Model selection techniques for flood frequency analysis

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One of the main goals of flood frequency analysis is to estimate the design flood, namely, the discharge value corresponding to an assigned return period. Usually this problem is solved by fitting a suitable probability distribution to the observed peak flow data. However, the choice of the probabilistic model is often a relevant issue. This study aims at identifying an objective criterion for the selection of the most appropriate extreme value probability distribution. A relevant contribution to the subject of model identification is in the work by Akaike (1973), who proposes the use of the principle of maximum entropy for model selection. Later, Schwartz (1978) developed a similar idea in a Bayesian context, therefore formulating the Bayesian Information Criterion. Applications of model selection techniques within flood frequency analysis are rare.. The objective of this study is to verify whether the model selection techniques proposed by Akaike and Schwartz work correctly when they are applied for identifying the probability distribution of extreme events. A comparison of these and others model selection techniques is carried out trough an extensive numerical analysis in order to check the performances of the considered methods when dealing with small sample sizes and highly asymmetric distributions.