

A quality control scheme for solar irradiance measurements on facades in urban environments

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Abstract

The increasing prominence of digital tools for city-scale solar analysis emphasizes the need for validation methodologies, which include urban environmental monitoring and data quality control. This study addresses this gap by introducing a quality control scheme for solar irradiance measurements, using a typical street canyon in Geneva (Switzerland) as a case study. The developed quality control scheme is replicable and effectively addresses challenges posed by the built environment, distinguishing it from existing methods that mostly apply to measurements from unobstructed sensors. The experimental data used in this study were retrieved from the monitoring system installed on two opposing facades of the street canyon case study, as well as a nearby weather station. Measurements were recorded from December 22nd, 2022, to December 19th, 2023, at a one-minute time resolution. Five quality checks – nighttime check, range limit tests, precipitation check, shadow detection, and consistency check - were defined to identify the potential flaws and disturbances in the dataset so that these data points could be flagged accordingly. The results consist of reliable solar irradiance data over one year, which can be used in the future for validating a new component for modeling façade solar potential within the Grand Geneva Area Solar Cadaster.

Keywords: Global tilted irradiance, Solar radiation Data quality control, Building façade, Shadow detection, Urban monitoring

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