



Comparing several satellite-derived databases of surface solar radiation in Morocco

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Satellite-derived databases of the surface solar irradiance (SSI) are common tools in solar energy and assessing their performances by comparison with in situ measurements is a common activity. Several authors have reported that performances of a given database differ from one site to another depending on the geographical region, topography, orography, climate, viewing angle from the satellite. . . As a consequence, quality assessment must be performed for a large number of sites. The present communication contributes to that and focuses on the case of Morocco.

Ground measurements of hourly means of global and direct irradiances were collected by the IRESEN, the national research institute for solar energy and new energies in Morocco, from five sites installed in the framework of the EnerMENA project led by the DLR (German Aerospace Center). The five sites are: Missouri, Ben Guerir, Erfoud, Zagora and Tan-Tan. Instruments are either a set of pyranometers, shaded pyranometers and pyrheliometers or rotating shadowband irradiometers. Measurements were quality-checked using recognized procedures.

Estimates were collected from the SoDa web site (www.soda-pro.com) for the same locations and same instants of measurements for three databases. The CAMS Radiation service exploits products of the Copernicus Atmosphere Monitoring Service (CAMS) on gaseous content and aerosols in the atmosphere and cloud optical properties deduced every 15 min from Meteosat imagery. Part of this service is the McClear service that provides estimate of the irradiance that should be observed if the sky were cloud-free. The second database is the HelioClim-3v4 that is derived from Meteosat images using the Heliosat-2 method. The third database: HelioClim-3v5, differs from v4 by the partial use of McClear and CAMS products.

As a whole, the three databases perform fairly well and their estimates are reliable in Morocco. The correlation coefficients are great, meaning that the hourly variability in irradiance is well captured by any of these databases. HC3v5 exhibits correlation coefficients greater than 0.97 for global and 0.87 for direct, a relative bias comprised between 4% and 0% (7% and 2% for direct with an exception of 22% in Tan-Tan), and a relative RMSE ranging from 11% to 13% (16% and 20% for direct with an exception of 31% in Tan-Tan). The two other databases are slightly less accurate.

This work shows evidence on the reliability of these databases and it adds up to comparisons performed previously for Europe, Brazil, Egypt, Oman and UAE.