



Analysing the stability of gridded surface radiation data sets

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Climate monitoring and climate analysis require high-quality data sets as, for example, a high accuracy and temporal stability of the data records. The temporal stability is required to detect changes in the data set over time that are due to changes in the climate system and not affected by artificial changes in the data set itself. Possible causes of artificial changes in satellite-derived data sets are the use of multiple satellites or satellite instruments to generate a climate data record, and the temporal degradation of satellite sensors during their lifetimes. Reanalysis systems that assimilate all available information suffer from changes in the availability of the relevant observations, e.g., from satellites, which possibly can introduce artificial shifts.

Methods to detect and to correct inhomogeneities in climate data records have been developed and applied to observational time series (e.g. temperature and precipitation) from surface stations. The detection and correction of inhomogeneities is substantially improved, if a homogeneous reference time series is available or can be constructed.

Here, we present the application of these methods to detect inhomogeneities in gridded data sets of the surface radiation derived from satellite measurements (e.g., CM SAF, GEWEX-SRB) and reanalysis (ERA-Interim). Surface observations, e.g., from the Baseline Surface Radiation Network (BSRN) and the Global Energy Balance Archive (GEBA), are used as reference series for the gridded data sets. The temporal homogeneity of the data sets will be discussed in the context of the recently introduced GCOS stability requirement for the surface radiation budget.