EGU26-21929, updated on 06 Jun 2026
https://doi.org/10.5194/egusphere-egu26-21929
EGU General Assembly 2026

Estimation and spatial prediction methods for high-frequency space-time solar irradiance

William Kleiber and Nicolas Coloma
University of Colorado, Department of Applied Mathematics, Boulder, United States of America
(william.kleiber@colorado.edu)

As the power grid moves to a more renewable future, energy sources from weather-driven phenomena such as solar power will form an increasingly large portion of electricity generation. The predicatibility, non-Gaussianity and intermittency of solar resources challenge current grid operation paradigms, and realistic data scenarios are required for grid planning and operational studies. However, such data are not available at the space-time resolution needed for realistic grid models. Given sparse spatial samples that are high-resolution in time, we introduce a framework for spatiotemporal prediction and downscaling in a functional data analysis framework when data exhibit nonstationary phase misalignment. The approach is illustrated on a challenging irradiance dataset and compares favorably against existing methods.