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Regionalization procedures for the estimation of daily flow duration curves in the Italian Alps

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This paper presents the application of the regionalization procedures for the estimation of daily flow duration curves in two areas of the Italian Alps, close to the massif of the Adamello and the Mont-Blanc-Monte Rosa, respectively. Given some selected hydrological catchment parameters, the procedure allows to calculate a flow duration curve at any ungauged river cross section, as a tool to estimate the potential availability of water resources. To calibrate the relationship between the catchment parameters and the characteristics of the flow duration curves, some gauge stations are required. Some of the selected gauged river cross sections are located downstream of hydroelectric reservoirs resulting in the natural stream flow regime being affected due to an artificial hydraulic regulation. To restore the measured flows to the natural flows, an appropriate technique was applied. Two main approaches are commonly used in the literature for the regionalization of flow duration curves: the parametric method, based on the measured flow duration curves fitting; and the probabilistic approach, where an analogy between the flow-duration curve and the frequency distribution of runoff data is assumed. For the parametric approach the most significant parameters resulted: the area of the upstream basin, the mean annual net precipitation, the length of the main river, the basin relief and the percentage of impervious area. The application of the regionalization procedure in the study area shows that the best results for the flow duration curves fitting can be found by applying logarithmic or exponential formulas.