

Estimating evaporation with the Bowen ratio: joining a data rejection criterion and reconstruction with multiple-point statistics

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The error that affects meteorological measurements can have a strong impact on evaporation estimated with the Bowen ratio method. Unreliable values of evaporation can be rejected according to some given criteria. However, if the rejected values of evaporation are not properly replaced, the cumulated estimates of evaporation can significantly differ from the true ones.

In this work a procedure that uses a rejection criterion based on error propagation theory and multiple-point statistics to simulate the rejected evaporation values is proposed. In multiple-point statistics simulation, the evaporation values that are not rejected are used as training data using a direct sampling algorithm. The methodology is tested on a meteorological data set collected from June 2009 to June 2011 at a station located in the Po plain (Italy).

For the considered data set, the cumulated evaporation computed neglecting the rejected values is underestimated by at least 30% with respect to the cumulated evaporation computed with the proposed procedure. In addition, comparing the time series obtained by simulating the data rejected with diverse acceptance thresholds, it is possible to provide helpful guidelines for the selection of the proper threshold, which is therefore totally consistent with the proposed procedure.