



Validation of Direct Normal Irradiance from Meteosat Second Generation

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We present a validation study of Direct Normal Irradiance (DNI) derived from MSG/SEVIRI radiance measurements over the site of Plataforma Solar de Almeria (PSA), a solar power plant in Southern Spain. The 1 km x 1 km site of PSA hosts about a dozen pyrheliometers operated by the German Aerospace Centre (DLR) and the Centre for Energy, Environment and Technological Research (CIEMAT). They provide high-quality long-term measurements of surface DNI on a site of the scale of the MSG/SEVIRI pixel resolution. This makes the PSA DNI measurements a dataset particularly well suited for satellite validation purposes.

The satellite-based surface DNI was retrieved from MSG/SEVIRI radiances by the HelioMont algorithm (Stöckli 2013) that forms part of the Heliosat algorithm family (e.g. Müller et al., 2004). We have assessed the accuracy of this DNI product for the PSA site by comparing with the in-situ measured DNIs of June 2014 – July 2015. Despite a generally good agreement, the HelioMont DNI exhibits a significant low bias at the PSA site, that is most pronounced during clear-sky periods. We present a bias correction method and discuss (1) the role of circumsolar diffuse radiation and (2) the role of climatological vs. reanalysis-based aerosol optical properties therein. We also characterize and assess the temporal variability of the HelioMont DNI as compared to the in situ measured DNIs, and will discuss and quantify the uncertainties in both DNI datasets.