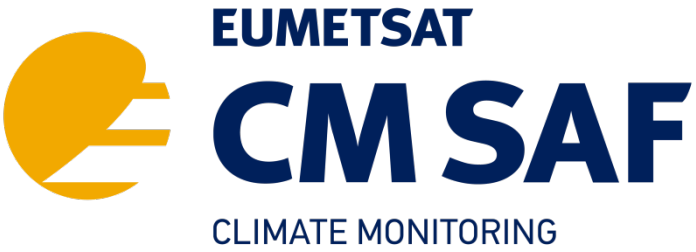
EUMETSAT Satellite Application Facility on Climate Monitoring



SARAH-3 Auxiliary Data User Guide

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Reference	Title	Code
RD 1	Product User Manual SARAH-3	SAF/CM/DWD/PUM/METEOSAT/ HEL/3.2, 02.03.2023

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1 Introduction

The third edition of CM SAF Surface Solar Radiation Climate Data Record using Heliosat (SARAH-3) provides surface radiation parameters derived from the MVIRI and SEVIRI instruments onboard geostationary METEOSAT First (MFG) and Second Generation (MSG) satellites. The auxiliary file provided with the SARAH-3 data record is applicable to all SARAH-3 data products, while the parameters called “time_difference_MVIRI” and “time_difference_SEVIRI” are only applicable for the instantaneous (30-minutes) data.

For detailed information about the SARAH-3 product suite, see the corresponding Product User Manual (RD 1). All relevant information can be also found via the DOI page 10.5676/EUM_SAF_CM/SARAH/V003.

In order to facilitate work with the SARAH-3 data records, we provide the following auxiliary data:

Table 1: Available auxiliary data and corresponding netCDF variable names.

Parameter	Definition
Latitude	lat(lat)
Longitude	lon(lon)
Coordinate Reference System	crs
Land-Sea-Mask	land_mask(lat, lon)
Land Cover	land_cover(lat,lon)
Altitude [m]	altitude(lat, lon)
Time difference to get image acquisition time for MVIRI [hours]	time_difference_MVIRI(lat,lon)
Time difference to get image acquisition time for SEVIRI [hours]	time_difference_SEVIRI(lat,lon)

2 Auxiliary Data

The SARAH-3 products come on a regular 0.05°x0.05° latitude/longitude grid. Hence the auxillary data file (AuxilaryData_SARAH-3.nc) comes on the same grid and is applicable to all data products. However, there are two parameters that are dedicated to be applied to the instantaneous (30-minute) data, which are "time_difference_MVIRI" and "time_difference_SEVIRI". The sections below give more details on the parameters in the auxiliary data file:

Parameter **"time_difference_MVIRI**":

This is the 2-dimensional field of the time difference between the time stamp as given in the product netcdf files and the estimated actual time of observation per grid-box, also called image acquisition time, for the MVIRI instrument. MVIRI is used from 1983 to 2005. The "time_difference_MVIRI" needs to be **added** to the time given in the product file (e.g. in SISinYYYYMMDD…) as it is different for each grid-box.

Parameter "**time_difference_SEVIRI**":

This is the 2-dimensional field of the time difference between the time stamp as given in the product netcdf files and the estimated actual time of observation per grid-box, also called image acquisition time, for the SEVIRI instrument. SEVIRI is used from 2006 onwards. The parameter needs to be **added** to the time given in product file as differs for each grid-box.

Parameter **"land_mask"** and **"altitude"**:

The land-mask and altitude data are taken from the "Global Land One-kilometer Base Elevation dataset" (GLOBE) by NOAA (see https://www.ngdc.noaa.gov/mgg/topo/report/globedocumentationmanual.pdf). GLOBE is based on Digital Elevation Models.

Parameter **"land_cover"**:

The land cover is taken from the European Commission's GLC 2000 Project. GLC2000 provides for the year 2000 a harmonized land cover database over the whole globe. The data is regridded to the SARAH-3 grid. The GLC200 land use classes are given in Table 2.

Table 2: Land use classes as defined by the GLC 2000 Project and as given in the SARAH-3 Auxiliary file

Class	Short Description
1	Tree Cover, broadleaved, evergreen LCCS >15% tree cover, tree height > 3m
2	Tree Cover, broadleaved, deciduous, closed
3	Tree Cover, broadleaved, deciduous, open (open 15-40% tree cover)
4	Tree Cover, needle-leaved, evergreen
5	Tree Cover, needle-leaved, deciduous
6	Tree Cover, mixed leaf type
7	Tree Cover, regularly flooded, fresh water (& brackish)
8	Tree Cover, regularly flooded, saline water, (daily variation of water level)
9	Mosaic: Tree cover / Other natural vegetation
10	Tree Cover, burnt

Class	Short Description
11	Shrub Cover, closed-open, evergreen
12	Shrub Cover, closed-open, deciduous
13	Herbaceous Cover, closed-open
14	Sparse Herbaceous or sparse Shrub Cover
15	Regularly flooded Shrub and/or Herbaceous Cover
16	Cultivated and managed areas
17	Mosaic: Cropland / Tree Cover / Other natural vegetation
18	Mosaic: Cropland / Shrub or Grass Cover
19	Bare Areas
20	Water Bodies (natural & artificial)
21	Snow and Ice (natural & artificial)
22	Artificial surfaces and associated areas

More details on the land cover data set, its generation and land class definitions can be found at https://forobs.jrc.ec.europa.eu/products/glc2000/glc2000.php.

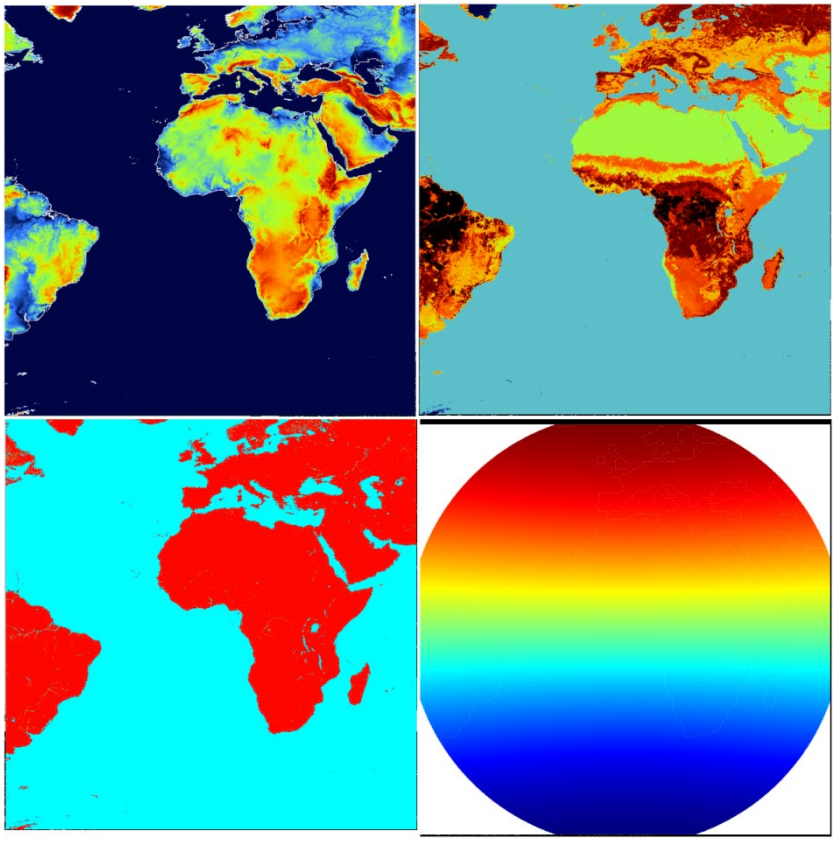

Figure 2-1: Example plots of available auxiliary data: Altitude (lop left), land cover (top right), land mask (bottom left), time difference to get image acquisition time for instantaneous data products (bottom right).