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# Low flows regionalization in North-Western Italy

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Predicting specific low flows in ungauged catchments provides critical information for adequate water resource management, including environmental flow requirements. Several methods have been proposed in literature in order to extend to ungauged sites the available regional information on low flows. In most of these methods, the study domain is divided into sub-regions in which the low flow behaviour is assumed to be homogeneous. The formation of these regions is performed by grouping the gauged sites according to a classification criterion and checking the performance of prediction of low flows with cross-validation. In our work we analyse the $q_{95}$ discharge (i.e., the specific discharge that is exceeded on 95% of all days) as a reference of low flow regime. We compare two different grouping methods: the Seasonality Indices method (SI) and the Classification and Regression Tree (CART) algorithm. The SI method delineates regions according to differences in the occurrence of low flows while CART divides the domain by maximising the homogeneity function within each group. For each obtained sub-region, a regression model between catchment characteristics and the $q_{95}$ is fitted to the data. The predictive performance of models is then compared in terms of variance analysis (ANOVA) and, subsequently with error statistics coming from a leave-one-out cross-validation procedure. Data from 43 catchments in the North-West of Italy are used in the analysis. Results indicate that catchments grouping based on CART performs better than the SI method in this region. The spatial variance explained by CART is 53% against 32% for SI, and the overall predictive performance checked by cross-validation gives a coefficient of determination $R^2_{CV} = 60\%$ for CART and 41% for SI.