Availability and **Reliability of Ground-Based Solar Radiation**

Measurements

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Introduction

- Accurate assessment of solar radiation (SR) is crucial for a wide range of applications (solar energy)
- Ground-based measurements are considered the most reliable way of measuring SR
- Lack of long-term, highquality SR measurements and quality control (QC) procedures

Methods

- 14 datasets from > 2,000 stations in 53 countries
- Hourly or higher resolution
- Study period: 1991-2020
- Sequential data availability checks, QC, gap-filling procedure, and statistical analysis of SR time series



Solar radiation measurements as a key source for solar energy potential assessment exhibit substantial data gaps and quality issues.

Updates on ResearchGate









Sander et al., 2025 (in preparation)

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Results and Discussion

- Data availability (DA)
- Very few (< 3 %) time series with \geq 90 % DA
- Many time series with short measurement periods and/or substantial data gaps
 - Increasing DA in the 2010s



- Quality control (QC) Filtering of data points, time series (sequences) Various quality issue, including wrong timestamps, implausible values, artificial changepoints, etc. Statistical analysis Overriding importance of
- diurnal and annual cycles depends on the location Widespread positive trend of SR (low long-term DA)

