Independent Validation of SolarAnywhere® Satellite-based Solar Irradiance Data

Executive Summary

Under the SolarAnywhere® brand, Clean Power Research, L.L.C., provides global solar irradiance data based on satellite imagery. The Fraunhofer Institute for Solar Energy Systems ISE is the largest solar research institute in Europe with longstanding expertise in satellite-based solar irradiance retrieval and validation. In this project, Fraunhofer ISE carried out an independent validation of SolarAnywhere® global horizontal irradiance (GHI) data in comparison with ground measurements in Germany.

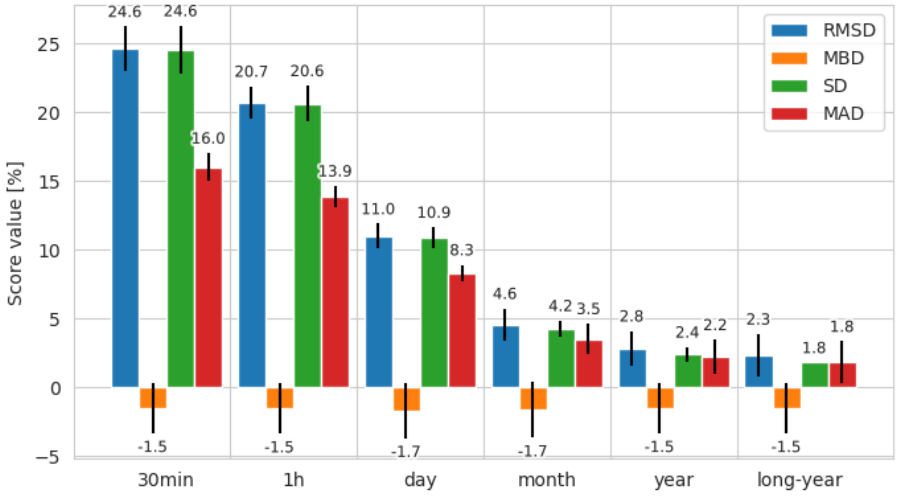
Based on data availability and quality checks, 22 ground measurement stations operated by Germany's national meteorological service, Deutscher Wetterdienst (DWD), and a time period of 11 years (2011 – 2021) were selected. The measurement GHI time series were aligned with respective satellite-based GHI time series provided by Clean Power Research for the given locations. Average GHI was analyzed on various temporal aggregation levels from 30 minutes (the native resolution of SolarAnywhere®) to the full 11 years (long-year average).

Common scores for solar irradiance evaluation (root mean square difference RMSD, mean bias difference MBD, standard deviation of differences SD, mean absolute difference MAD) were calculated. Further evaluations comprise scatter plots, comparison of GHI distributions, distributions of model-measurement differences, and an analysis of seasonal deviations.

All findings of this validation are within the expected quality range for satellite-derived GHI in Germany. On the aggregation level of annual averages – which is commonly used for PV yield estimation – the following relative score values (± standard deviation between stations) were found:

RMSD	2.8%	(± 1.3%)
MBD	-1.5%	(± 1.8%)
SD	2.4%	(± 0.5%)
MAD	2.2%	(± 1.3%)

The corresponding values for all averaging time scales summarized in a bar chart show the expected behavior of decreasing RMSD, SD, MAD and constant MBD with increasing temporal aggregation.



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