CM SAF
Climate Monitoring

The EUMETSAT Satellite Application Facility on Climate Monitoring

The EUMETSAT Network of Satellite Application Facilities

The EUMETSAT SAF Network

CM SAF — Climate Monitoring

H SAF — Support to Operational Hydrology and Water Management

O3M SAF — Ozone and Atmospheric Chemistry Monitoring

LSA SAF — Land Surface Analysis

NWC SAF — Support to Nowcasting and Very Short Range Forecasting

OSI SAF — Ocean and Sea Ice

NWP SAF — Numerical Weather Prediction

ROM SAF — Radio Occultation Meteorology SAF

- EUMETSAT Member States
- EUMETSAT Cooperating States

The Satellite Application Facility on Climate Monitoring (CM SAF)

Deutscher Wetterdienst — Wetter und Klima aus einer Hand — DWD

SMHI — Swedish Meteorological and Hydrological Institute

Koninklijk Nederlands Meteorologisch Instituut — Ministerie van Infrastructuur en Milieu

RMI — Royal Meteorological Institute of Belgium

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Finnish Meteorological Institute

Met Office, United Kingdom

- EUMETSAT Member States
- EUMETSAT Cooperating States
- CM SAF Member States
- Location of Partner NMHSs

Overview of Climate Data Records

temporal coverage of CDR

1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017

year of release

year	Record	Parameter	Coverage
2017	TCDR SSM/I Ed. 3	HOAPS	global ice free ocean
	FCDR SSM/I + SSMIS Ed. 2		global
	TCDR AVHRR GAC Ed. 3	Cloud & Radiation	global
	TCDR MVIRI/SEVIRI Ed. 3	Cloud, Radiation, LST, FTH	Africa & Europe
	TCDR TOVS/ATOVS Ed. 1	Clouds	global
2016	TCDR MW_WV_T Ed. 1	Water vapour, temp	global
	ICDR SEVIRI Ed. 2		Africa & Europe
	ICDR GERB/SEVIRI Ed. 2	ToA fluxes	Africa & Europe
	TCDR MVIRI/SEVIRI/GERB Ed. 1	ToA fluxes	Africa & Europe
2015	TCDR SSM/I Ed. 2	HOAPS	global ice free ocean
	FCDR SSM/I + SSMIS Ed. 1		global
	TCDR AVHRR GAC Ed. 2	Cloud & Surface Albedo	global
	TCDR MVIRI/SEVIRI Ed. 2	Cloud & Radiation	Africa & Europe
2014			EDR AVHRF global
2013			
	TCDR AVHRR GAC Ed. 1	Cloud & Radiation	global
	TCDR MVIRI/SEVIRI Ed.1	FTH	Africa & Europe
	FCDR SSM/I Ed. 1		global
	TCDR ATOVS Ed. 1	Water Vapour	global
	ICDR SEVIRI Ed. 1	Cld & Rad	A&E
2012	ICDR GERB/SEVIRI Ed.1	ToA Rad	A&E
	TCDR MVIRI Ed. 1	Cloud & Radiation	Africa & Europe
2011	TCDR SSM/I Ed. 1	HOAPS	global ice free ocean
	EDR ATOVS	global	
2005	EDR SEVIRI		Africa & Europe
	EDR AVHRR LAC		Europe
2004	EDR GERB/SEVIRI		Africa & Europe

Overview of available and planned Climate Data Records from the CM SAF. The x-axis denotes the length of the time series. The y-axis shows the (planned) release date of the Climate Data Record.

The notion within each color bar describes (from left to right):
- Main satellite data input and kind of Climate Data Record (FCDR, TCDR, ICDR, EDR)
- Parameters included in data record
- Geographical coverage

Free Data Access & Contact

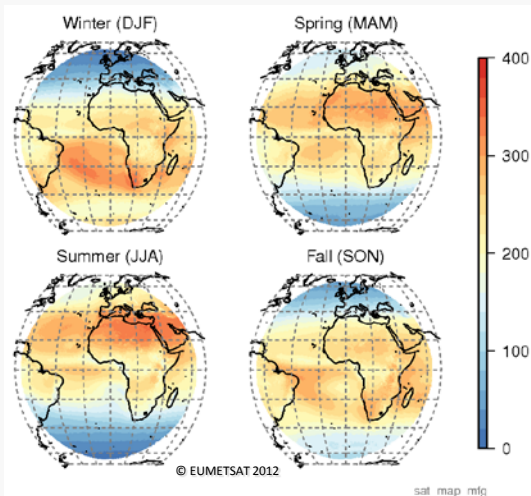www.cmsaf.eu/wui   User help desk: contact.cmsaf@dwd.de

Cloud, Radiation & Water Vapour

Mean cloud fraction (1982-2009)

© EUMETSAT 2012
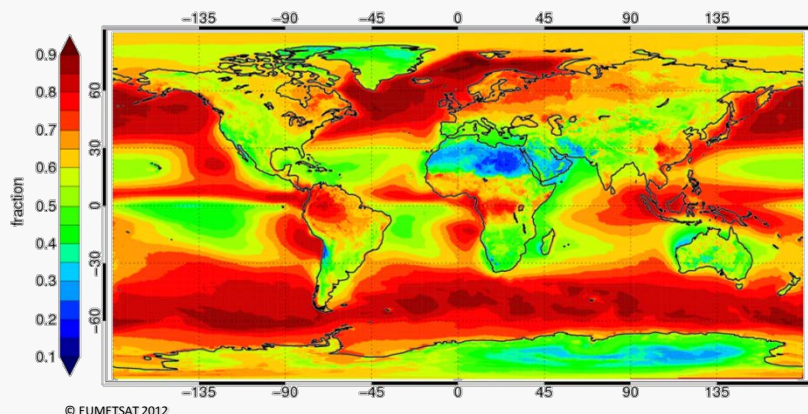
CM SAF SIS seasonal mean (1983-2005) W/m^{-2}

Winter (DJF)   Spring (MAM)

Summer (JJA)   Fall (SON)

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© EUMETSAT 2012
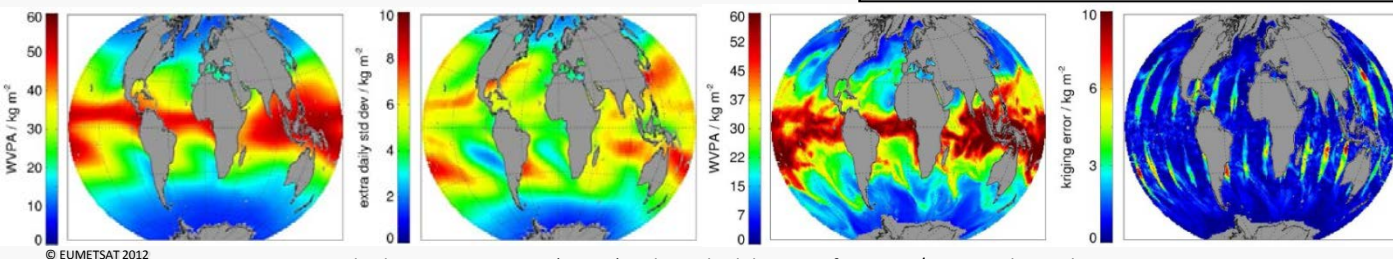
Total column water vapour (WVPA) and standard deviation from SSM/I averaged over the period 1987-2006 (left two figures). The both figures to the right show WVPA and kriging error for an exemplary day in April 2001.

Overview

The **Satellite Application Facility on Climate Monitoring** (CM SAF) develops, produces, archives and disseminates satellite-data-based products in support to climate monitoring. The product suite mainly covers parameters related to the energy & water cycle and addresses many of the Essential Climate Variables as defined by GCOS (GCOS 138).

The CM SAF produces both **Enviromental Data Records** and **Climate Data Records**.

Environmental Data Records (EDR)
are time-tagged earth-located geophysical parameters produced from sensor data. EDRs are derived in low to medium latency not fulfilling strictest climate requirements.

Climate Data Records (CDR)
are time series of measurements of sufficient length, consistency, and continuity to determine climate variability and change.

Available documentation

All products are thoroughly reviewed by international experts and a comprehensive documentation is available, comprising i.a.:

• Product User Manual
• Algorithm Theoretical Basis Document
• Validation Report

CM SAF   SMHI   RMI   Koninklijk Nederlands Meteorologisch Instituut Ministerie van Infrastructuur en Milieu   Met Office   Deutscher Wetterdienst   EUMETSAT

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Product Overview

	Acronym	Coverage			
		Europe & Africa		global	
		EDR	CDR	EDR	CDR
Radiation					
Surface Radiation Budget	SRB	◊	○	-	●
Surface Incoming Shortwave	SIS	●	●	○	●
Surfcae Net Shortwave	SNS	-	●	-	●
Direct Irradiance at Surface	SID	●	●	-	-
Spectrally Resolved Irradiance	SRI	-	○	-	-
Daylight	DAL	-	○	-	-
Surface Albedo	SAL	◊1	○	○	●
Cloud Albedo	CAL	-	●	-	-
Direct Aerosol Radiative Forcing	AEF	-	○	-	-
Cloud Radiative Effect SW & LW	CFS/L	-	○	-	●
Surface Net Longwave	SNL	◊	○	-	●
Surface Downward Longwave	SDL	◊	○	-	●
Surface Outgoing Longwave	SOL	◊	○	-	●
Top of Atmosphere Reflected Solar Radiative Flux	TRS	●	●	-	-
Top of Atmospere Emitted Thermal Radiative Flux	TET	●	●	-	-
Top of Atmosphere Incoming Solar Radiation	TIS	◊	-	-	-
Cloud & Aerosol					
Cloud Fractional Cover	CFC	●1	○	○	●
Cloud Optical Thickness	COT	●	○	-	●
Cloud Phase	CPH	●1	○	○	●
Cloud Top Temperature/Height/Pressure	CTO	●1	○	○	●
Cloud Water Path (ice &liquid)	CWP	●	-	-	-
Liquid Water Path	LWP	●	○	○	●
Ice Water Path	IWP	-	○	○	●
Aerosol Optical Depth	AOD	-	○	-	-
High Cirrus Cloud Amount	CA	-	-	-	○
Joint Cloud property Histograms	JCH	-	○	-	●
Water Vapour + Temperature, radiances					
Vertically Integrated Water Vapour	HTW	-	-	●	●
Layered Water Vapour and Temperature	HLW	○	-	●	○
Near Surface Specific Humidity	NSH	-	-	-	●
Specific Humidity and Temperature at pressure levels	HSH	-	-	●	○
Free Tropospheric Humidity	FTH	-	○	-	-
Land Surface Temperature	LST	-	○	-	-
Microwave Radiances	FCDR-SSMI	-	-	-	●
HOAPS					
Latent Heat Flux	LHF	-	-	-	●
Precipitation	PRE	-	-	-	●
Evaporation	EVA	-	-	-	●
Freshwater Flux	EMP	-	-	-	●
Near Surface Wind Speed	SWS	-	-	-	●

● Available - not available ◊ data are only available until March 2012
1 including Arctic ○ planned

April2013

Free Data Access & Contact

www.cmsaf.eu/wui   **User help desk: contact.cmsaf@dwd.de**

Surface Radiation

Cloud Albedo, Solar Surface Irradiance and Direct Irradiance

CM SAF SIS yearly mean (1983–2005) [Wm^{-2}]

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sat_map_mfg
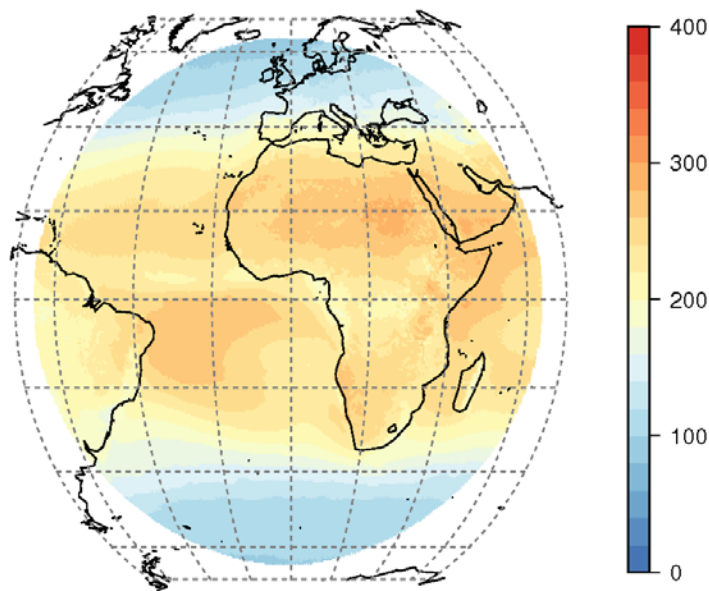
The figure shows the average of the solar surface irradiance derived from the Meteosat First Generation satellites with the MAGICSOL method.

The numbers are given in W/m^2.

Overview

The CM SAF Surface Radiation MVIRI Data Set is a satellite-based climatology of the surface irradiance, the surface direct irradiance and the effective cloud albedo derived from satellite-observations from the visible channel of the MVIRI instruments onboard the geostationary Meteosat satellites. The data are available from 1983 to 2005 and cover the region ±70° longitude and ±70° latitude. The products are available as monthly, daily, and hourly averages on a regular latitude/longitude grid with a spatial resolution of 0.03° x 0.03° degrees. The Swiss National Supercomputing Centre (CSCS) is gratefully acknowledged for providing the computational services needed for developing and processing the 23 year long MVIRI-based surface radiation climate data set.

Available documentation

- Product User Manual
- Algorithm Theoretical Basis Document
- Validation Report

R. W. Müller, C.Matsoukas, A. Gratzki, H. D. Behr, and R. Hollmann.
The cm-saf operational scheme for the satellite based retrieval of solar surface irradiance - a lut based eigenvector hybrid approach. Remote Sensing of Environment, 113(5):1012–1024, May 2009. doi: 10.1016/j.rse.2009.01.012.

R. Posselt, R. W. Müller, R. Stöckli, and J. Trentmann.
Remote sensing of solar surface radiation for climate monitoring – the CM-SAF retrieval in international comparison. Remote Sens. Environ., 118:186–198, 2012. doi: 10.1016/j.rse.2011.11.016.

Surface Radiation

Satellite Input Data

Meteosat-7
Meteosat-6
Meteosat-5
Meteosat-4
Meteosat-3
Meteosat-2

1980   1985   1990   1995   2000   2005   2010
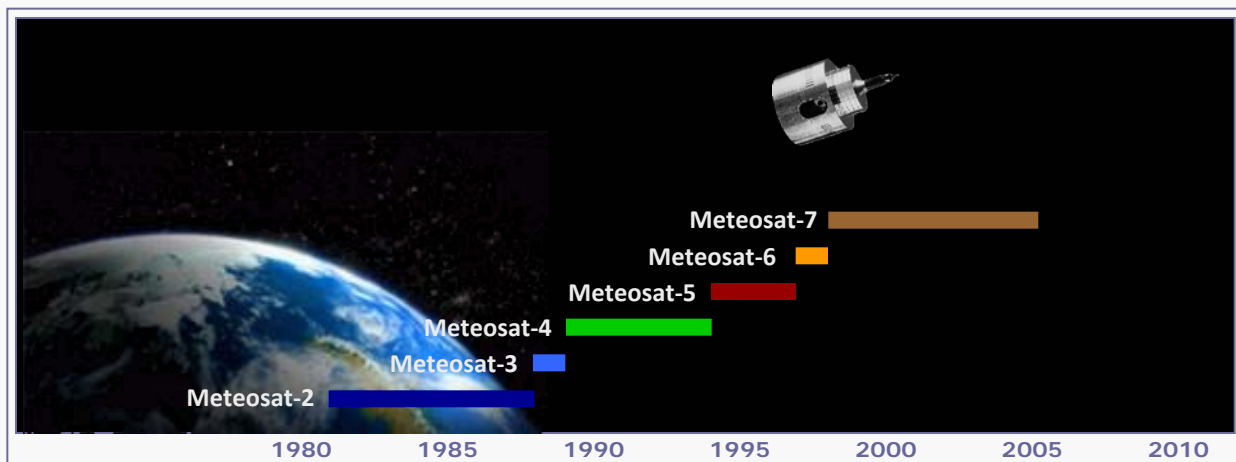
Products

Surface incoming solar radiation	(SIS) also known as global irradiance
Surface incoming direct radiation	(SID) also known as direct irradiance
Effective cloud albedo	(CAL) also known as cloud index

Technical Specifications

Time period:	01.01.1983 – 31.12.2005
Temporal resolution:	monthly mean, daily mean, hourly mean
Spatial coverage:	Meteosat disk up to a scanning angle of 70 degree
Spatial resolution:	0.03° × 0.03°
Data Format:	NetCDF, Climate and Forecast (CF) Metadata Convention v1.5

Free Data Access & Contact

www.cmsaf.eu/wui   **User help desk: contact.cmsaf@dwd.de**

TOA Reflected Solar and Emitted Thermal Radiation from GERB

© EUMETSAT 2013
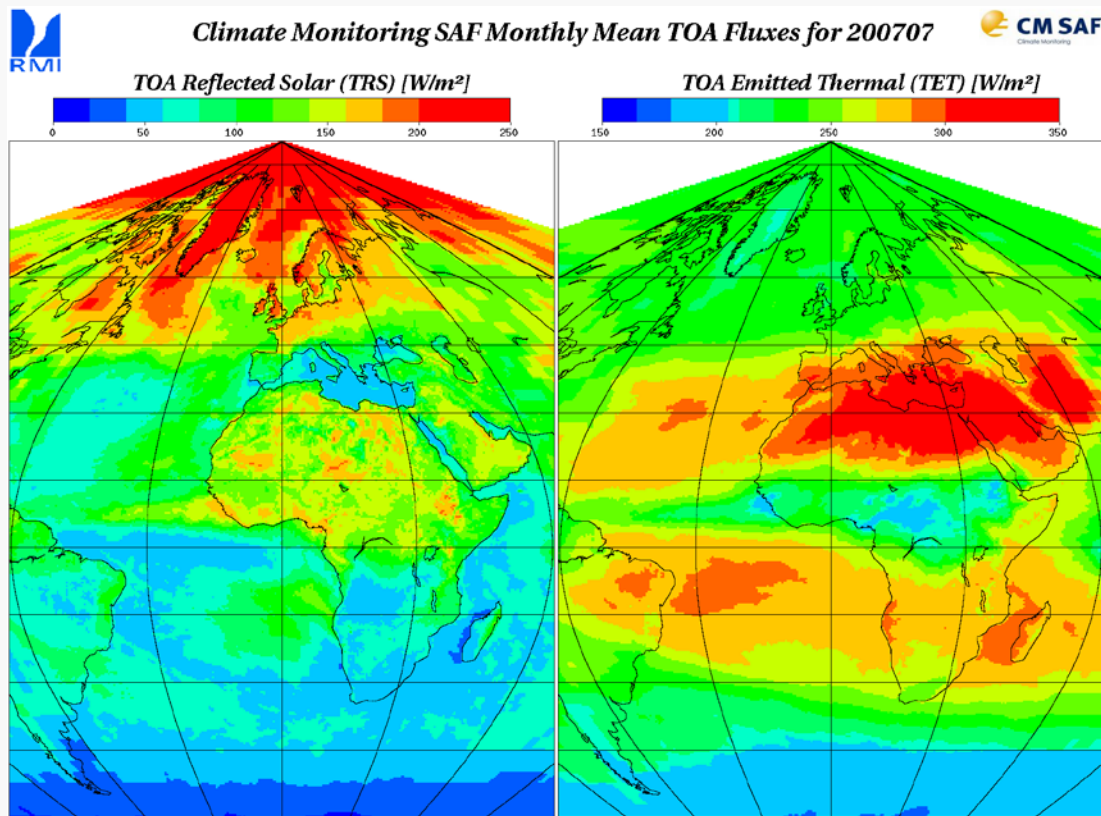
Overview

The CM SAF Top-Of_Atmosphere Radiation Data Set is a satellite-based climatology of the broadband reflected solar and emitted thermal radiations. The data set is based on the Geostationary Earth Radiation Budget (GERB) instruments on board the geostationary Meteosat Second Generation satellites. As it is based on geostationary observations, the data set is especially useful to study the diurnal cycle of the Earth radiation budget. The products are available from February 2004 to January 2011 as monthly mean, daily mean and monthly mean of hourly values. The data set is provided on a sinusoidal equal area grid with spatial resolution of 45 x 45 km.

Available documentation

- Product User Manual
- Algorithm Theoretical Basis Document
- Validation Report

N. Clerbaux, E. Baudrez, I. Decoster, S. Dewitte, A. Ipe, S. Nevens, and A. Velazquez-Blazquez, 2012:
The Climate Monitoring SAF TOA Radiation "GERB" Dataset, accepted for publication in Adv. Space Research.

Satellite Input Data

| | Meteosat-9 |
| | Meteosat-8 |

1980   1985   1990   1995   2000   2005   2010

Products

TOA Reflected Solar	(TRS) also known as shortwave flux
TOA Emitted Thermal	(TET) also known as outgoing longwave radiation

Technical Specifications

Time period:	01.02.2004 - 31.01.2011
Temporal resolution:	monthly mean, daily mean, monthly mean of hourly values
Spatial coverage:	Meteosat disk + inner arctic
Spatial resolution:	45km x 45km
Data Format:	NetCDF, Climate and Forecast (CF) Metadata Convention v1.5

Free Data Access & Contact

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HOAPS 3.2

DOI 10.5676/EUM_SAF_CM/HOAPS/V001

Hamburg Ocean Atmosphere Parameters and Fluxes

Climatological mean field (left) and zonal mean annual cycle (right) of HOAPS precipitation for the years 1988 – 2008.
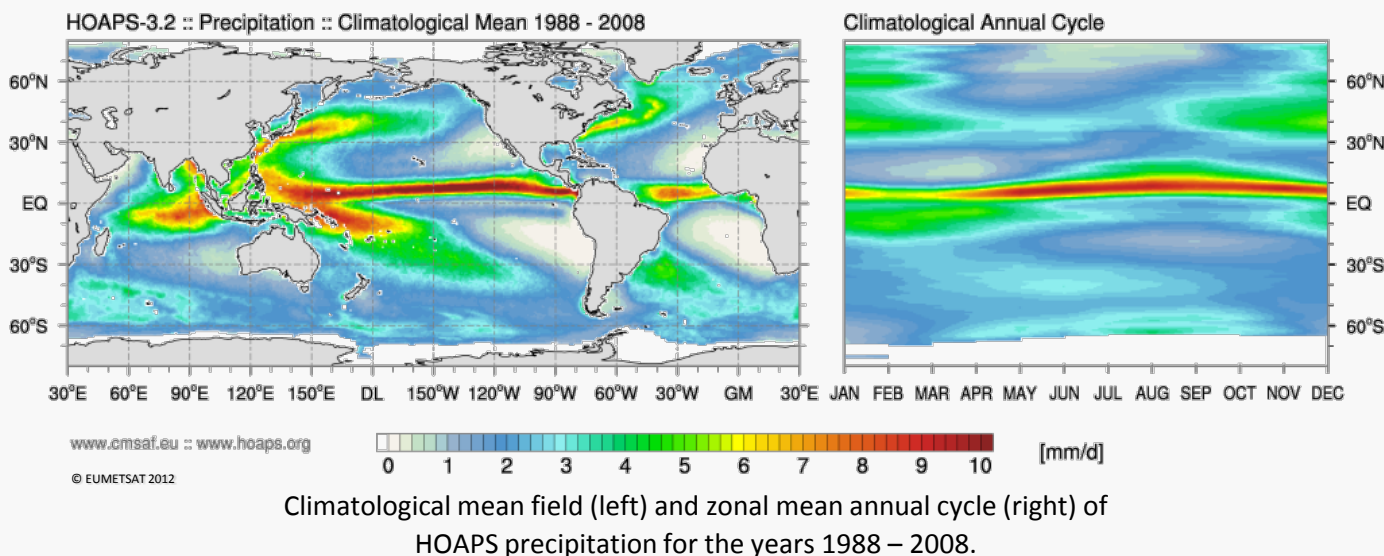
Overview

The Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data (HOAPS) set is a completely satellite based climatology of precipitation, evaporation and freshwater budget (evaporation minus precipitation) as well as related turbulent heat fluxes and atmospheric state variables over the global ice free oceans. All variables are derived from SSM/I passive microwave radiometers, except for the SST, which is taken from AVHRR measurements. The data set includes multi-satellite averages, inter- sensor calibration, and an efficient sea ice detection procedure. Main changes in this version are a prolonged time series, now containing data for the time period from 1987 until end of 2008 and an updated processing of the level-1 SSM/I brightness temperatures. The physical retrieval algorithms remain unchanged compared to HOAPS 3.0. All HOAPS products have global coverage, i.e., within ±180° longitude and ±80° latitude and are only defined over the ice-free ocean surface. The products are available as monthly averages and 6-hourly composites on a regular latitude/longitude grid with a spatial resolution of 0.5° x 0.5° degrees.

Available documentation

- Product User Manual
- Algorithm Theoretical Basis Document
- Validation Report

Andersson, A., C. Klepp, K. Fennig, S. Bakan, H. Graßl, and J. Schulz, 2010a:
Evaluation of HOAPS-3 ocean surface freshwater flux components. Journal of Applied Meteorology and Climatology, doi:10.1175/2010JAMC2341.1.

Andersson, A., K. Fennig, C. Klepp, S. Bakan, H. Graßl, and J. Schulz, 2010b:
The Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data – HOAPS-3. Earth System Science Data Discussion, 3, 143-194, doi:10.5194/essdd-3-143-2010.
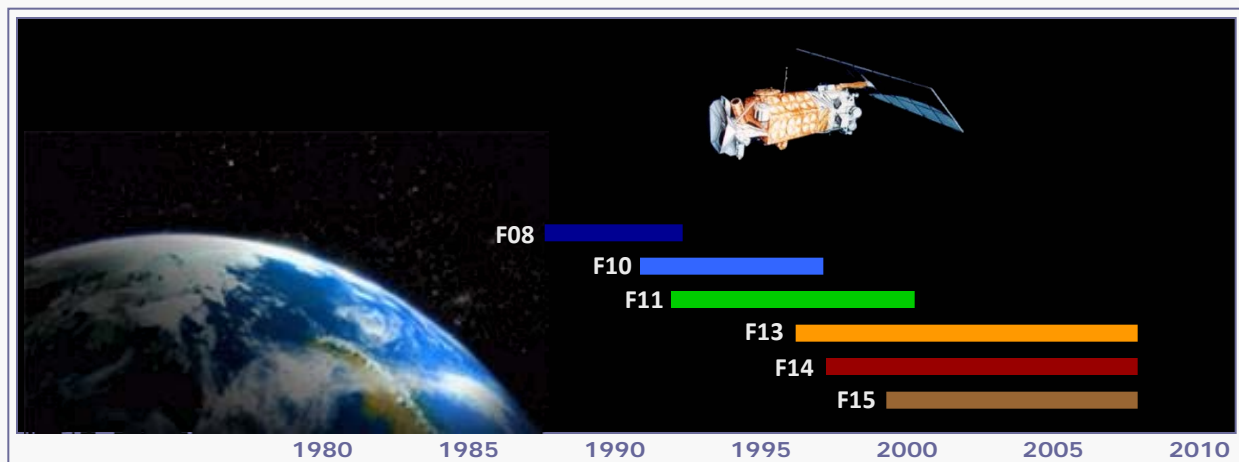
HOAPS 3.2

DOI 10.5676/EUM_SAF_CM/HOAPS/V001

Satellite Input Data

Temporal coverage of SSM/I instrument aboard DMSP satellite platforms for the HOAPS processing.

Products

Near surface wind speed	(SWS)
Near surface specific humidity	(NSH)
Latent heat flux at sea surface	(LHF)
Evaporation	(EVA)
Precipitation	(PRE)
Freshwater flux	(EMP)

Technical Specifications

Time period:	9th of July 1987 to 31st of December 2008
Temporal resolution:	6-hourly composites and monthly averages
Spatial coverage:	quasi-global coverage over the ice-free ocean surface, i.e., within ±180° longitude and ±80° latitude on regular latitude/longitude grid
Spatial resolution:	0.5° × 0.5°
Data Format:	NetCDF, Climate and Forecast (CF) Metadata Convention v1.5

## Free Data Access & Contact

www.cmsaf.eu/wui   **User help desk: contact.cmsaf@dwd.de**

Vertically Integrated Water Vapour from SSM/I
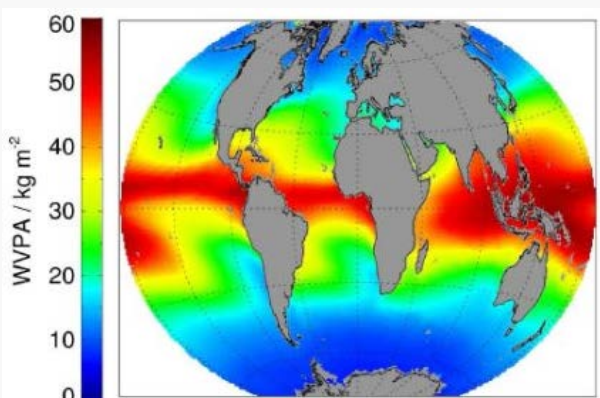
© EUMETSAT 2012

Total column water vapour over the period 1987 – 2006.
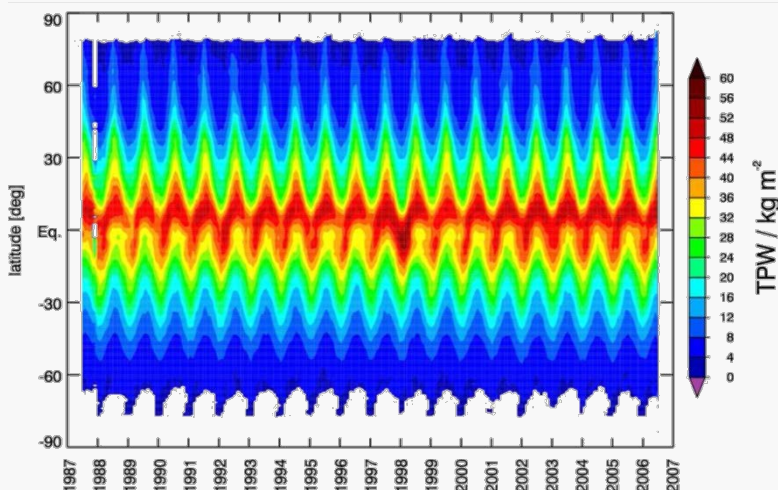
© EUMETSAT 2012

Hovmoeller diagram of zonally averaged monthly mean WVPA for the time series July 1987 – August 2006.

Overview

A dataset of vertically integrated water vapour was derived from homogenized SSM/I observations at the Satellite Application Facility on Climate Monitoring (CM SAF). CM SAF utilized observations of the Special Sensor Microwave/Imager (SSM/I) flying onboard Defense Meteorological Satellite Program (DMSP) platforms F08, F10, F11, F13, F14 and F15 using data in native SSM/I resolution from the Hamburg Ocean-Atmosphere Parameters and Fluxes from Satellite (HOAPS) data set. The CM SAF water vapour dataset from SSM/I has global coverage, i.e., within ±180° longitude and ±80° latitude. The product is only defined over the ice-free ocean surface. This product contains the monthly and daily averages on a regular latitude/longitude grid with a spatial resolution of 0.5° x 0.5° degrees. The temporal coverage of the dataset ranges from July 1987 to August 2006.

Available documentation

- Product User Manual
- Algorithm Theoretical Basis Document
- Validation Report

Schröder, M., Jonas, M., Lindau, R., Schulz, J., and Fennig, K.:
The CM SAF SSM/I-based total column water vapour climate data record: methods and evaluation against re-analyses and satellite, Atmos. Meas. Tech. Discuss., 5, 6423-6453, doi:10.5194/amtd-5-6423-2012, 2012.

Satellite Input Data
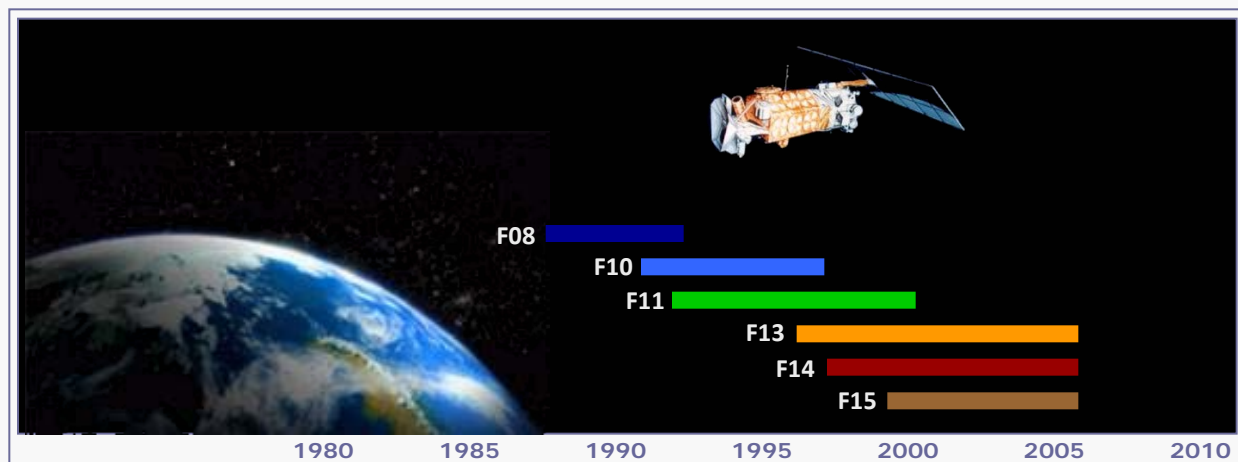
Temporal coverage of SSM/I instrument aboard DMSP satellite platforms for the HOAPS processing.

Products

Vertically Integrated Water Vapour from SSM/I	(HTW)

Technical Specifications

|	
Time period:	9th of July 1987 to 31st of August 2006
Temporal resolution:	monthly mean, daily mean
Spatial coverage:	quasi-global coverage over the ice-free ocean surface, i.e., within ±180° longitude and ±80° latitude on regular latitude/longitude grid
Spatial resolution:	0.5° × 0.5°
Data Format:	NetCDF, Climate and Forecast (CF) Metadata Convention v1.5

Free Data Access & Contact

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CLARA-A1

CM SAF cLoud, Albedo & RAdiation dataset, AVHRR-based, Edition 1

Mean cloud fraction (1982–2009)

© EUMETSAT 2012
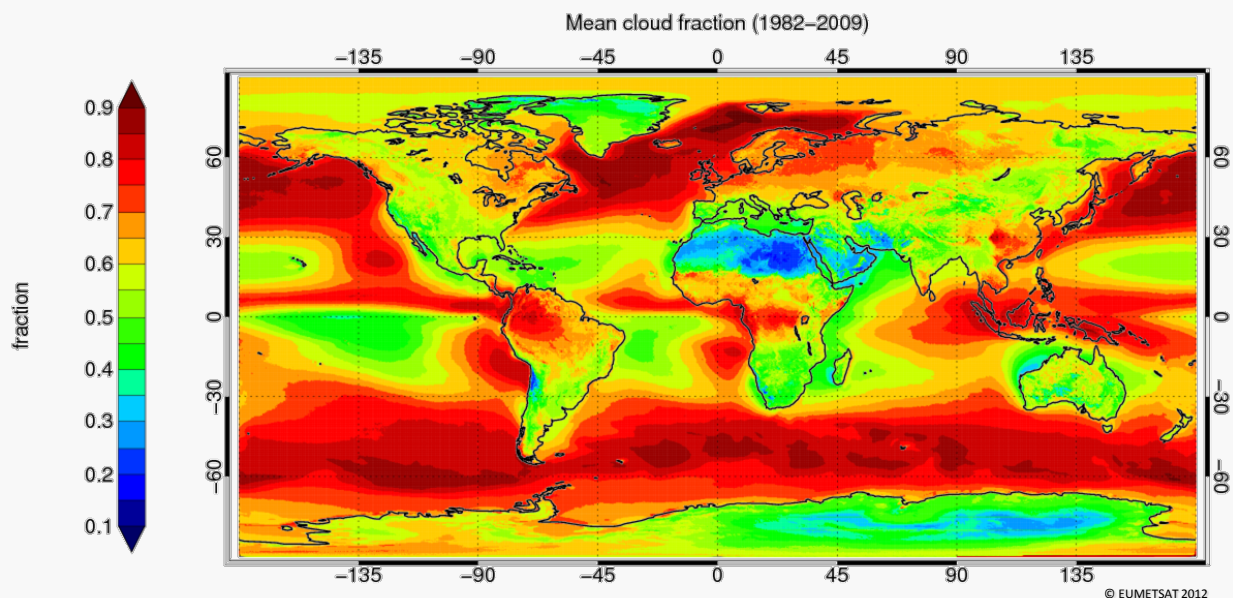
Climatological mean field of CLARA-A1 cloud fractional coverage for the years 1982 – 2009.

Overview

The CLARA-A1 dataset is a global dataset of cloud, surface albedo and surface radiation products derived from measurements of the Advanced Very High Resolution Radiometer (AVHRR) onboard the polar orbiting NOAA and Metop satellites. Monthly and daily mean products have been compiled over a time period of 28 years starting in 1982 and ending in 2009. Results are available for individual satellites as well as aggregated for all satellites. The data are provided on two types of grids: one global regular latitude-longitude grid with 0.25 degrees resolution and two equal-area grids covering the polar regions with 25 km resolution (products on the polar grids are restricted to cloud amount and surface albedo). Further extensions, e.g. single- and multi-parameter histograms, and subsets, e.g. daytime-only and night-time only results, are also available.

Available documentation

- Product User Manual
- Algorithm Theoretical Basis Document
- Validation Report

Karlsson, K.-G., Riihelä, A., Müller, R., Meirink, J. F., Sedlar, J., Stengel, M., Lockhoff, M., Trentmann, J., Kaspar, F., Hollmann, R., and Wolters, E.: *CLARA-A1: the CM SAF cloud, albedo and radiation dataset from 28 yr of global AVHRR data, Atmos. Chem. Phys. Discuss., 13, 935-982, doi:10.5194/acpd-13-935-2013, 2013.*

The EUMETSAT Network of Satellite Application Facilities

CM SAF Climate Monitoring

Satellite Input Data
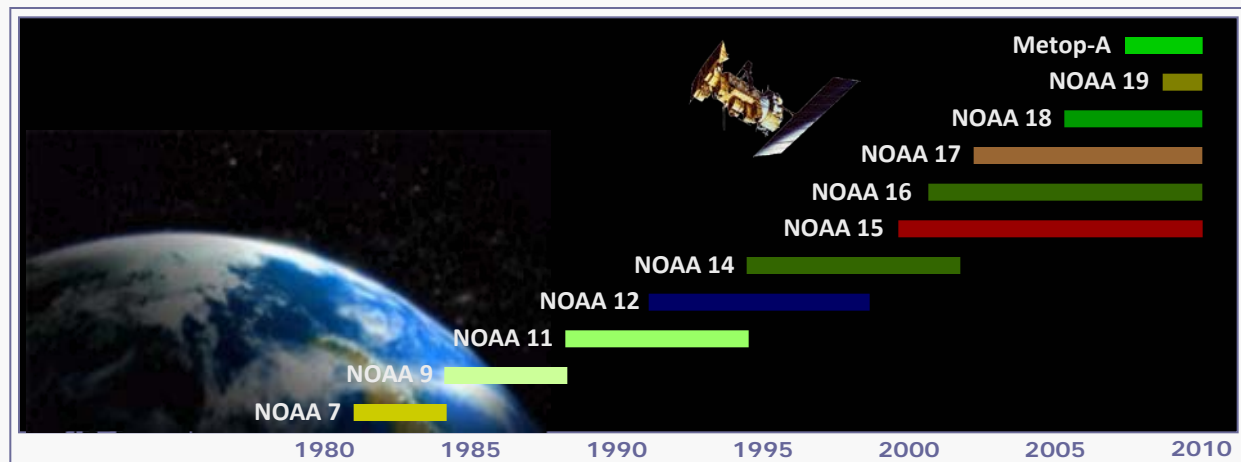
Temporal coverage of used AVHRR instruments aboard NOAA and Metop satellites.

Products

Fractional Cloud Cover	(CFC)	Surface Incoming Shortwave Radiation	(SIS)
Joint Cloud property Histogramm	(JCH)	Surface Albedo	(SAL)
Cloud Top Height, Temperature, Pressure	(CTO)	Surface Net Shortwave Radiation	(SNS)
Cloud Optical Thickness	(COT)	Surface Outgoing Longwave Rad.	(SOL)
Cloud Phase	(CPH)	Downward Longwave Rad.	(SDL)
Liquid Water Path	(LWP)	Surface Net Longwave Rad.	(SNL)
Ice Water Path	(IWP)	Radiation Budget	(SRB)
		Cloud Radiative Effect short wave	(CFS)
		Cloud Radiative Effect long wave	(CFL)

Technical Specifications

Time period:	1982 – 2009 (Clouds & Surface Albedo); 1989 – 2009 (Radiation)
Temporal resolution:	daily mean, pentad mean, monthly mean, monthly histograms (depending on product)
Spatial coverage:	global on a regular latitude/longitude grid (polar areas: equal area)
Spatial resolution:	0,25° x 0,25° (JCH: 1°x1°; polar areas: 25x25km²)
Data Format:	NetCDF, Climate and Forecast (CF) Metadata Convention v1.5

Free Data Access & Contact

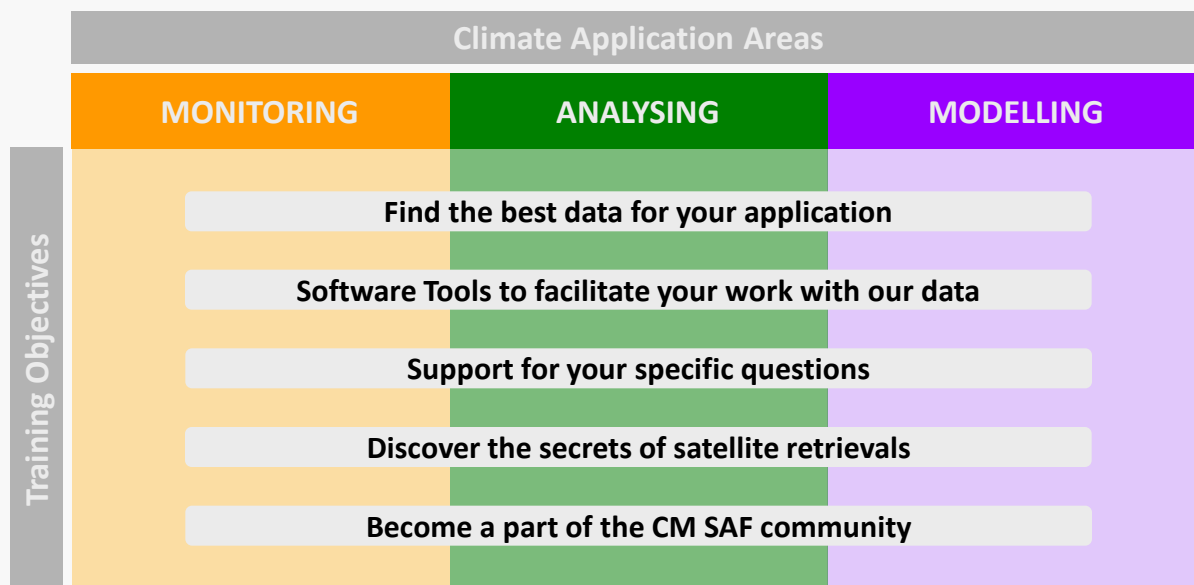**www.cmsaf.eu/wui**   **User help desk: contact.cmsaf@dwd.de**

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Water vapour and temperature from ATOVS
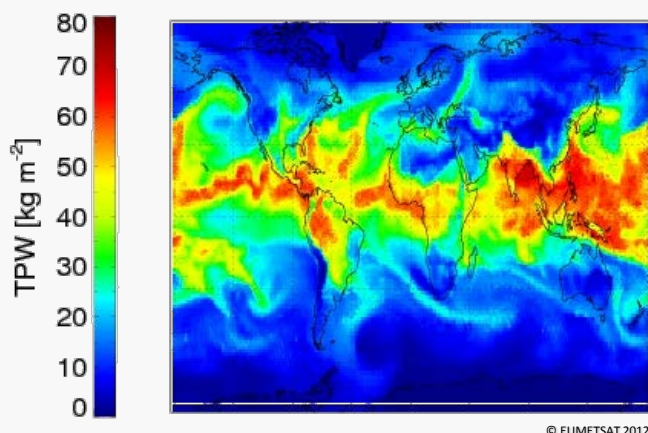
Global total precipitable water vapour
(TPW) for the 20th of September 2007.
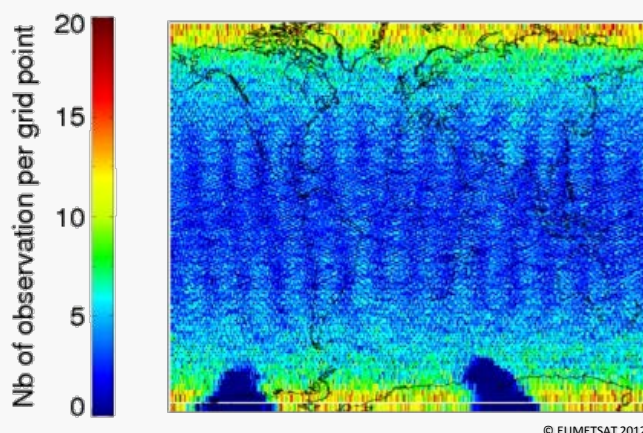
Corresponding number of observations
per grid point.

Overview

The CM SAF ATOVS data set provides global water vapour and temperature products using the International TOVS Processing Package (IAPP; Li et al, 2000). The products are available as daily and monthly means on a cylindrical equal area projection of 90km×90km. The temporal coverage of the data set ranges from 1st of January 1999 to the 31st of December 2011.

The products were evaluated against reference radiosonde data (GUAN (GCOS Upper-Air Network)), and other satellite observations with focus on AIRS (Atmospheric InfraRed Sounder). A comparison of the CM SAF ATOVS data set with the CM SAF ATOVS operational products was also performed.

Available documentation

- Product User Manual
- Algorithm Theoretical Basis Document
- Validation Report

Li et al (2000)

ATOVS ed. 1

Satellite Input Data

NOAA-15		
NOAA-16		
NOAA-17		
NOAA-18		
METOP-A		
NOAA-19		

1995   2000   2005   2010
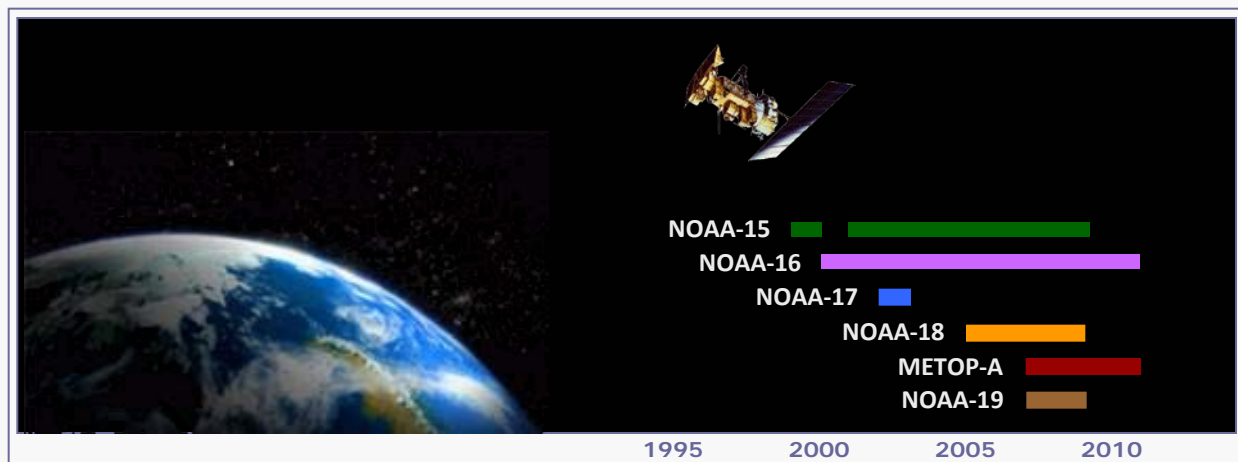
Products

Vertically Integrated Water Vapour	(HTW)
	(TPW)
Layered Water Vapour (5 layers)	(HLW)
Specific Humidity and Temperature at pressure levels (6 pressure levels)	(HSH)

Technical Specifications

Time period: 1999 – 2011
Temporal resolution: daily mean, monthly mean

Spatial coverage: global cylindrical equal area projection
Spatial resolution: 90 x 90 km^2

Data Format: NetCDF, Climate and Forecast (CF) Metadata Convention v1.5

Free Data Access & Contact

www.cmsaf.eu/wui   **User help desk: contact.cmsaf@dwd.de**

CM SAF   SMHI   RMI   Koninklijk Nederlands Meteorologisch Instituut Ministerie van Infrastructuur en Milieu   Met Office   Deutscher Wetterdienst DWD   EUMETSAT

TRAINING ACTIVITIES

The EUMETSAT
Network of
Satellite Application
Facilities

CM SAF
Climate Monitoring

Overview

The **Satellite Application Facility on Climate Monitoring** (CM SAF) provides training acitivities to support the application of CM SAF data in climate monitoring, climate analysis, and climate modelling. The focus is on annual workshops, the provision of documented software tools, and the supervision of master and bachelor theses. The workshops are composed of online elements and a classroom phase of several days. The training activities are mainly designed for climatologists from National Meteorological and Hydrological Services and from research institutions as well as students.

CM SAF supports to everyone interested in working with CM SAF data. The training contents are tailored to your needs.
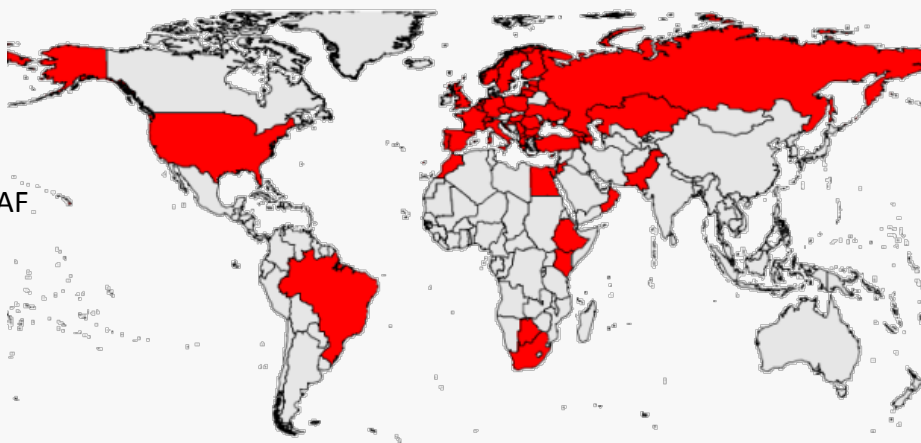
Participants from all parts of the world have already participated in CM SAF training activities.

Concept

Climate Application Areas		
MONITORING	ANALYSING	MODELLING

Training Objectives

Find the best data for your application

Software Tools to facilitate your work with our data

Support for your specific questions

Discover the secrets of satellite retrievals

Become a part of the CM SAF community

CM SAF   SMHI   RMI   Koninklijk Nederlands Meteorologisch Instituut Ministerie van Infrastructuur en Milieu   Met Office   Deutscher Wetterdienst   EUMETSAT

Workshops

Annual one-week CM SAF training workshops (supported by EUMETSAT) for up to 20 participants have been conducted since 2007. In joint activities and practical exercises the participants learn to apply CM SAF data to their needs and share their experiences.
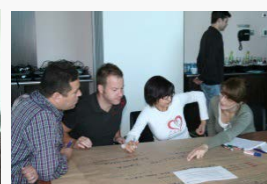
CM SAF Community Site

The **CM SAF Community Site** (training.eumetsat.int) is the communication platform between CM SAF Users and the CM SAF Team. It provides **Online Lectures** on the available CM SAF data and the applied retrieval algorithms. The **CM SAF Toolbox** provides software based on the climate data operators (cdo) and R to analyse and visualise CM SAF data.

Screencasts

help to navigate the Web User Interface (WUI) for data download and document the provided software.

Forums

enable the efficient interaction of the users with the CM SAF team and to share information.
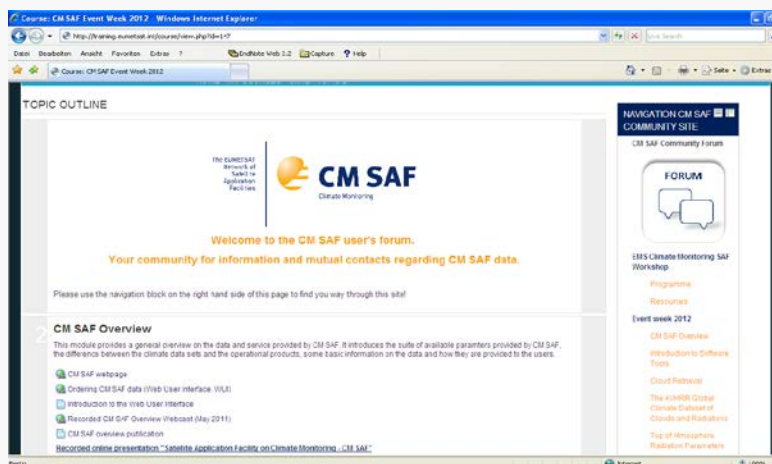
Free Data Access & Contact

www.cmsaf.eu/wui

User help desk: contact.cmsaf@dwd.de

Access to CM SAF Data

Overview

CM SAF products are archived in a database system. To enable the users to access this archive, CM SAF provides a Java Web Application, the Web User Interface (WUI), which translates the user requests into "database language" and vice versa. So, the users will be enabled to browse through the available products or to search for the products of their interests. Furthermore, it is possible to view the details of a specific product like available domain, time range or satellite input data.

Furtermore, for most products there are quicklook images integrated into the details page which helps the customers to visualize the selected product. And of course users can order data - CM SAF products are available to anyone **free of charge**. Customers have to register - we like to know your name, adress and organisation. And, of course, we are interested in feedback on your experiences and your application area of the data.

Available documentation

The Web User Interface is a HTML Interface and every page / form brings along its documentation. Furthermore, there are three video messages available that give a short introduction to the use of CM SAFs Web User Interface:

1. Introduction: http://www.screenr.com/0Hr8
2. Search the database: http://www.screenr.com/MCr8
3. Order data: http://www.screenr.com/QOG8

Processing the data and CM SAF Toolbox

CM SAF products are gridded on a product specific area. The type of gridding (i.e. the combination of geographical projection and horizontal resolution) is product specific, too. The Web User Interface offers the opportunity to reproject products to a regular latitude/longitude projection, to resample the horizontal resolution to user needs and to restrict the area to a user specific subdomain.

To process these requests CM SAF uses the "climate data operators" (CDO) to manipulate the original product. CDO is a free software tool and comprises a collection of command line operators that were originally developed for processing and analysis of data produced by climate and numerical weather prediction models (e.g. for file operations, simple statistics, arithmetics, interpolation or the calculation of climate indices). Supported file formats are NetCDF, GRIB and several binary formats.

Additionally, CM SAF provides the CM SAF Toolbox (**http://www.cmsaf.eu/tools**) with example data and software tools to analyse and visualise CM SAF data. The scripts, designed for MS Windows, are based on CDO (**https://code.zmaw.de/projects/cdo**) and R (**http://www.r-project.org**). The scripts allow to calculate and visualise spatial and temporal averages, anomalies, trends, etc. Documentation is provided together with the toolbox and through online screencasts. They are available e.g. from CM SAF Community Site (training.eumetsat.int).

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