# Homogenization of the 1958-2016 in-situ surface solar radiation records in China

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This job presents a method to homogenize China's surface solar radiation (SSR) data over the period 1958-2016. More long-term series are obtained by joining nearby station data. Also, all dates of joining are recorded as dates of relocation. Eventually, data from 119 stations are analyzed in this study, including 64 stations with long-term SSR records (>50 years). Metadata shows most of the SSR stations over China experienced changes in the instrument, observation schedule and observation environment, especially the network-wide changes occurred in the early 1990s which are deemed to be the most significant uncertainty in SSR historical records. Given the high correlation between surface sunshine duration (SSD) and SSR and much fewer inhomogeneity issues in SSD records, neighboring SSD data are used as reference data to assess the SSR data homogeneity. A Principle Components Analysis is applied to build a reference series, which is proven to be less sensitive to occasional data issues such as relocation than using the arithmetic mean of data from adjacent stations. A relative or absolute test is applied to detect change points, depending on whether or not a suitable reference series is available. A Quantile-Matching method is used to adjust the data to diminish the inhomogeneities. As a result, 60 out of the 119 SSR stations were found to have inhomogeneity issues. These were mainly caused by changes in instrument and observation schedule. The non-climatic changes exaggerated the SSR change rates in 1991-1993 and resulted in a sudden rise in the national average SSR series, causing an unrealistically drastic trend reversal in the 1990s. This was diminished by the data homogenization.