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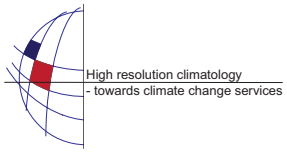

Quality control of solar radiation data within the RMIB solar measurements network

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The Royal Meteorological Institute of Belgium (RMIB) has a long term experience with ground based measurement of solar radiation in Belgium (uninterrupted 30 minutes average measurements in Uccle since 1951, in Oostende since 1958, and in Saint-Hubert since 1959). Uccle is one of the 22 Regional Radiation Centres establised within the WMO Regions and the RMIB is in relationship with the World Radiation Data Centre (WRDC) for the Uccle, Saint-Hubert and Melle sites. The usual solar radiation parameters measured on ground are the global solar irradiance (a measure of the rate of total incoming solar energy (both direct and diffuse) on a horizontal plane at the Earth's surface), the direct solar irradiance (a measure of the rate of solar energy arriving at the Earth's surface from the Sun's direct beam on a plane perpendicular to the beam), the diffuse solar irradiance (a measure of the rate of incoming solar energy on a horizontal plane at the Earth's surface resulting from scattering of the Sun's beam due to atmospheric constituents) and the sunshine duration (defined to be the sum of all time periods during the day when the direct solar irradiance equals or exceeds 120 W/m^2). We are currently measuring various combinations of these parameters in 14 automatic weather stations (AWS) in addition to the measurement performed in our main/reference station in Uccle.

Because of the difficulties frequently encountered when measuring solar radiation and the resulting unknown quality of some solar radiation data, it is crucial to perform a quality assessment of these data prior to their further processing. Radiometric data and instruments are routinely monitored by a human operator to avoid any departure in the reliability of the measured solar radiation and maintain up-to-date series of those data. Because this is a lengthy and tedious task, a major effort has been recently undertaken at RMIB to develop procedures and software for performing post-measurement quality control of solar data in order to speed up to some extend the human data monitoring.

Based on previously proposed procedures for quality assessment of solar irradiation data we present a new quality control scheme to assess and characterize the quality of solar data measured in the RMIB solar radiation monitoring network. Guided by physical mechanisms which determine the inter-relation between individual radiation parameters as well as by the statistical variability of the data on both spatial and temporal basis, the proposed scheme for quality control of radiometric measurements establish boundaries or limits within which acceptable data are expected to lie. In order to provide continuous time series of solar radiation data, additional procedures have also been developed to estimate missing values (data initially lacking or removed via quality checks).