A comparison of statistical methods for runoff regime estimation

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A non-parametric regional model is developed for the estimation of runoff regime in basins with limited or no data. In this model the runoff regime curve is considered as a non-parametric object and is obtained with a nearest neighbors approach. This model aims to improve the results obtained with a mehtod in which the regime is obtained from a Fourier-transform parametric representation. Both methods rely on basin descriptors through multiple regression. The non parametric approach relates (dis)similarity between all possible pairs of curves (preliminary normalized) to characteristic distance values that can be computed on the basin descriptors, that are taken among geographic, geomorphologic and climatic parameters averaged at the catchment scale. The (dis)similarity between curves is computed using a predefined metric based on Euclidean distance. The distance matrix is related to analogous matrices of descriptor differences by means of linear regression models. The most significant descriptors are identified by statistical testing. The distance matrices of descriptors allow us to define a nearest neighbor's rank, that allows one to compute the runoff regime based on those of the nearest ones, usually averaging the chosen ones. The procedure has been applied to runoff regimes from 40 basins located in northwestern Italy. The performances of the two procedures is assessed by means of a cross-validation procedure. In most cases the two models produce results of comparable quality.