

Abstract

Reliability of solar radiation databases is a matter of concern for engineers and professionals working in solar energy. Variability of solar radiation and its forecasting is of great importance to solar power plant developers and operators. But variation due to climatic conditions needs to be distinguished from various operational and instrumental errors. Proper identification of these errors is required in determining the radiation potential of selected location. The procedures used for solar radiation data quality analysis are critically looked at in this research work in the context of a hot and dry climactic zone. The database selected for analysis pertains to Jodhpur city in Western Rajasthan, India. Solar radiation data quality analysis includes data-step checking, transmittance plot analysis, detailed quality control analysis based on coherence test and gap filling analysis. Data quality tests proposed by various international agencies such as NREL, BSRN, and CWET-MNRE-GIZ are compiled and applied to Jodhpur ground station data. After this procedure, the finalized radiation database was formed to have uniform time intervals. This thesis takes into account various cloud conditions and the efficiency of available gap filling algorithms are compared for these days. To check the impact of these research findings, artificial gaps are introduced in the Jodhpur IMD weather station data (one-year radiation database, 10-minute interval). Several gap filling algorithms are then used to create a corrected database. Comparison is done between available raw radiation database with corrected database and results are discussed in terms of the error metrics and their relevance for solar resource assessment.

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**“Humbly Dedicated
In
The Lotus Feet
Of
“The Supreme Father”**

And

My Family

(Mr. Dharam Pal & Mrs. Sumitra Pal)

(Mr. Sumit Kumar, Mrs. Jaishree Rathore & Mr. Sujai)

(Mrs. Richa Gurawa & Ms. Dhara)