Climate Data Records of the EUMETSAT Satellite Application Facility on Climate Monitoring

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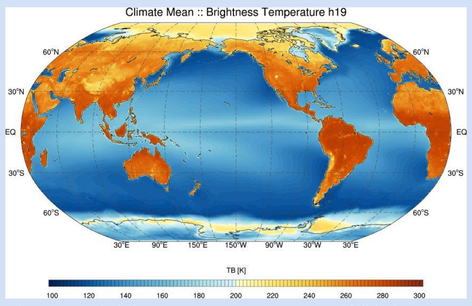
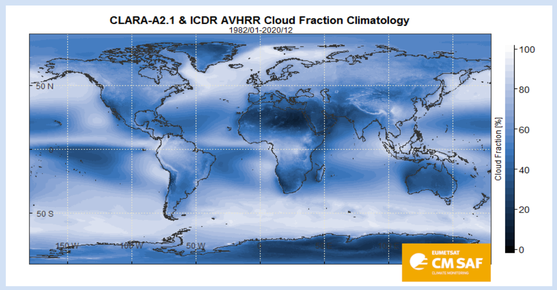
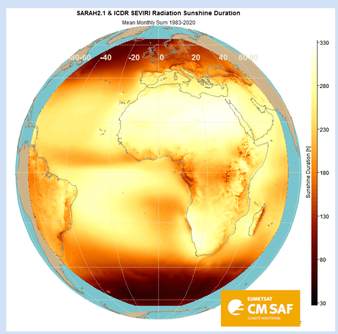
In recent decades, climate variability and change have caused impacts on natural and human systems on all continents. Observations are needed to understand and document these interactions of the climate system. They are increasingly based on remote sensing from satellites which offer global scale and 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.



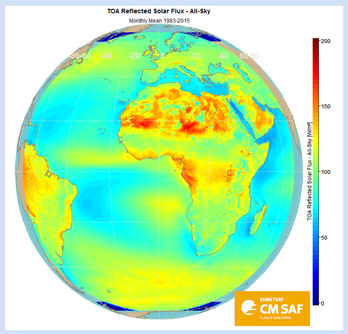
Microwave brightness temperatures at 19(h) GHz (1987-2015), DOI: 10.5676/EUM_SAF_CM/FCDR_MWI/V003



Cloud fraction climatology (1982-2020) from CLARA-A2.1 + ICDR DOI TCDR: 10.5676/EUM_SAF_CM/CLARA_AVHRR/V002_01



Sunshine duration (1983-2020) from SARAH-2.1 + ICDR SEVIRI DOI TCDR: 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 Data Records as defined by CEOS CGMS WGClimate (2020)

A ***Fundamental Climate Data Records (FCDR)*** consists of a consistently-processed time series of uncertainty-quantified sensor observations calibrated to physical units, located in time and space, and of sufficient length and quality to be useful for climate science or applications.
Climate Data Records (CDR) consist of a consistently-processed time series of uncertainty-quantified retrieved values of a geophysical variable or related indicator, located in time and space, and of sufficient length and quality to be useful for climate science or applications.
Interim Climate Data Records (ICDR) are consistently-processed times series of uncertainty-quantified estimates of CDR values produced at lower latency than, but otherwise minimizing differences with, the estimated CDR values

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

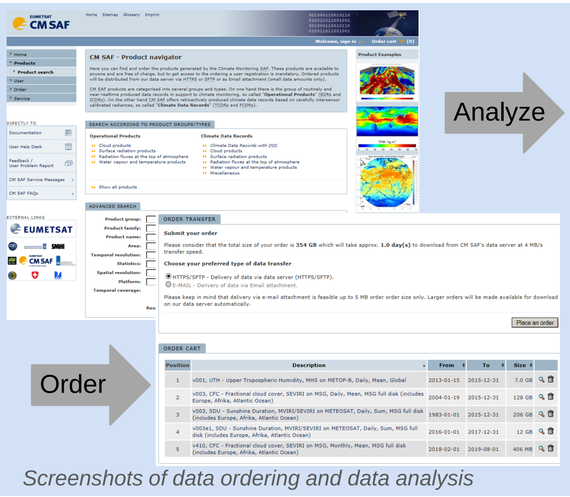
Since 2012 CM SAF has been operationally delivering high-quality satellite based Climate Data Records for climate monitoring and model evaluation.

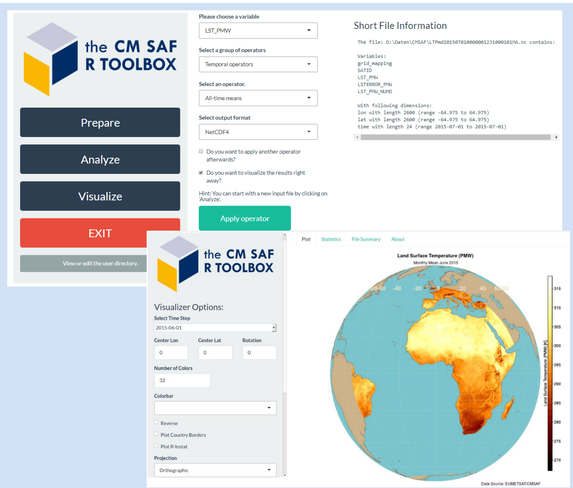
CM SAF's CDRs are based on carefully (inter-)calibrated satellite data using the latest versions of the respective algorithms. All CM SAF data records undergo a rigorous technical and scientific external review process, while still being flexible enough to incorporate the latest developments.
To support the emerging European operational climate monitoring services, ICDRs for selected CDRs (CLAAS-2.1, SARAH-2.1, and CLARA-A2.1) are generated additionally. These ICDRs are based on the respective algorithms of the previously released CDR to allow the continuation of the time series with shorter time latency. Already now, it is possible to cover the new WMO reference period (1991-2020) with a combination of the CDR and its respective ICDR data.
Currently, CM SAF is in the process of updating several already released 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	CDR 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 (CDR & 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	1999-2015	global	
		1996-2018		
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)	1982-2019		
	As CLARA-A2.1 + top of the atmosphere radiation (CLARA-A3)	1979-2020		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		
	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.





Analyze

Screenshots of data ordering and data analysis

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.

EUMETSAT Satellite Application Facility on Climate Monitoring (CM SAF)
www.cmsaf.eu - contact.cmsaf@dwd.de
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