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On quality control procedures for solar radiation and meteorological measures, from subhourly to montly average time periods

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Meteorological data measured by ground stations are often a key element in the development and validation of methods exploiting satellite images. These data are considered as a reference against which satellite-derived estimates are compared.

Long-term radiation and meteorological measurements are available from a large number of measuring stations. However, close examination of the data often reveals a lack of quality, often for extended periods of time. This lack of quality has been the reason, in many cases, of the rejection of large amount of available data.

The quality data must be checked before their use in order to guarantee the inputs for the methods used in modelling, monitoring, forecast, etc. To control their quality, data should be submitted to several conditions or tests. After this checking, data that are not flagged by any of the test is released as a plausible data.

In this work, it has been performed a bibliographical research of quality control tests for the common meteorological variables (ambient temperature, relative humidity and wind speed) and for the usual solar radiometrical variables (horizontal global and diffuse components of the solar radiation and the beam normal component). The different tests have been grouped according to the variable and the average time period (sub-hourly, hourly, daily and monthly averages).

The quality test may be classified as follows:
• Range checks: test that verify values are within a specific range. There are two types of range checks, those based on extrema and those based on rare observations.
• Step check: test aimed at detecting unrealistic jumps or stagnation in the time series.
• Consistency checks: test that verify the relationship between two or more time series.
The gathered quality tests are applicable for all latitudes as they have not been optimized regionally nor seasonably with the aim of being generic. They have been applied to ground measurements in several geographic locations, what result in the detection of some control tests that are no longer adequate, due to different reasons. After the modification of some test, based in our experience, a set of quality control tests is now presented, updated according to technology advances and classified.

The presented set of quality tests allows radiation and meteorological data to be tested in order to know their plausibility to be used as inputs in theoretical or empirical methods for scientific research.

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