EMS Annual Meeting Abstracts
Vol. 15, EMS2018-481, 2018

Preliminary results of the new method Heliosat-5 Interim for the assessment of the solar radiation at surface from geostationary meteorological satellites

Claire Thomas (1), Laurent Saboret (1), Stéphane Rubino (1), Benoit Tournadre (2), Benoit Gschwind (2), Lucien Wald (2), Philippe Blanc (2), and Etienne Wey (1)

(1) TRANSVALOR, Mougins, France (claire.thomas@transvalor.com), (2) OIE, MINES ParisTech, Sophia Antipolis, France

The well-know and widely cited Heliosat-2 method has been successfully applied at Transvalor and MINES ParisTech for more than twelve years to derive solar irradiance received at ground level from satellite imagery. It has been applied on a reduced dataset extracted from Meteosat First Generation imagery to generate the GEOSS-core service HelioClim-1, spanning from 1985 to 2005, and is routinely used to provide archives, real time and short-term forecasts of HelioClim-3, starting from 2004.

Several drawbacks have been identified in Heliosat-2; the method presented here, called Heliosat-5 Interim, intends to correct several of them. This is the first steps of an ambitious project to produce the Heliosat-5 method that may process various satellites to achieve a worldwide solar radiation database. This communication provides an overview of the Heliosat-5 Interim method and the preliminary results of its validation against measurements collected at terrestrial stations.

Heliosat-2 computes the ground albedo in cloud-free conditions at a given pixel by selecting one of the minima in a time series of satellite observations. This algorithm may at times select wrong values in specific cases. It has also an operational drawback as it requires a long enough archive of satellite images to build a relevant time series. This prevents from the immediate real-time processing of images from a recently launched satellite.

This limitation is overcome in Heliosat-5 Interim by exploiting two runs of McClear clear-sky model, one in the downward direction from the sun towards the earth surface, and a second one upward from the surface towards the satellite. McClear is a service of the European-funded Copernicus Atmosphere Monitoring Service (CAMS). It produces estimates of the solar irradiance that should be observed if the sky were cloud-free at any time and any site in the world since 2004. Part of its inputs is the properties of the cloud-free atmosphere such as ozone, water vapour and aerosols, which are updated every three hours, provided by CAMS. McClear has already demonstrated its reliability and its performance as it is exploited in our most performant version of HelioClim-3 version 5 (HC3v5) for more than four years now. It is consequently sound and safe to base a new operational service on this resource. Heliosat-5 Interim is based on the same concept that Heliosat-2. The other elements of the model are so far similar to those available in Heliosat-2, except that they are now computed at satellite level instead of at ground level.

The preliminary results of validation against the measurements of fourteen stations located in the geographical coverage of the Meteosat Second Generation satellite are presented together with a reminder of those obtained for HC3v5. Limits of Heliosat-5 Interim are discussed and ways of improvements are proposed.