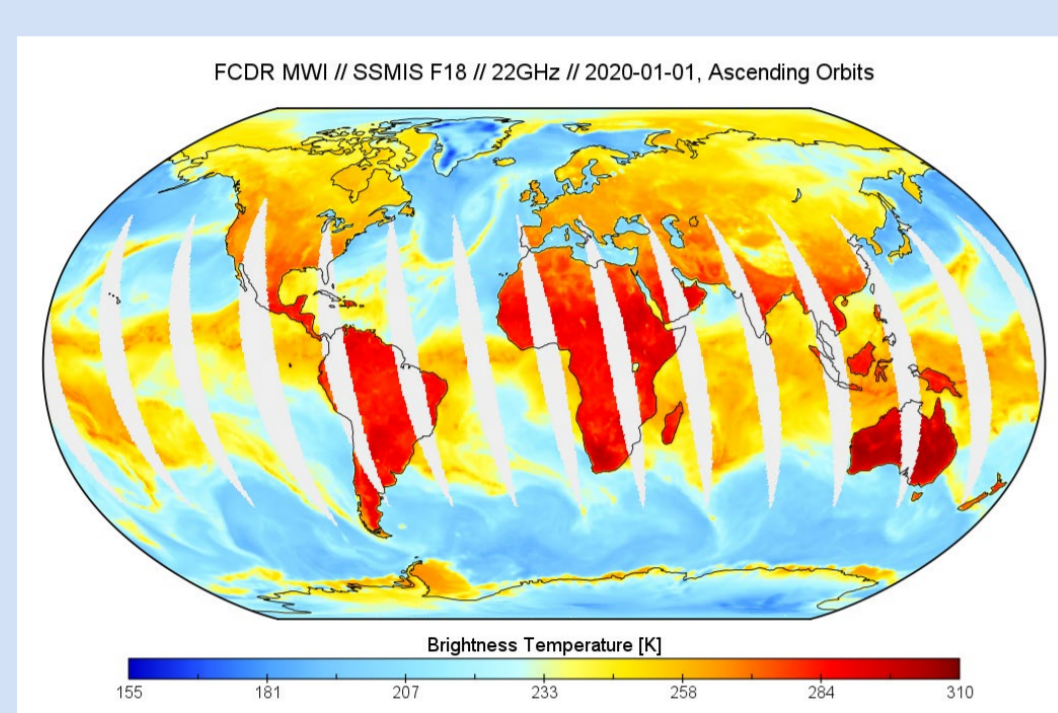


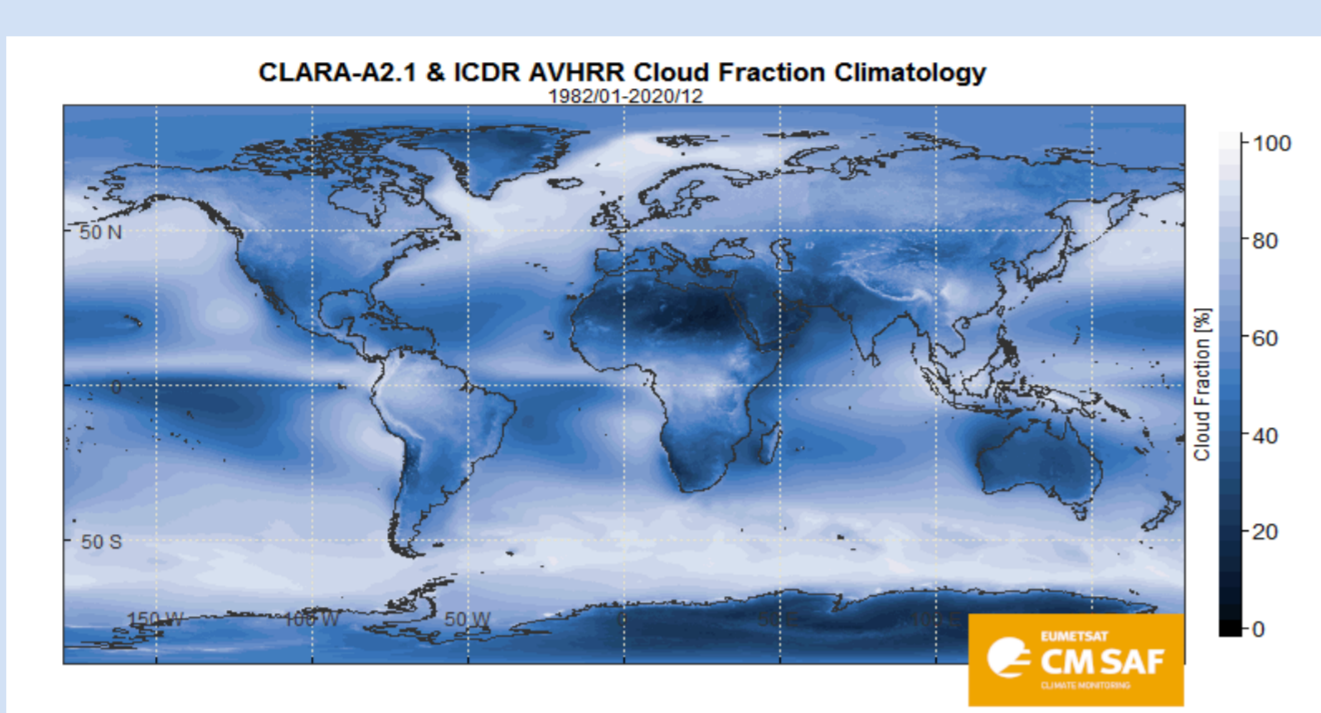
Climate Data Records of the EUMETSAT Satellite Application Facility on Climate Monitoring

N. Selbach (DWD) on behalf of the CM SAF team (email: Nathalie.selbach@dwd.de)

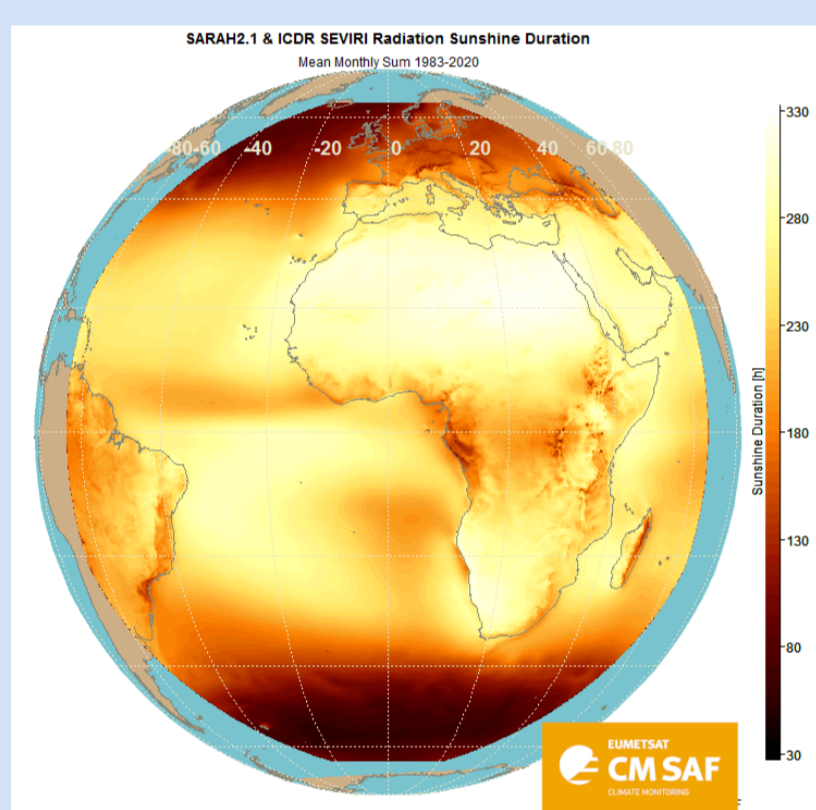
In recent decades, climate variability and change have caused impacts on natural and human systems on all continents. Observations are needed to understand and document these interactions of the climate system. They are increasingly based on remote sensing from satellites which offer global scale and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



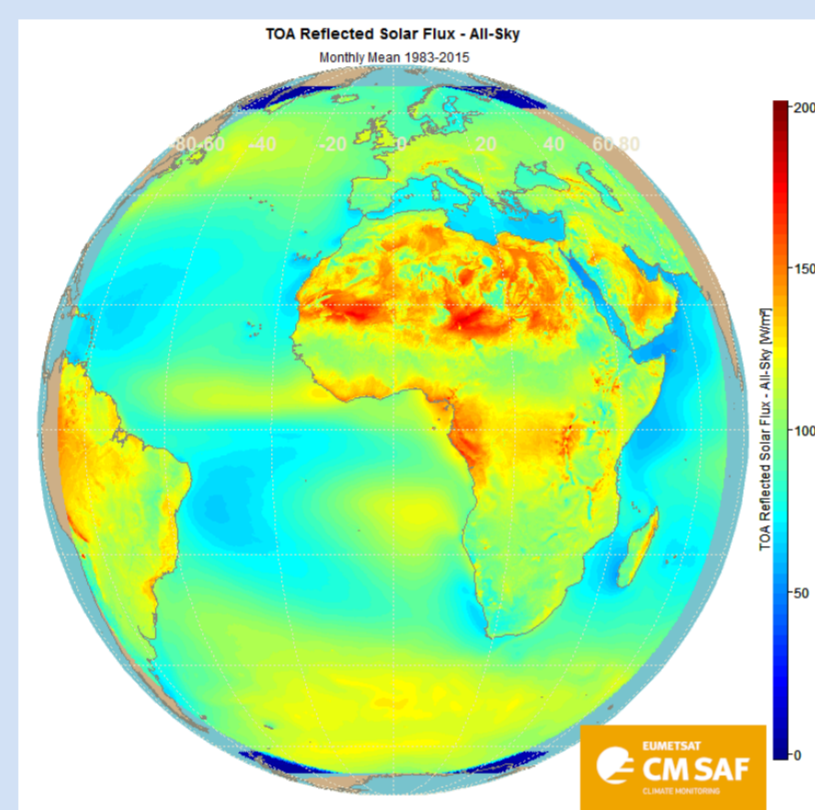
Microwave brightness temperatures at 22 GHz on 01/01/2020 (asc. orbits). DOI: 10.5676/EUM_SAF_CM/FCDR_MWI/V004



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

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 operational climate monitoring services, additionally Interim CDRs for selected CDRs are generated.

These ICDRs are based on the respective algorithms of the CDR to allow the continuation of the time series with shorter time latency. Already now, it is possible to cover the WMO reference period (1991-2020) with satellite-based CDRs.

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 during CDOP-4 including work towards usage of the next generation satellites, EPS-SG and MTG.

Utilisation of data from EPS-SG and MTG

Starting with the CDOP-4 phase (2022-2027) CM SAF plans to prepare and/or start the utilisation of data from:

FCI:

- CM SAF plays a key role in the ISCCP-NG activity. One aspect will be the usage of data from FCI.

- Key input to CLAAS and SARAH CDRs and ICDRs in order to extend them into the future.

MetImage:

- Start adaptation of CLARA retrievals and prepare future releases.

- Provide support to NWC SAF PPS processing software for cloud retrievals

3MI:

- Consideration for improving surface albedo estimations in CLAAS

MWI:

- Start intercalibration of MWI and provide feedback to EUMETSAT

More opportunities, in particular also for other sensors, will emerge and CM SAF will monitor these developments.

Information on the CM SAF CDRs can be found via the respective DOIs which are available at <https://www.cmsaf.eu/doi>

Sensor	Parameter	CDR period	Area	ICDR start year	
Fundamental Climate Data Records (FCDR)					
SMMR, SSM/I SSMI(S)	Microwave Radiances (SMMR, SSMI, SSMIS)	1979-2020 ¹	global		
	Microwave Radiances (SMMR, SSMI, SSMIS)	1979-2024			
Climate Data Records and Interim Climate Data Records (CDR & ICDR)					
SSMI(S), AMSR-E, TMI, GMI, AMSR-2	Total column water vapour, evaporation, latent heat flux, precipitation, freshwater flux, near surface wind speed and humidity (HOAPS-4)	1987-2014	global ice-free ocean		
	Similar to HOAPS-4 + liquid water path (HOAPS-5)	1987-2020			
	As HOAPS-5	1987-2024			
Microwave Imager + Sounder, Geo-ring	Global precipitation (GIRAFE)	2002-2020 1998-2024 ²	global	2021	
Microwave Sounder	Upper tropospheric humidity	1999-2015 1996-2018 1994-2024	global		
Microwave + Near Infrared Imager	Total column water vapour	2002-2017	global		
ATOVS	Total column water vapour, layer integrated water vapour and temperature, specific humidity and temperature at 6 levels	1999-2012	global		
AVHRR GAC	Cloud properties, surface radiation, surface albedo (CLARA-A2.1)	1982-2019	global	2019 ³	
	Similar to CLARA-A2.1 + additional surface and top of the atmosphere radiation (CLARA-A3)	1979-2020		2021	
AVHRR GAC/VIIRS	Similar to CLARA-A3 (CLARA-A3.1)	1979-2023	global	2024	
SEVIRI	Aerosol Optical Depth (AOD)	2004-2012	Europe & Africa		
	Cloud parameters (CLAAS-3)	2004-2020		2021	
SEVIRI/FCI	Cloud and TOA radiation parameters (CLAAS-4)	2004-2024	Europe & Africa	2025	
GERB/SEVIRI	Top of atmosphere radiative fluxes (Edition 2)	2004-2015	Europe & Africa		
	Cloud fraction (COMET) and land surface temperature (SUMET)	1991-2015		Europe & Africa	
MVIRI/SEVIRI	Daylight	1983-2011	Geo-ring		
	Top of atmosphere radiative fluxes	1983-2015			
	Latent and Sensible Heat fluxes (land), free tropospheric humidity, cloud fraction (COMET), land surface temperature (SUMET), surface radiation budget	1983-2020			
	Latent and Sensible Heat fluxes, land surface temperature, surface radiation budget	demonstration data ²			
	Solar surface radiation parameters (SARAH-2.1)	1983-2017			Europe & Africa
	Solar surface radiation parameters (SARAH-3)	1983-2020		Europe & Africa	2021
Geo-ring	Solar surface radiation parameters (SARAH-GEO) ⁴	1983-2025	Geo-ring	2026	

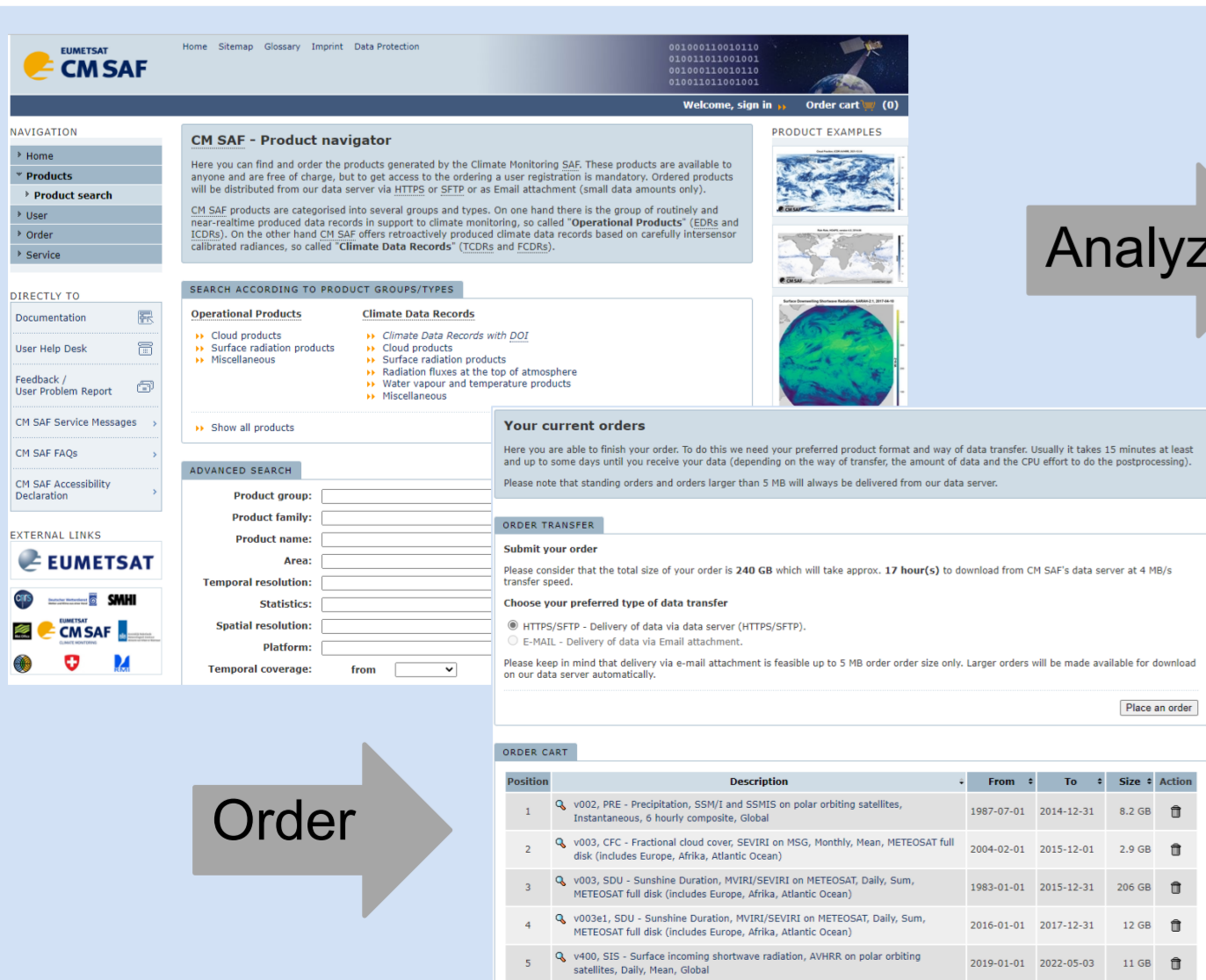
¹ will be extended until 2022, planned release in Q3/2023

² release foreseen for CDOP-5

³ selected parameters only

⁴ record length depending on location in Geo-ring: 1983-2025 (Meteosat 0° service, SARAH-4), 2005-2025 (Himawari), 2000-2025 (GOES-E), 2000-2025 (GOES-W), ICDR generation for Meteosat 0° coverage only

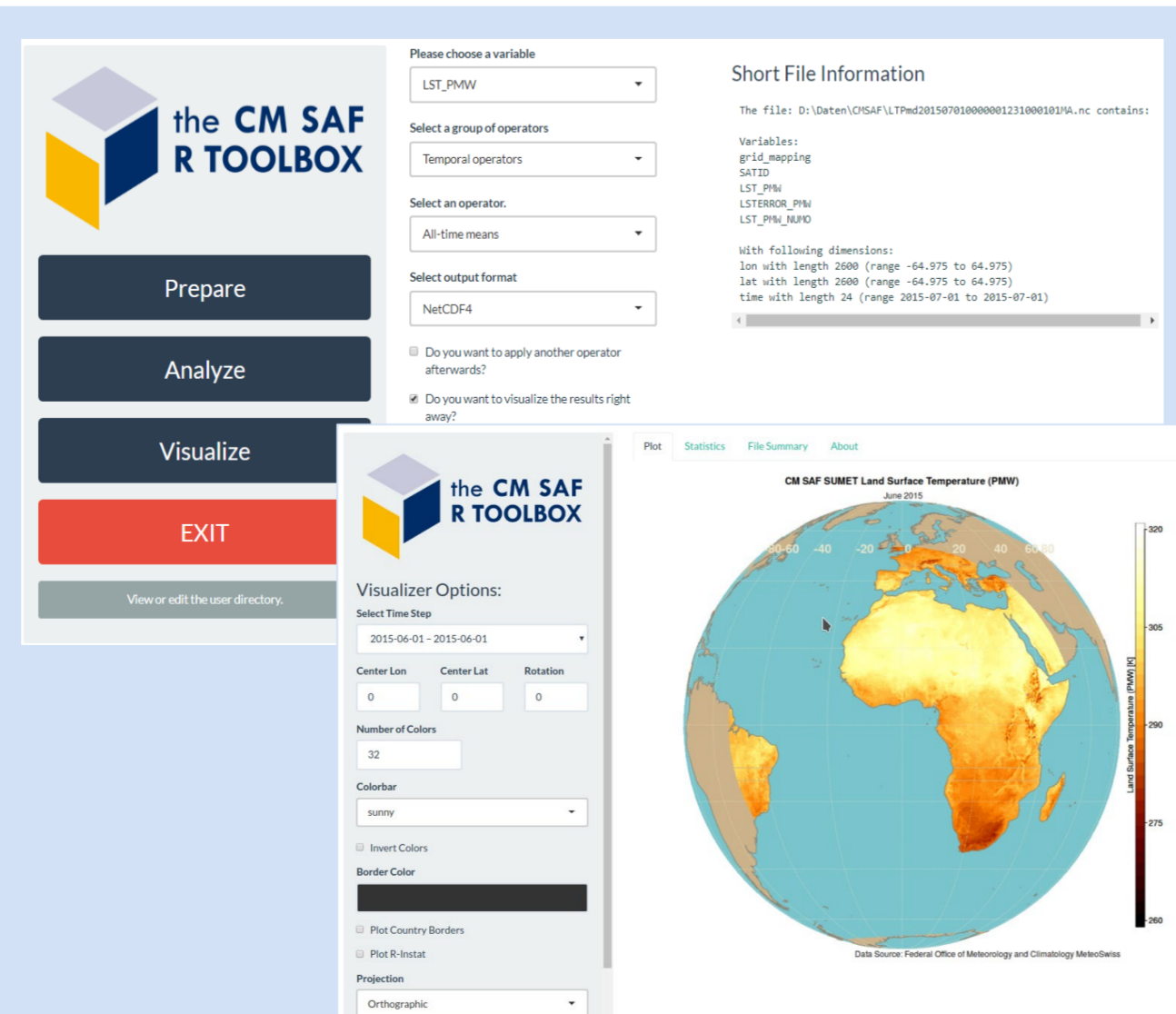
Table 1: Details for latest version of released (black, latest version only) and upcoming (red: within 2023/2024, blue: CDOP-4 activities) CM SAF CDRs. Further information can be found via the corresponding Digital Object Identifiers (DOI) available at www.cmsaf.eu/doi.



Analyze

Order

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.

