Attempts to flow regime classification and characterisation in Mediterranean streams

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Mediterranean rivers are characterized by the irregularity of flow and harsh hydrological fluctuations. Extreme seasonal variation of the flow regimes often causes a marked pattern of zero or low flow. However, until now, no river classification was available for the whole Mediterranean water courses whereas many classifications was developed at country or regional scale. In this study, a long-term flow records from 60 sites across the Mediterranean basin were analyzed to classify streams into flow regime groupings. It is considered that these catchments provide a good representation of various flow regimes prevailing across the Mediterranean basin. Six hydrological variables based on flow intermittency, variability and predictability were used for this classification. Cluster analysis indicated that streams could be classified broadly into perennial and intermittent. To get more verified information about the hydrological regimes of Mediterranean rivers, 38 hydrological indices (HIs) were derived for each stream. The principal component analysis (PCA) was then applied for the two river types and for all streams combined to identify subsets of HIs that best describe each stream type while minimizing redundancy. The results from the PCA applied on the three sets of streams allow us to extract three principal components, each associated with a fundamental characteristic. First and second principal components for the intermittent cluster describe respectively the intermittence and variability facets of the flow regime while for perennial cluster they describe high flow condition and rate of change (rise rate and fall rate). Finally linear and canonical correlation coefficients were calculated between the significant components extracted for each stream type and catchment descriptors (area, latitude and longitude). This allows us to reveal the descriptors that influence the spatial variability of the flow regime in the Mediterranean area.