



## **Applying the Heliosat-4 method to four different cloud property databases for the estimation of the surface downwelling short wave irradiation.**

Mireille Lefèvre (1), Sylvain Cros (2), Yves-Marie Saint-Drenan (1), Jan Fokke Meirink (3), Marion Schroedter-Homscheidt (4), Hartwig Deneke (5), and Martin Stengel (6)

(1) MINES ParisTech, PSL Research University, Centre Observation, Impacts, Energy, Sophia Antipolis, France (mireille.lefevre@mines-paristech.fr), (2) Reuniwatt SAS, Sainte-Clotilde, Reunion Island, France, (3) Royal Netherlands Meteorological Institute (KNMI), R&D Satellite Observations, De Bilt, The Netherlands, (4) German Aerospace Center (DLR), Oldenburg, Germany, (5) Leibniz Institute for Tropospheric Research (TROPOS), Leipzig, Germany, (6) Deutscher Wetterdienst (DWD), Offenbach, Germany

The Heliosat-4 method estimates the surface downwelling shortwave radiation (DSSR) received at ground level in all sky conditions. It is composed of two parts: the McClear model calculating the irradiance under cloud-free conditions and the McCloud model calculating the extinction of irradiance due to clouds. The main inputs to McClear are aerosol properties, total column water vapor and ozone content provided by the Copernicus Atmosphere Monitoring Service (CAMS). As for McCloud the cloud properties are retrieved from multispectral analysis of images of the Meteosat Second Generation (MSG) satellites using dedicated algorithms. The flexibility of Heliosat-4 (H4) offers the possibility to integrate different sources of cloud properties. In this work, three databases have been implemented to H4. The first one is the APOLLO (AVHRR Processing scheme Over cLOUDs, Land and Ocean) database from the German Aerospace Center (DLR) which is implemented in the framework of the CAMS Radiation service. The second one is the MSG-CPP product issued by the Royal Netherlands Meteorological Institute (KNMI). The third cloud property dataset is the CLAAS-2 dataset generated by the German DWD in the framework of CM-SAF. A new and fourth one called SICLONE (Système d'Information pour l'analyse et la prévision des Configurations spatio-temporelles des Occurrences Nuageuses) has been produced by Reuniwatt, containing cloud retrieval properties calculated with the NWC-SAF software.

In this study, the feasibility of connecting different cloud property databases to H4 along with the sensitivity of the method to the input cloud properties are tested. To this end, the cloud properties of the different databases are first compared. The DSSR calculated with H4 with the different datasets are then compared. Here, solar radiation evaluated by KNMI with their inversion algorithm is considered to also get an insight on the impact of the method on the estimation. Pyranometer measurements from the BSRN and KNMI networks for the year 2016 are used for this analysis.