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Comparison of regionalization methods in poorly gauged basins by Monte Carlo simulations

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Estimation of the T-year flood flow at a poorly gauged site is of essential importance, but it has many sources of uncertainty. To reduce these uncertainties, the ungauged site is identified as part of a region that has homogeneous statistical characteristics. Statistical methods are applied to the set of observed data in that region to fit a probability distribution that can simulate the region flood behaviour.

There are different methods to estimate the probability distribution parameters: Moments, L-moments, maximum likelihood and others, and different steps of regionalization: At-site estimation or not regionalization, regionalization of the third order statistic or skewness regionalization and regionalization of the second and third order statistics or index-flood method. L-moment estimation is widely considered as the best method and regionalization will yield much more accurate estimations that at-site analysis, but there is not a general agreement about the best regionalization method, skewness regionalization or index-flood method. Index-flood method assumes that all sites in a region have the same frequency distribution apart from a scale coefficient. On the other hand, skewness regionalization assumes that all sites in a region do not have the same coefficient of variation.

At-site estimation, skewness regionalization and index-flood method have been compared. Monte Carlo simulations have been carried out from the assumed true probability distribution in a region, sampling the number of years of record. Estimation variability of the first, second and third moments and L-Moments have been calculated and relationship between moment estimation accuracy and record length has been an-

alyzed. The first moment has very low variability and it can be accurately estimated with a short record. But, accuracy of skewness and coefficient of variation estimations decreases quickly as the record is smaller.

A probability distribution has been fitted to each synthetic sample with each regionalization method, calculating errors between fitted distributions and the true distribution. Results have shown that selection of the best regionalization method depends on the record of length, return period and statistical characteristics of the region.