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Satellite-based surface solar radiation data provided by CM SAF – Solar energy applications

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The planning of solar power plants requires accurate estimates of the solar energy available at the surface. Satellite observations provide useful information on the cloud coverage, which is one of the main factors modulating the solar surface radiation. This information can be used to estimate the solar surface radiation from satellite. Observations from geostationary satellites allow the retrieval of the surface solar radiation with high temporal (up to hourly) and spatial (approx. 5 km) resolution.

The EUMETSAT Satellite Application Facility on Climate Monitoring (CM SAF) is deriving surface solar radiation from geostationary and polar-orbiting satellite instruments. While CM SAF is focusing on the generation of high-quality long-term climate data records, also operationally data is provided in short time latency within 8 weeks. CM SAF has already released one data set based on geostationary Meteosat satellite covering 1983 to 2005 (doi: 10.5676/EUM_SAF_CM/RAD_MVIRI/V001) and one global data set based on measurements of the polar-orbiting AVHRR instruments covering 1982 to 2009 (doi: 10.5676/EUM_SAF_CM/CLARA_AVHRR/V001).

Here, we present details and applications of the CM SAF surface radiation data generated from the observations of the geostationary Meteosat satellites. The climate data set is available at high spatial (0.03 x 0.03 deg) and temporal (hourly, daily, monthly) resolutions. Besides global radiation, also the direct beam component is provided, which is for instance required for the estimation of the energy generated by solar thermal plants. Based on comparisons with surface observations the accuracy of CM SAF surface solar radiation data is better than 10 W/m2 on a monthly basis and 25 W/m2 on a daily basis. The data sets are well documented (incl. validation using surface observations) and available in netcdf-format at no cost without restrictions at www.cmsaf.eu. Solar energy applications of the data include the Photovoltaic Geographical Information System (PVGIS, http://re.jrc.ec.europa.eu/pvgis/) at the Joint Research Centre (JRC) in Ispa, Italy and the Spanish solar atlas generated by AEMET.