

Comparison of hydrological similarity measures

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The use of a traditional at site approach for the statistical characterization and simulation of spatio-temporal precipitation fields has a major recognized drawback. Indeed, the weakness of the methodology is related to the estimation of rare events and it involves the uncertainty of the at-site sample statistical inference, because of the limited length of records. In order to overcome the lack of at-site observations, regional frequency approach uses the idea of substituting space for time to estimate design floods.

The conventional regional frequency analysis estimates quantile values at a specific site from multi-site analysis. The main idea is that homogeneous sites, once pooled together, have similar probability distribution curves of extremes, except for a scaling factor. The method for pooling groups of sites can be based on geographical or climatological considerations. In this work the region of influence (ROI) pooling method is compared with an entropy-based one. The ROI is a flexible pooling group approach which defines for each site its own “region” formed by a unique set of similar stations. The similarity is found through the Euclidean distance metric in the attribute space.

Here an alternative approach based on entropy is introduced to cluster homogeneous sites. The core idea is that homogeneous sites share a redundant (i.e. similar) amount of information. Homogeneous sites are pooled through a hierarchical selection based on the mutual information index (i.e. a measure of redundancy).

The method is tested on precipitation data in Central Italy area.