



The Homogeneity of the Potsdam Solar Radiation Data

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At Meteorological Station in Potsdam (Germany) the measurement of sunshine duration started already in 1983. Later on, in 1937 the registration of global, diffuse and direct solar radiation was begun with pyranometers and a pyrheliometer.

Since 1983 sunshine duration has been measured with the same method, the Campbell-Stokes sunshine recorder, at the same site, while the measurements of solar radiation changed as well as in equipment, measurement methods and location.

Furthermore, it was firstly necessary to supplement some missing data within the time series and secondly, it was desirable to extend the series of global radiation by regression with the sunshine duration backward to 1893.

Because solar radiation, especially global radiation, is one of the most important quantities for climate research, it is necessary to investigate the homogeneity of these time series.

At first the history was studied and as much as possible information about all parameters, which could influence the data, were gathered. In a second step these metadata were reviewed critically followed by a discussion about the potential effects of local factors on the homogeneity of the data.

In a first step of data rehabilitation the so-called engineering correction (data levelling to WRR and SI units) were made followed by the supplementation of gaps.

Finally, for every month and the year the so generated time series of measured data (1937/2008) and the complete series, prolonged by regression and measurements (1893/2008), were tested on homogeneity with the following distribution-free tests:

WILCOXON (U) test, MANN-KENDALL test and progressive analysis were used for the examination of the stability of the mean and the dispersion, while with the Wald-Wolfowitz test the first order autocorrelation was checked.

These non-parametric test were used, because frequently radiation data do not fulfil the assumption of a GAUSSian or normal distribution.

The investigations showed, that discontinuities which were found in most cases are not in relation to metadata marking changes of site, equipment etc. Also, the point of intersection, where the calculated time series were connected to the measurements were not marked. This means that the time series are stable and measurements and the calculated part are in good agreement.