Homogeneity Analysis of Gridded Data Sets of the Surface Solar Radiation

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Long-term gridded data sets of the surface incoming solar radiation, e.g., from satellite observations or from reanalysis activities with numerical weather prediction models, become increasingly available to the scientific community. Applications of such data sets range from the analysis of the spatial and temporal distribution of surface solar radiation (e.g., for the planning of electricity generation plants from solar energy), the use as input parameters (e.g., for hydrological models), and climate monitoring and analysis of the surface radiation.

Validation of such data sets is typically conducted using surface observations as reference and applying classical measures (bias and RMSE) to judge the quality of the data sets. However, certain applications (e.g., climate monitoring and analysis) require other measures to be included in the validation. Especially when the data is intended for temporal analysis (e.g., the calculation of changes and/or trends) no artificial inhomogeneities (e.g., change points and/or trends) must be present in the data.

Here, we present results from homogeneity analysis of gridded data sets derived from satellite observations (CM SAF, GEWEX) and from reanalysis (ERA-Interim). When surface reference data are available, e.g., from BSRN, relative homogeneity tests are applied. However, for most of the areas of the gridded data sets, no reference data is available and an absolute homogeneity test has to be applied. The implications for the applicability of the gridded data sets for climate analysis will be discussed.