



Assessment of CAMS Radiation Service and HelioClim-3 satellite-derived databases against ground-based measurements in The Netherlands

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Satellite-derived databases of the surface solar irradiance (SSI) are common tools in solar energy and assessing their performance by comparison with in situ measurements is a common activity. The present work focuses on two databases: the CAMS Radiation Service version 3 (abbreviated as CAMS-Rad) and the HelioClim-3 version 5 (abbreviated as HC3v5) that are well used by academics and practitioners. It adds up to the continuous documentation of these databases already available in detailed manner for Europe, Brazil, Egypt, Arabic Peninsula, and Morocco. It has been found that these two databases capture the temporal and spatial variability of the solar radiation and that they are reliable sources of solar radiation.

The present communication focuses on 12 stations located in The Netherlands operated by the met-office KNMI. They are close to each other, thus allowing the study of the spatial consistency of the performance of a database. Ground measurements of hourly means of global irradiance by pyranometers were collected from the KNMI website. The twelve sites are: Leeuwarden, Marknesse, Deelen, Volkel, Ell, Maastricht, Twenthe, Hupsel, De Bilt, Cabauw, Valkenburg, Voorschoten. 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 both databases. CAMS-Rad uses the Heliosat-4 method with inputs from the Copernicus Atmosphere Monitoring Service (CAMS) of gaseous and aerosols content in the atmosphere, and cloud optical properties deduced every 15 min from Meteosat imagery. Part of this service is the McClear service that provides estimates of the irradiance that should be observed if the sky were cloud-free. The second database is the HelioClim-3v5 that is derived from Meteosat images using the Heliosat-2 method, McClear and CAMS products.

Expectations for performance are to be the same at all stations for a given database. This is what is observed as a whole for both databases. The relative bias is approximatively 9 % of the mean of the measurements for CAMS-Rad and 3 % for HC3v5. The relative standard deviation ranges between 19 and 25 % for CAMS-Rad and between 16 and 19 % for HC3v5. The correlation coefficient is greater than 0.95 for both databases.

The two stations Valkenburg and Voorschoten are close to the seashore and their results are slightly different. Assuming that the quality of measurements is the same at both stations, this discrepancy in performance may be related to the difference in cloud coverage as these two stations experience more frequent cloud-free conditions than the others. It is speculated that the performance depends on the clearness index. This point will be deepened in a further study.