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A new method for assessing surface solar irradiance: Heliosat-4

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Downwelling shortwave irradiance at surface (SSI) is more and more often assessed by means of satellite-derived estimates of optical properties of the atmosphere. Performances are judged satisfactory for the time being but there is an increasing need for the assessment of the direct and diffuse components of the SSI. MINES ParisTech and the German Aerospace Center (DLR) are currently developing the Heliosat-4 method to assess the SSI and its components in a more accurate way than current practices. This method is composed by two parts: a clear sky module based on the radiative transfer model libRadtran, and a cloud-ground module using two-stream and delta-Eddington approximations for clouds and a database of ground albedo. Advanced products derived from geostationary satellites and recent Earth Observation missions are the inputs of the Heliosat-4 method. Such products are: cloud optical depth, cloud phase, cloud type and cloud coverage from APOLLO of DLR, aerosol optical depth, aerosol type, water vapor in clear-sky, ozone from MACC products (FP7), and ground albedo from MODIS of NASA.

In this communication, we briefly present Heliosat-4 and focus on its performances. The results of Heliosat-4 for the period 2004-2010 will be compared to the measurements made in five stations within the Baseline Surface Radiation Network. Extensive statistic analysis as well as case studies are performed in order to better understand Heliosat-4 and have an in-depth view of the performance of Heliosat-4, to understand its advantages comparing to existing methods and to identify its defaults for future improvements.

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