, SAOCOM-2B	Being developed	Imaging microwave radars	Land, ocean, emergencies, soil moisture, interferometry, others.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: L-band SAR 1.275 GHz 10 x 10 m – 100 x 100 m 40–320 km 5 dB
SARSAT Search and Rescue Satellite Aided Tracking NOAA	MetOp-A, MetOp-B, NPOESS-1, NPOESS-2, NPOESS-3, NPOESS-4	Operational	Data collection	Satellite and ground based system to detect and locate aviators, mariners, and land-based users in distress.	Waveband: Spatial resolution: Swath width: Accuracy:	UHF 406.0 MHZ

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
S-band SAR S-band Synthetic Aperture Radar CAST	HJ-1C	Being developed	Imaging microwave radars	Radar measurements for natural and disaster monitoring.	Waveband: S-band SAR Spatial resolution: 20 m (4 looks) Swath width: 100 km Accuracy: 3 dB
SBUV/2 Solar Backscattter Ultraviolet Instrument/2 NOAA	NOAA-16, NOAA-17, NOAA-18, NOAA-N'	Operational	Atmospheric chemistry	Data on trace gases including vertical profile ozone, and solar irradiance and total ozone concentration measurements.	Waveband: UV: 0.16–0.4 µm (12 channels) Spatial resolution: 170 km Swath width: Accuracy: Absolute accuracy: 1%
ScaRaB Scanner for Earth's Radiation Budget CNES	Megha-Tropiques	Being developed	Earth radiation budget radiometer	Measures top-of-atmosphere shortwave radiation (0.2–4.0 µm) and total radiation (0.2–50 µm). Two additional narrow-band channels (0.5–0.7 µm and 11–12 µm) allow cloud detection and scene identification.	Waveband: VIS window channel: 0.5–0.7 µm Solar channel UV–SWIR: 0.2–4 µm Total channel UV–FIR: 0.2–50 µm Thermal window channel: 10.5–12.5 µm Spatial resolution: 40 km Swath width: 2200 km Accuracy: Absolute: ± 2.5 W/m^2/sr Relative: ± 0.7 W/m^2/sr
SCAT Scatterometer NSOAS	HY-2A	Being developed	Scatterometers	Monitoring global sea surface winds.	Waveband: 13.2515 GHz, HH, VV Spatial resolution: 50 km Swath width: 1300 km Accuracy: 0.5 dB
Scatterometer (ISRO) ISRO	OCEANSAT-2 OCEANSAT-3	Being developed	Scatterometers	Ocean surface wind measurements.	Waveband: 13.515 GHz Spatial resolution: 50 km Swath width: 1400–1840 km Accuracy:
SCIAMACHY Scanning Imaging Absorption Spectrometer for Atmospheric Chartography ESA (DLR)	Envisat	Operational	Atmospheric chemistry	Measures middle atmosphere temperature. Provides tropospheric and stratospheric profiles of O_2, O_3, O_4, CO, N_2O, NO_2, CO_2, CH_4, H_2O, and tropospheric and stratospheric profiles of aerosols and cloud altitude.	Waveband: UV–SWIR: 240–314 nm, 309–3405 nm, 394–620 nm, 604–805 nm, 785–1050 nm, 1000–1750 nm, 1940–2040 nm and 2265–2380 nm Spatial resolution: Limb vertical 3 x 132 km Nadir horizontal 32 x 215 km Swath width: Limb and nadir mode: 1000 km (max) Accuracy: Radiometric: <4%
SeaWinds NASA (JAXA)	QuikSCAT	Operational	Scatterometers	Measurement of surface wind speed and direction.	Waveband: Microwave: 13.402 GHz Spatial resolution: 25 km Swath width: 1600 km Accuracy: Speed: 2–3.5 m/s Direction: 20º
SEISS Space Environment In Situ Suite NOAA	GOES-R, GOES-S	Prototype	Space environment	Monitor proton, electron, and alpha particle fluxes.	Waveband: 30 eV–500 MeV Spatial resolution: 15º, 30º, 60º, 90º Swath width: Accuracy: 25%

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
SEM (GOES) Space Environment Monitor NOAA	GOES-11, GOES-12, GOES-13, GOES-O, GOES-P	Operational	Space environment	Used for equipment failure analysis, solar flux measurement, solar storm warning, and magnetic and electric field measurement at satellite.	Waveband: Spatial resolution: Swath width: Accuracy:
SEM (POES) Space Environment Monitor NOAA	MetOp-A, MetOp-B, NOAA-16, NOAA-17, NOAA-18, NOAA-N'	Operational	Space environment	Used for equipment failure analysis, solar flux measurement, solar storm warning, and magnetic and electric field measurement at satellite.	Waveband: Spatial resolution: Swath width: Accuracy: Senses and quantifies intensity in the sequentially selected energy bands, with energies ranging from 0.05–20 keV. Senses protons, electrons and ions with energies from 30 keV to levels exceeding 6.9 MeV.
SEM Space Environment Monitor NRSCC	FY-3A, FY-3B	Operational	Space environment	Measures space environment parameters to support space craft operations.	Waveband: Spatial resolution: Swath width: Accuracy:
SEM-N Space Environment Monitor - NPOESS NOAA	NPOESS-1	Operational	Space environment	Used for equipment failure analysis, solar flux measurement, solar storm warning, and magnetic and electric field measurement at satellite	Waveband: Spatial resolution: Swath width: Accuracy: Senses and quantifies intensity in the sequentially selected energy bands, with energies ranging from 0.05–20 keV. Senses protons, electrons, and ions with energies from 30 keV to levels exceeding 6.9 MeV
SEVIRI Spinning Enhanced Visible and Infrared Imager EUMETSAT (ESA)	Meteosat-10, Meteosat-11, Meteosat-8, Meteosat-9	Operational	Imaging multi-spectral radiometers (vis/IR)	Measurements of cloud cover, cloud top height, precipitation, cloud motion, vegetation, radiation fluxes, convection, air mass analysis, cirrus cloud discrimination, tropopause monitoring, stability monitoring, total ozone and sea surface temparature.	Waveband: VIS: 0.56–0.71 µm, 0.5–0.9 µm (broadband) NIR: 0.74–0.88 µm SWIR 1.5–1.78 µm SWIR: 3.48–4.36 µm IR: 5.35–7.15 µm, 6.85–7.85 µm, 8.3–9.1 µm, 9.38–9.94 µm, 9.8–11.8 µm, 11–13 µm, 12.4–14.46 µm Spatial resolution: 1 km (at SSP) for one broadband visible channel HRV, 5 km (at SSP) for all other channels Swath width: Full Earth disc Accuracy: Cloud cover: 10% Cloud top height: 1 km Cloud top temparature: 1 K Cloud type: 8 classes Surface temparature: 0.7–2.0 K Specific humidity profile: 10% Wind profile (horizontal component): 2–10 m/s Long wave Earth surface radiation: 5 W/m^2

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
SGLI Second-generation Global Imager JAXA	GCOM-C1, GCOM-C2, GCOM-C3	Approved	Imaging multi-spectral radiometers (vis/IR) and ocean colour instruments	Medium resolution multi-spectral imaging of land, ocean and atmosphere.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS – NIR: 0.38–0.865 μm SW: 1.05–2.21 μm TIR: 10.8–12.0 μm 250 m, 500 m, 1000 m 1150 km (VNR) 1400 km (IRS)
SI Star Imager DNSC	Ørsted (Oersted)	Operational	Precision orbit	Measurements to determine the orientation of both the satellite and the CSC magnetometer.	Waveband: Spatial resolution: Swath width: Accuracy:	
SIM Solar Irradiation Monitor NRSCC	FY-3A, FY-3B	Operational	Earth radiation budget radiometer	Solar irradiance monitoring.	Waveband: Spatial resolution: Swath width: Accuracy:	
SIM Spectral Irradiance Monitor NASA	SORCE	Operational	Earth radiation budget radiometer	Measures solar spectral irradiance in the 200–2000 nm range.	Waveband: Spatial resolution: Swath width: Accuracy:	UV–SWIR: 200–2000 nm
SIRAL SAR Interferometer Radar Altimeter ESA	CryoSat-2	Being developed	Radar altimeters	Marine ice and terrestrial ice sheet thickness measurement.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 13.575 GHz (Ku-band) Range resolution 45 cm along-track resolution 250 m Footprint 15 km Arctic sea-ice: 1.6 cm/year for 300 km x 300 km cells Land ice (small scale): 3.3 cm/year for 100 km x 100 km cells Land ice (large scale): 0.17 cm/year for Antarctica size area
SLSTR Sea and Land Surface Temperature Radiomete ESA (EC)	Sentinel-3 A, Sentinel-3 B, Sentinel-3 C	Approved	Imaging multi-spectral radiometers (passive microwave)	Marine and land services.	Waveband: Spatial resolution: Swath width: Accuracy:	9 bands in VNIR/SWIR/TIR 500 m (VNIR/SWIR) 1 km (TIR) 1675 km (near-nadir view) 750 km (backward view) 0.2 K abs., 80 mK rel.
SMR Submillimetre Radiometer SNSB	Odin	Operational	Atmospheric temperature and humidity sounders and atmospheric chemistry	Measures global distributions of ozone and species of importance for ozone chemisty, ClO, HNO_3, H_2O, N_2O, (HO_2, H_2O_2). Measures temperature in the height range 15–100 km.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 118.7 GHz + 4 bands in the region 480–580 GHz: Tunable measures 2–3 x 1 GHz regions at a time Vertical resolution 1.5–3 km along track 600 km Altitudes of 5–100 km 2–40% depending on species and altitude
SODAD Orbital System for an Active Detection of Debris CONAE (CNES)	SAC-D	Approved	TBD		Waveband: Spatial resolution: Swath width: Accuracy:	

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
SODISM SOlar Diameter Imager and Surface Mapper CNES	PICARD	Being developed	Earth radiation budget radiometer	Measures diameter and differential rotation of the sun – a whole Sun imager.	Waveband: Spatial resolution: Swath width: Accuracy:	UV: 230 nm, VIS: 548 nm, Active regions: 160 nm plus Lyman alpha detector
SOLSTICE SOLar STellar Irradiance Comparison Experiment NASA	SORCE	Operational	Earth radiation budget radiometer	Data on UV and charged particle energy inputs, and on time variation of full-disc solar UV spectrum. Measures solar UV radiation (115–430 nm) with resolution of 0.12 nm. Compares solar UV output with UV radiation of stable bright blue stars.	Waveband: Spatial resolution: Swath width: Accuracy:	UV: 115–180 nm & 170–320 nm 1%
Sounder (INSAT) IR Sounder ISRO	INSAT-3D	Being developed	Atmospheric temperature and humidity sounders	Atmospheric soundings, atmospheric stability, thermal gradient winds.	Waveband: Spatial resolution: Swath width: Accuracy:	SWIR: 3.74–4.74 µm MWIR: 6.51–11.03 µm TIR: 12.02–14.71 µm VIS: 0.55–0.75 µm 10 x 10 km Full (Full Earth disc sounding), Program (Options provided for Sector Scans)
Sounder NOAA	GOES-11, GOES-12, GOES-13, GOES-0, GOES-P	Operational	Atmospheric temperature and humidity sounders	Atmospheric soundings and data on atmospheric stability and thermal gradient winds.	Waveband: Spatial resolution: Swath width: Accuracy:	VIS – TIR: 19 channels 10 km Horizon to horizon
SOVAP SOlar Variability Picard radiometer CNES	PICARD	Being developed	Earth radiation budget radiometer	Total solar irradiance measurements.	Waveband: Spatial resolution: Swath width: Accuracy:	Total irradiance
Spectrometer (OCO) NASA	OCO	Being developed	Atmospheric chemistry	Global measurements of atmospheric CO_2 needed to describe the variability of CO_2 sources and sinks.	Waveband: Spatial resolution: Swath width: Accuracy	0.76 µm, 1.61 µm, 2.06 µm
SRAL SAR Radar Altimeter ESA (EC)	Sentinel-3 A, Sentinel-3 B, Sentinel-3 C	Approved	Radar altimeters	Marine and land services.	Waveband: Spatial resolution: Swath width: Accuracy:	Dual freq radar altimeter, Ku-band, C-band 300 m Profiling 3 cm in range (1 s average, 2 m SWH including atm. corrections)
SSB/X-2 Special Sensor Gamma Ray Particle Detector NOAA (DoD (USA))	DMSP F-14	Operational	Space environment	Detects the location, intensity and spectrum of X-rays emitted from the Earth's atmosphere.	Waveband: Spatial resolution: Swath width: Accuracy:	
SSI/ES-2 Special Sensor Ionospheric Plasma Drift/Scintillation Meter NOAA (DoD (USA))	DMSP F-14, DMSP F-15	Operational	Space environment	Measurement of the ambient electron density and temperatures, the ambient ion density and ion temperature and molecular weight.	Waveband: Spatial resolution: Swath width: Accuracy:	

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
SSI/ES-3 Special Sensor Ionospheric Plasma Drift/Scintillation Meter NOAA (DoD (USA))	DMSP F-16, DMSP F-17, DMSP F-18, DMSP F-19, DMSP F-20	Operational	Space environment	Measurement of the ambient electron density and temperatures, the ambient ion density and ion temperature and molecular weight.	Waveband: Spatial resolution: Swath width: Accuracy:
SSJ/4 Special Sensor Precipitating Plasma Monitor NOAA (DoD (USA))	DMSP F-14, DMSP F-15	Operational	Magnetic field	Measurement of transfer energy, mass and momentum of charged particles through the magnetosphere-ionosphere in the Earth's magnetic field.	Waveband: Spatial resolution: Swath width: Accuracy:
SSJ/5 Special Sensor Precipitating Plasma Monitor NOAA (DoD (USA))	DMSP F-16	Operational	Magnetic field	Measurement of transfer energy, mass and momentum of charged particles through the magnetosphere-ionosphere in the Earth's magnetic field.	Waveband: Spatial resolution: Swath width: Accuracy:
SSM Special Sensor Magnetometer NOAA (DoD (USA))	DMSP F-14, DMSP F-15, DMSP F-16, DMSP F-17, DMSP F-18, DMSP F-19, DMSP F-20	Operational	Magnetic field	Measures geomagnetic fluctuations associated withMeasures geomagnetic fluctuations associated with solar geophysical phenomena. With SSIES and SSJ provides heating and electron density profiles in the ionosphere.	Waveband: Spatial resolution: Swath width: Accuracy:
SSM/I Special Sensor Microwave Imager NOAA (DoD (USA))	DMSP F-14, DMSP F-15	Operational	Imaging multi-spectral radiometers (passive microwave)	Measures atmospheric, ocean and terrain microwave brightness temperatures to provide: sea surface winds, rain rates, cloud water, precipitation, soil moisture, ice edge, ice age.	Waveband: Microwave: 19.35 GHz, 22.235 GHz, 37 GHz, 85 GHz Spatial resolution: 15.7 km x 13.9 km to 68.9 x 44.3 km (depends on frequency) Swath width: 1400 km Accuracy:
SSM/IS Special Sensor Microwave Imager Sounder NOAA (DoD (USA))	DMSP F-16, DMSP F-17, DMSP F-18, DMSP F-19, DMSP F-20	Operational	Atmospheric temperature and humidity sounders	Measures thermal microwave radiation. Global measurements of air temp profile, humidity profile, ocean surface winds, rain overland/ocean, ice concentration/age, ice/snow edge, water vapour/clouds over ocean, snow water content, land surface temperature.	Waveband: Microwave: 19–183 GHz (24 frequencies) Spatial resolution: Varies with frequency: 25 x 17 km to 70 x 42 km Swath width: 1700 km Accuracy:
SSM/T-1 Special Sensor Microwave Temperature Sounder NOAA (DoD (USA))	DMSP F-14, DMSP F-15	Operational	Atmospheric temperature and humidity sounders	Measures Earth's surface and atmospheric emission in the 50–60 GHz oxygen band.	Waveband: Microwave: 7 channels in the 50–60 GHz range Spatial resolution: 174 km diameter beam Swath width: 1500 km Accuracy:
SSM/T-2 Special Sensor Microwave Water Vapour Sounder NOAA (DoD (USA))	DMSP F-14, DMSP F-15	Operational	Atmospheric temperature and humidity sounders	Water Vapour profiler.	Waveband: Microwave: 91.6 GHz, 150 GHz, 183.31 GHz (3 channels) (Total 5 channels) Spatial resolution: approx 48 km Swath width: 1500 km Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
SSULI Special Sensor Ultraviolet Limb Imager NOAA	DMSP F-16, DMSP F-17, DMSP F-18, DMSP F-19, DMSP F-20	Operational	Space environment	Measures vertical profiles of the natural airglow radiation from atoms, molecules and ions in the upper atmosphere and ionosphere.	Waveband: Spatial resolution: Swath width: Accuracy:
SSUSI Special Sensor Ultraviolet Spectrographic Imager NOAA	DMSP F-16, DMSP F-17, DMSP F-18, DMSP F-19, DMSP F-20	Operational	Space environment	Monitors the composition and structure of the upper atmosphere and ionosphere, as well as auroral energetic particle inputs, with spectrographic imaging and photometry.	Waveband: Spatial resolution: Swath width: Accuracy:
STR Star Tracker Set (3) ESA	Swarm	Being developed	Precision orbit	Precise attitude determination from the combination of two or three star trackers.	Waveband: N/A Spatial resolution: < 1 arcsec Swath width: N/A Accuracy: < 3 arcsec pointing accuracy around all STR axes
SumbandilaSat Imager CSIR (Uni of Stellenbosh)	SumbandilaSat	Approved	Imaging multi-spectral radiometers (vis/IR)	Primary payload (imager): Support decision making in natural resource management, disaster management, agriculture, urban planning and other applications.	Waveband: Blue 440–510 nm XAN 520–540 nm Green 520–590 nm Red 630–685 nm RedEdge 690–730 nm NIR 845–890 nm Spatial resolution: 6.25 m GSD Swath width: 45 km; Off-nadir: 530 km Accuracy:
SUVI Solar Ultraviolet Imager NOAA	GOES-R, GOES-S	Being developed	Other	The SUVI will monitor the entire dynamic range of solar x-ray features, including coronal holes and solar flares, and will provide quantitative estimates of the physical conditions in the Sun's atmosphere.	Waveband: Spatial resolution: Swath width: Accuracy:
SWIFT Stratospheric Wind Interferometer for Transport Studies CSA	CHINOOK	Being developed	Other	Objective is to measure stratospheric winds and ozone fluxes.	Waveband: An ozone rotation-vibration line near 9 mm Spatial resolution: Vertical resolution approx 1.5 km (from 15–55 km altitude) Swath width: N/A Accuracy: 3–5 m/s for wind vector 5% for ozone density (from 15–30 km)
SXI Solar X-ray Imager NOAA (USAF)	GOES-12, GOES-13, GOES-P	Operational	Earth radiation budget radiometers	Obtains data on structure of solar corona. Full disc imagery also provides warnings of geomagnetic storms, solar flares and information on active regions of sun and filaments.	Waveband: Spatial resolution: Swath width: Accuracy:
TANSO-CAI Thermal And Near infrared Sensor for carbon Observation - Cloud and Aerosol Imager JAXA (MOE (Japan), NIES (Japan))	GOSAT	Being developed	Imaging multi-spectral radiometers (vis/IR)	Measurement of cloud and aerosol for calibration of TANSO-FTS.	Waveband: 0.380 µm, 0.678 µm, 0.870 µm, 1.62 µm Spatial resolution: 0.5 km (0.380 µm, 0.678 µm, 0.870 µm bands) 1.5 km (1.62 µm band) Swath width: 1000 km (0.380 µm, 0.678 µm, 0.870 µm bands) 750 km (1.62 µm band) Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
TANSO-FTS Thermal And Near infrared Sensor for carbon Observation - Fourier Transform Spectrometer JAXA (MOE (Japan), NIES (Japan))	GOSAT	Being developed	Atmospheric temperature and humidity sounders and atmospheric chemistry)	CO_2 and methane distribution.	Waveband: 0.758–0.775 µm, 1.56–1.72 µm, 1.92–2.08 µm, 5.56–14.3 µm Spatial resolution: 10.5 km Swath width: 160 km Accuracy:
TDP Technological Development Package CONAE	SAC-D	Being developed	Precision orbit	Develop, test, and operate the Technological Demonstration Package (TDP) for demonstrating a newly developed GPS receiver for position, velocity, and time determination and an Inertia Reference Unit (IRU) to measure inertial angular velocity.	Waveband: Spatial resolution: Swath width: Accuracy:
TES PAN Panchromatic sensor ISRO	TES	Operational	High resolution optical imagers	High resolution images for study of topography, urban areas etc.	Waveband: Panchromatic VIS: 0.5–0.75 µm Spatial resolution: 1 m Swath width: Accuracy:
TES Tropospheric Emission Spectrometer NASA	Aura	Operational	Atmospheric chemistry	3D profiles on a global scale of all infrared active species from surface to lower stratosphere. Measures greenhouse gas concentrations, tropospheric ozone, acid rain precursors, gas exchange leading to stratospheric ozone depletion.	Waveband: SWIR–TIR: 3.2–15.4 µm Spatial resolution: In limb mode: 2.3 km vertical resolution In down-looking mode: 50 km x 5 km (global) 5 km x 0.5 km (local) Swath width: Limb mode: global: 50 km x 180 km local: 5 km x 18 km Accuracy: Ozone: 20 ppb Trace gases: 3–500 ppb
TIM Total Irradiance Monitor NASA	Glory, SORCE	Operational	Earth radiation budget radiometer	Measurement of total solar irradiance directly traceable to SI units with an absolute accuracy of 0.03% abd relative accuracy of 0.001% per year.	Waveband: Spatial resolution: Swath width: Looks at the sun every orbit, providing 15 measurements per day Accuracy:
TIR (OCEANSAT-3) Thermal Infrared Radiometer (OCEANSAT-3) ISRO	OCEANSAT-3	Being developed	Imaging multi-spectral radiometers (vis/IR)	TIR and OCM combination will support joint analysis for operational potential fishing zones.	Waveband: 5 bands Spatial resolution: 1 km Swath width: 1500 km Accuracy:
TIS (CONAE) Thermal IR Scanner CONAE	SAC-F	Approved	TBD		Waveband: Thermal IR Spatial resolution: Swath width: Accuracy:
TM Thematic Mapper USGS	Landsat-5	Operational	Imaging multi-spectral radiometers (vis/IR)	Measures surface radiance and emittance, lands cover state and change (eg vegetation type). Used as multi-purpose imagery for land applications.	Waveband: 0.45–12.50 µm Spatial resolution: VIS–SWIR: 30 m TIR: 120 m Swath width: 185 km Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
TMI TRMM Microwave Imager NASA	TRMM	Operational	Imaging multi-spectral radiometers (passive microwave)	Measures rainfall rates over oceans (less reliable over land), combined rainfall structure and surface rainfall rates with associated latent heating. Used to produce monthly total rainfall maps over oceans.	Waveband: Spatial resolution: Swath width: Accuracy:	Microwave: 10.7 GHz, 19.4 GHz, 21.3 GHz, 37 GHz, and 85.5 GHz Vertical: 2.5 km approx Horizontal: 18 km 790 km Liquid water: 3 mg/cm^3 Humidity: 3 mg/cm^3 Ocean wind speed: 1.5 m/s
TOPSAT Telescope BNSC	TopSat	Operational	High resolution optical imagers	Experimental medium-resolution imaging satellite supporting a range of possible land applications.	Waveband: Spatial resolution: Swath width: Accuracy:	Panchromatic imagery Resolution 2.8 m Multi-spectral imagery (RGB) Resolution 5.6 m Panchromatic imagery 17 x 17 km Multi-Spectral – Swath 12 x 18 km
TOU/SBUS Total Ozone Unit & Solar Backscatter Ultraviolet Sounder NRSCC	FY-3A, FY-3B, FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Operational	Atmospheric temperature and humidity sounders	Ozone total column vertical profile measurements.	Waveband: Spatial resolution: Swath width: Accuracy:	TOU: 6 channels in the range 308–360 nm SBUS: in the range 252–340 nm TOU: 50 km total ozone SBUS: 200 km total ozone TOU: 3000 km SBUS: nadir only
TRSR Turbo-Rogue Space Receiver NASA	Jason-1	Operational	Atmospheric temperature and humidity sounders and precision orbit	Precise continuous tracking data of satellite to decimeter accuracy.	Waveband: Spatial resolution: Swath width: Accuracy:	
TSIS Total Solar Irradiance Sensor NOAA	NPOESS-1, NPOESS-3, NPOESS-4	Being developed	Earth radiation budget radiometer	0.2–2 μm solar spectral irradiance monitor.	Waveband: Spatial resolution: Swath width: Accuracy:	UV – SWIR: 0.2–2 μm 1.5 W/m^2
UVN (Sentinel-4) UV-visible-near-infrared imaging spectrometer (Sentinel-4) ESA (EC)	MTG S1/ Sentinel-4 A, MTG S2/ Sentinel-4 B	Proposed	Atmospheric chemistry	Supporting atmospheric composition and air quality monitoring services.	Waveband: Spatial resolution: Swath width: Accuracy:	UV–1: 290–308 nm UV–2: 308–400 nm VIS: 400–500 nm NIR: 750–775 nm < 5 km at SSP, possibly relaxed to 50 km for wavelengths < 308 nm FOV E–W: 30ºW–45ºE at 40ºN, N–S: 30ºN–65ºN
UVNS (post-EPS) UV-visible-near infrared-shortwave infrared imaging spectrometer (post-EPS) ESA (EC)	post-EPS/ Sentinel-5	Proposed	Atmospheric chemistry	Supporting atmospheric composition and air quality monitoring services.	Waveband: Spatial resolution: Swath width: Accuracy:	UV–1: 270–300 nm UV–2: 300–400 nm VIS: 400–500 nm NIR: 710–775 nm SWIR–1: 1593–1672 nm SWIR–2: 1940–2030 nm SWIR–3: 2305–2385 nm 5–15 km at SSP, possibly relaxed to 50 km for wavelengths < 300 nm Daily global coverage

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
UVNS (Sentinel-5 precursor) UV-visible-near-infrared imaging spectrometer (Sentinel-5 precursor) ESA (EC)	Sentinel-5 precursor	Proposed	Atmospheric chemistry	Supporting atmospheric composition and air quality monitoring services.	Waveband: UV–1: 270–300 nm UV–2: 300–400 nm VIS: 400–500 nm NIR: 710–775 nm SWIR–3: 2305–2385 nm Spatial resolution: 5–15 km at SSP, possibly relaxed to 50 km for wavelengths < 300 nm Swath width: Daily global coverage Accuracy:
VEGETATION CNES (EC)	SPOT-4, SPOT-5	Operational	Imaging multi-spectral radiometers (vis/IR)	Data of use for crop forecast and monitoring, vegetation monitoring, and biosphere/geosphere interaction studies.	Waveband: Operational mode: VIS: 0.61–0.68 µm NIR: 0.78–0.89 µm SWIR: 1.58–1.75 µm Experimental mode: VIS: 0.43–0.47 µm Spatial resolution: 1.15 km at nadir – minimal variation for off-nadir viewing Swath width: 2200 km Accuracy:
VFM Vector Magnetometer ESA	Swarm	Being developed	Magnetic field	Magnetic field vector measurments.	Waveband: N/A Spatial resolution: <0.1 nT Swath width: N/A Accuracy: < 0.5 nT/15 days
VHRR Very High resolution Radiometer ISRO	INSAT-2E, INSAT-3A, Kalpana	Operational	Imaging multi-spectral radiometers (vis/IR)	Cloud cover, rainfall, wind velocity, sea surface temperature, outgoing longwave radiation, reflected solar radiation in spectral band 0.55–0.75 µm, emitted radiation in 10.5–12.5 µm range.	Waveband: VIS: 0.55–0.75 µm NIR: 5.7–7.1 µm TIR: 10.5–12.5 µm Spatial resolution: 2 km in visible 8 km in IR Swath width: Full Earth disc every 30 minutes Accuracy:
VIIRS Visible/Infrared Imager Radiometer Suite NOAA (NASA)	NPOESS-1, NPOESS-2, NPOESS-3, NPOESS-4, NPP	Being developed	Imaging multi-spectral radiometers (vis/IR) and ocean colour instruments	Global observations of land, ocean, and atmosphere parameters: cloud/weather imagery, sea-surface temperature, ocean colour, land surface vegetation indices.	Waveband: VIS – TIR: 0.4–12.5 µm (22 channels) Spatial resolution: 400 m – 1.6 km Swath width: 3000 km Accuracy: SST 0.35 K
VIRR Multi-spectral Visible and Infrared Scan Radiometer (10 channels) NRSCC (CAST)	FY-3A, FY-3B, FY-3C, FY-3D, FY-3E, FY-3F, FY-3G	Operational	Imaging multi-spectral radiometers (vis/IR)	Multi-spectral Visible and Infrared Scan Radiometer.	Waveband: Instrument features 10 channels over 0.43–10.5 µm Spatial resolution: 1.1 km at nadir Swath width: 2800 km Accuracy:
VIRS Visible Infrared Scanner NASA	TRMM	Operational	Imaging multi-spectral radiometers (vis/IR)	Data to be used in conjunction with data from CERES instrument to determine cloud radiation. Will enable 'calibration' of precipitation indices derived from other satellite sources.	Waveband: VIS: 0.63 µm SWIR–MWIR: 1.6 µm and 3.75 µm TIR: 10.8 µm and 12 µm Spatial resolution: 2 km at nadir Swath width: 720 km Accuracy:

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics
VSC Venus Superspectral Camera CNES (ISA)	VENUS	Being developed	Imaging multi-spectral radiometers (vis/IR)	High resolution superspectral images (12 spectral bands) for vegetation and landcover applications.	Waveband: 420 nm centre wavelength (width: 40 nm), 443 nm (40), 490 nm (40), 555 nm (40), 620 nm (40), 620 nm (40), 667 nm (30), 702 nm (24), 742 nm (16), 782 nm (16), 865 nm (40), 910 nm (20) Spatial resolution: 5.3 m spatial resolution with 27 km swath Swath width: 27 km Accuracy:
Water Vapour Radiometer NASA	GFO (GEOSAT Follow-on)	Operational	Imaging multi-spectral radiometers (passive microwave)	Measurement of the water vapour content along the altimeter pulse path.	Waveband: 22 GHz, 37 GHz Spatial resolution: Swath width: Accuracy:
WEFAX Weather Facsimile NOAA	GOES-11, GOES-12	Operational	Communications	Weather Facsimile.	Waveband: Spatial resolution: Swath width: Accuracy:
WFC Wide Field Camera NASA	CALIPSO	Operational	Imaging multi-spectral radiometers (vis/IR)	Acquires high spatial resolution imagery for meteorological context.	Waveband: VIS: 620 to 670 nm Spatial resolution: 125 m Swath width: 60 km Accuracy:
WFI Wide Field Imager CAST (INPE)	CBERS-2, CBERS-2B	Operational	High resolution optical imagers	Data used for coastal and vegetation monitoring.	Waveband: VIS: 0.63–0.69 µm NIR: 0.77–0.89 µm Spatial resolution: 258 m Swath width: 890 km Accuracy: 0.3 pixels
WFI-2 Wide Field Imager 2 CAST (INPE)	CBERS-3, CBERS-4	Being developed	Imaging multi-spectral radiometers (vis/IR)	Earth resources, environmental monitoring, land use.	Waveband: VIS: 0.45–0.52 µm, 0.52–0.59 µm, 0.63–0.69 µm, 0.77–0.89 µm Spatial resolution: 73 m Swath width: Accuracy:
WiFS Wide Field Sensor ISRO	IRS-1D	Operational	High resolution optical imagers	Vegetation and crop monitoring, resource assessment (regional scale), forest mapping, land cover/land use mapping, and change detection.	Waveband: 2 channels: R–IR Spatial resolution: 188 m Swath width: 810 km Accuracy:
WindSat DoD (USA) (NASA)	CORIOLIS	Operational	Multiple direction/polarisation radiometers	Measure ocean surface wind vectors.	Waveband: 6.8 GHz, 10.7 GHz, 18.7 GHz, 23.8 GHz, 37 GHz Spatial resolution: 8 x 13 km – 40 x 60 km Swath width: Accuracy: ± 2 m/s, ± 20°
WS LISS-III Wide Scan LISS-III ISRO	RESOURCESAT-3	Proposed	Imaging multi-spectral radiometers (vis/IR)	For crops and vegetation dynamics, natural resources census, disaster management and large scale mapping of themes.	Waveband: 3 bands in VNIR and 1 band in SWIR Spatial resolution: 23.5 m, 10 m Swath width: 700 km Accuracy

Instrument & agency (& any partners)	Missions	Status	Type	Measurements & applications	Technical characteristics	
WSAR NSOAS (CAST)	HY-3A, HY-3B, HY-3C	Proposed	Imaging microwave radars	High resolution radar measurements of land and ocean features.	Waveband: Spatial resolution: Swath width: Accuracy:	X-band: 8–12 GHz 3 modes: 1 m, 5 m, 10 m 3 swaths: 40 km, 80 km, 150 km
WTE Whale Tracker Experiment CONAE	SAC-C	Operational	Data collection	Tracking of Eubalean Australis and environmental data collection system.	Waveband: Spatial resolution: Swath width: Accuracy:	
X-band SAR X-band Synthetic Aperture Radar DLR	TanDEM-X, TerraSAR-X, TerraSAR-X2	Operational	Imaging microwave radars	High resolution images for monitoring of land surface and coastal processes and for agricultural, geological and hydrological applications.	Waveband: Spatial resolution: Swath width: Accuracy:	9.65 GHz, 300 MHz bandwidth, all 4 polarisation modes Spotlight: 1.2 x 1–4 m Stripmap: 3 x 3–6 m ScanSAR: 16 x 16 m Spotlight: 5–10 km x 10 km Stripmap: 30 km ScanSAR: 100 km
XPS XUV Photometer System NASA	SORCE	Operational	Other	Objective is to measure the extreme UV solar irradiance from 1–35 nm.	Waveband: Spatial resolution: Swath width: Accuracy:	UV: 1–35 nm