EUMETSAT CM SAF
CLIMATE MONITORING

Deutscher Wetterdienst
Wetter und Klima aus einer Hand
DWD

Climate Data Records and User Service of the EUMETSAT SAF on Climate Monitoring

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In recent decades, climate variability and change have caused impacts on natural and human systems on all continents. Observations are needed to understand and document these interactions of the climate system. They are increasingly based on remote sensing from satellites which offer global scale and continuous coverage. Only long term and consistent observations of the Earth system allow us to quantify impacts of climate variability and change on the natural and human dimension. From this understanding one can estimate and eventually predict future states of the Earth system and quantify its vulnerability and resilience to continuing anthropogenic forcing. In addition, these observations can be used in the evaluation and assessment of reanalysis data records and climate models.
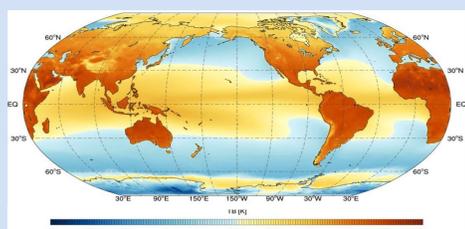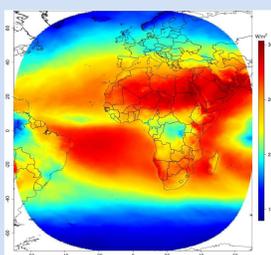
Microwave brightness temperatures at 22GHz (1987-2013)
DOI: 10.5676/EUM_SAF_CM/FCDR_MWI/V003
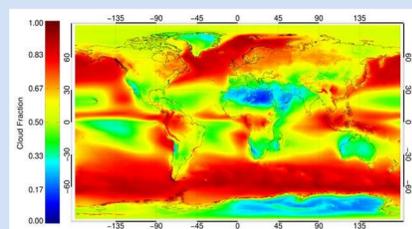
Cloud fraction of CLARA-A2 (1982-2015)
DOI: 10.5676/EUM_SAF_CM/CLARA_AVHRR/V002
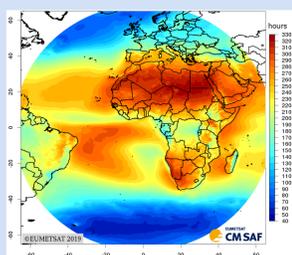
Sunshine duration (1983-2017)
DOI: 10.5676/EUM_SAF_CM/SARAH/V002_01

Top of the atmosphere Thermal Radiation (1983-2015)
DOI: 10.5676/EUM_SAF_CM/TOA_MET/V001

Definition of the different Climate Data Records (CDRs)

A **Fundamental Climate Data Records (FCDR)** is a long-term satellite data record of calibrated and quality-controlled data designed to allow the generation of homogeneous products that are accurate and stable enough for climate monitoring. FCDRs include the ancillary data used to calibrate them.

Thematic Climate Data Records (TCDR) are geophysical variables derived from the FCDRs, specific to various disciplines, and often generated by blending satellite observations, in situ data, and model output.

Interim Climate Data Records (ICDR) denote a regularly updated TCDR in shorter time latency with an algorithm and processing system as consistent as possible to the generation of reference TCDR. An ICDR is usually based on the latest available inter-calibration and requires a different validation approach.

Climate Data Records (CDRs) of EUMETSAT's CM SAF

Since 2012 CM SAF is operationally delivering high-quality satellite based Climate Data Records (CDR) for climate monitoring and model evaluation.

CM SAF's CDRs are based on carefully (inter-)calibrated satellite data using the latest versions of the respective algorithms. All CM SAF data records undergo a rigorous technical and scientific external review process, while still being flexible enough to incorporate the latest developments.

To support the emerging European operational climate monitoring services, ICDRs for selected TCDRs (CLAAS-2, SARAH-2.1, and CLARA-A2) are generated additionally. The ICDRs are based on the respective algorithms of the previously released TCDR to allow the continuation of the time series with shorter time latency. ICDR products based on CLAAS-2 and SARAH-2.1 are already available. CM SAF is currently preparing the implementation of the ICDR based on algorithms used in CLARA-A2.

During the current project phase (CDOP-3, 2017-2022) CM SAF will update several already re-leased CDRs and will provide CDRs of additional parameters after careful validation and review of the data records. Information on the CM SAF CDRs can be found via the respective DOIs which are available via https://www.cmsaf.eu/doi

Sensor	Parameter	TCDR period	Area	ICDR start year
Fundamental Climate Data Records (FCDR)				
SMMR, SSMI(S)	Microwave Radiances (SSMI)	1987-2008	global	
	Microwave Radiances (SSMI, SSMIS)	1987-2013		
	Microwave Radiances (SMMR, SSMI, SSMIS)	1979-2015		
	Microwave Radiances (SMMR, SSMI, SSMIS)	1979-2020		
Thematic and Interim Climate Data Records (TCDR & ICDR)				
SSMI(S), AMSR-E, TMI, GMI (HOAPS)	Total column water vapour, evaporation, precipitation, freshwater flux, latent heat flux, near surface wind speed and humidity (HOPAS 3.2)	1987-2008	global ice-free ocean	
	As HOAPS 3.2 (HOAPS-4)	1987-2014		
	As HOAPS-4 + liquid water path (HOAPS-5)	1987-2020		
Microwave Imager + Sounder, GEO-ring	Global precipitation	2002-2019	global	
Microwave Sounder	Upper tropospheric humidity	1992-2015	global	
		1992-2020		
ATOVS	Total column water vapour, layer integrated water vapour and temperature, specific humidity and temperature at 6 levels	1999-2012	global	
HIRS (HECTOR)	Cirrus cloud amount, cloud top level	1980-2016	global	
AVHRR GAC (CLARA)	Cloud properties, surface radiation, surface albedo (CLARA-A1)	1982-2009	global	
	As CLARA-A1 (CLARA-A2)	1982-2015		2019*
	As CLARA-A2 (CLARA-A2.1)	1982-2018		
	As CLARA-A2.1 + top of the atmosphere radiation (CLARA-A3)	1978-2020		2021
SEVIRI	Cloud parameters, surface radiation (CLAAS-1)	2004-2012	Europe & Africa	
	Cloud parameters (CLAAS-2)	2004-2015		2018*
	Cloud parameters (CLAAS-2.1)	2004-2017		
	Cloud parameters (CLAAS-3)	2004-2020		2021
	Aerosol Optical Depth (AOD)	2004-2012	Europe & Africa	
GERB/ SEVIRI	Top of atmosphere radiative fluxes (Edition 1)	2004-2011	Europe & Africa	
	Top of atmosphere radiative fluxes (Edition 2)	2004-2015		
MVIRI	Surface Radiation	1983-2005	Europe & Africa	
MVIRI/ SEVIRI	Cloud parameters, surface radiation parameters, free tropospheric humidity, incl. albedo and land surface temperature	1983-2015	Europe & Africa	
	Daylight	1983-2011		
	Top of atmosphere radiative fluxes	1982-2015		
	Land fluxes, free tropospheric humidity, land surface temperature	1983-2020		
MVIRI/ SEVIRI (SARAH)	Solar surface radiation parameters (SARAH-1)	1983-2012	Europe & Africa	
	Solar surface radiation parameters (SARAH-2.1)	1983-2017		2018*
	Solar surface radiation parameters (SARAH-3)	1983-2020		2021

*selected parameters only

Table 1: Details for released (black) and planned (until 2022, red) CM SAF CDRs. Further information can be found via the corresponding Digital Object Identifiers (DOI) available at www.cmsaf.eu/doi.

Select product
Order
Re-project/sub-area
Screenshots of ordering process via the CM SAF Web User Interface

User Help Desk and services

Data can be ordered through the CM SAF webpage wui.cmsaf.eu and is provided free of charge to any interested user (user registration required). A selection of sub-regions and re-projection of data is possible during the ordering process. Add-on products and ancillary data (e.g. lat/lon, land/sea mask, etc.) as well as example files are available on the webpage.

To support the processing and visualisation of the products a R-toolbox with ready to use functions for processing and visualisation of the CM SAF data records is provided, too.
The toolbox can be downloaded from

https://www.cmsaf.eu/tools.

Additionally, service messages, information on changes in processing, known product disruptions as well as newsletters and documentation on the products are being provided.

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