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Evaluating regional change in performance of several databases in Arabic Peninsula

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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. It has been observed that the quality differs 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 and the present communication contributes to that. The aim is to explore the possible changes in quality in a priori homogeneous areas in the Arabian Peninsula: Oman and Abu Dhabi. Ground measurements of hourly global irradiation were collected from national meteorological services and were quality-checked using recognized procedures. There are compared to three well recognized databases. The CAMS radiation service combines products of the Copernicus Atmosphere Monitoring Service (CAMS) on gaseous content and aerosols in the atmosphere together with cloud optical properties deduced every 15 min from Meteosat imagery to supply estimates of the SSI. Part of this service is the McClear service that provides estimate of the SSI that should be observed in cloud-free conditions. The second database is HelioClim-3 v4 that is derived from Meteosat images using the Heliosat-2 method and the ESRA clear sky model, based on the Linke turbidity factor. HelioClim-3 v5 is the third database and differs from v4 by the partial use of McClear and CAMS products. Performances are fairly similar from one site to another, demonstrating the reliability of each database in climate homogeneous areas. Underestimation of the SSI may be observed that could be related in part only to the already reported overestimation of the aerosol optical depth by CAMS over the region of the UAE. This bias has a marked spatial and temporal behavior and is not constant. These results are discussed against those published for several sites in Egypt.