



Top of Atmosphere Radiation MVIRI/SEVIRI Data Record within the Climate Monitoring SAF

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The CM SAF Top of Atmosphere (TOA) Radiation MVIRI/SEVIRI Data Record provides a homogeneous satellite-based climatology of the TOA Reflected Solar (TRS) and Emitted Thermal (TET) radiation in all-sky conditions. The continuous monitoring of these two components of the Earth Radiation Budget is of prime importance to study climate variability and change. The Meteosat Visible and InfraRed Imager (MVIRI - from 1983 until 2004) and the Spinning Enhanced Visible and Infrared Imager (SEVIRI - from 2004 onward) on board the Meteosat First and Second Generation satellites are combined to generate a long Thematic Climate Data Record (TCDR). Combining MVIRI and SEVIRI allows an unprecedented temporal (30 minutes / 15 minutes) and spatial (2.5 km / 3 km) resolution compared to the Clouds and the Earth's Radiant Energy System (CERES) products. This is a step forward as it helps to increase the knowledge of the diurnal cycle and the small-scale spatial variations of radiation.

The MVIRI/SEVIRI Data Record covers a 32 years time period from 1 February 1983 to 30 April 2015. The TOA radiation products are provided as daily mean, monthly mean and monthly averages of the hourly integrated values (diurnal cycle). To ensure consistency with other CM SAF products, the data is provided on a regular grid at a spatial resolution of 0.05 degrees (i.e. about 5.5 km) and covers the region between +/- 70° longitude and +/- 70° latitude.

Validation of the MVIRI/SEVIRI Data Record has been performed by intercomparison with several references such as the CERES products (EBAF, SYN1deg-Day and SYN1deg-M3Hour), the HIRS OLR Climate Data Record (Daily and Monthly), the reconstructed ERBS WFOV-CERES (or DEEP-C) dataset and the ISCCP FD products. CERES is considered as the best reference from March 2000 onward. The quality of the early part of the Data Record is verified against the other references. In general, the stability of all the TOA radiation products is estimated to be better than 4 W.m⁻² (max-min) and no significant transition or jump between satellites and generations of instruments is observed. Most of the products also fulfill the accuracy requirements that were defined in the CM SAF Product Requirement Document.

Finally, a few examples of possible applications of the MVIRI/SEVIRI Data Record will be presented as well as some indicative analysis results (such as trend analysis).