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Analysis of satellite-derived solar irradiance over the Netherlands

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Measurements from geostationary satellites allow the retrieval of surface solar irradiance homogeneously over large areas, thereby providing essential information for the solar energy sector. In this paper, the SICCS solar irradiance data record derived from 12 years of Meteosat Second Generation satellite measurements is analysed with a focus on the Netherlands, where the spatial resolution is about 6 by 3 km2. Extensive validation of the SICCS data with pyranometer observations is performed, indicating a bias of approximately 3 W/m2 and RMSE of 11 W/m2 for daily data. Long term averages and seasonal variations of solar irradiance show regional patterns related to the surface type (e.g., coastal waters, forests, cities). The inter-annual variability over the time frame of the data record is quantified. Methods to merge satellite and surface observations into an optimized data record are explored.