

Satellite-based climate data records of surface solar radiation from the CM SAF

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The incoming surface solar radiation has been defined as an essential climate variable by GCOS. Long term monitoring of this part of the earth's energy budget is required to gain insights on the state and variability of the climate system. In addition, climate data sets of surface solar radiation have received increased attention over the recent years as an important source of information for solar energy assessments, for crop modeling, and for the validation of climate and weather models. The EUMETSAT Satellite Application Facility on Climate Monitoring (CM SAF) is deriving regional and global thematic climate data records (TCDRs) from geostationary and polar-orbiting satellite instruments.

The regional climate data record SARAH (Surface Solar Radiation Dataset – Heliosat, doi: 10.5676/EUM_SAF_CM/SARAH/V002) is based on observations from the series of Meteosat satellites. SARAH provides 30-min, daily- and monthly-averaged data of the effective cloud albedo, the solar irradiance, the direct solar radiation (horizontal and normal), and the sunshine duration from 1983 to 2017 for the full view of the Meteosat satellite (i.e., Europe, Africa, parts of South America, and the Atlantic ocean). The data sets are generated with a high spatial resolution of 0.05° allowing for detailed regional studies. A corresponding data record based on the measurements from the Meteosat Indian Ocean Data Coverage satellites (located at about 60°E) is available from 1999 to 2016 and covers large parts of Asia (doi: 10.5676/DWD/JECD/SARAH_E/V001_01).

The global climate data record CLARA (CM SAF Clouds, Albedo and Radiation dataset from AVHRR data, doi: 10.5676/EUM_SAF_CM/CLARA_AVHRR/V002) is based on observations from the series of AVHRR satellite instruments. CLARA provides daily- and monthly-averaged global data of the solar irradiance (SIS) from 1982 to 2015 with a spatial resolution of 0.25°. In addition to the solar surface radiation also the longwave surface radiation as well as surface albedo and numerous cloud properties are provided in CLARA.

Within the CM SAF these TCDRs are accompanied by so-called Interim Climate Data Record (ICDR) that are consistently generated to the TCDRs, but provided with a short latency of less than 5 days. These data allow a near-realtime assessment of the current climatic situation in the context of the long-term average and variability.

Here we provide an overview of the climate data records of the surface solar radiation data provided by the CM SAF as well as selected applications, e.g., in the context of climate monitoring and renewable energy. All data from the CM SAF are available free of charge via www.cmsaf.eu.