



Low flows regional statistical analysis within a southern Italy context

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Knowledge of low flows events frequency is required for a number of reasons. Low flows regime is tightly dependent on catchment hydrogeological features and a detailed surface and groundwater catchment analysis is necessary for an accurate characterization. However on a practical perspective, although scientifically proven, and particularly for ungauged sites, statistical analysis is widely applied to derive low flow indexes, which are also a measure for environmental minimum flow. A statistical regional analysis consist of the identification of regional laws, generally multiple regression models applicable over a more or less wide area, a region, which generally use catchment features as the independent variables. In particular, a low flow regional statistical analysis is based on the correlation between low flow indexes and catchment attributes. Basin and climate characteristics which are most commonly related to low flow indexes include: catchment area, mean annual precipitation, percentage of forested areas, soil and geology indexes, catchment shape, mean catchment elevation and so on. The analysis we present is focused on some of the well known low flow statistics, which are also related to the environmental minimum flow requirements, such as the Q_7,T distribution of 7-day annual minimum streamflow associated with a given return period T and the flow duration curve and we particularly investigate the importance of geological features to improve low flow estimation. We found that analysed statistics are related to the base flow index (BFI) which, in the end, is related, both from a conceptual and a statistical perspective, to the main geological and hydrogeological catchment features. Indeed the principal terrestrial influence on low flows is geology and the principal meteorological influence is precipitation. The case study we propose is represented by 29 stations, ranging in area from 13 to 5500 km², mainly located within the Campania region, southern Italy.