Regionalisation of Mediterranean catchments flow characteristics based on Canonical Correlation Analysis

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Regional analysis is an essential step to improve water management plans and transpose flow characteristics on ungauged catchments. The Mediterranean region limited by the topographical boundary is a highly fragmented area with 1270 catchments ranging between 100 and 3000 km2 and draining towards the Mediterranean Sea. Qualified as one of the most sensitive and challenging regions to climatic and anthropogenic variations and lacking flow measurements, mostly in its southern side, this region stands as a good candidate for regional analysis.
Despite all the research at the regional scale, a specific Mediterranean hydrology is long to be defined yet and require additional research related to the relation between hydrological processes and their climate and physiographic descriptors. This paper seeks to define these relations relying on multivariate analysis approach.
The proposed methodology consists of (1) defining the most contributing climatic and physiographic indices, (2) classifying the catchments using k-means clustering and (3) regionalising flow characteristics based on the physio-climatic similarity issued from a canonical correlation analysis. The main characteristics were uniformly collected across the Mediterranean and a representative data set of catchments covering 15 countries was considered for the regionalisation.
The canonical correlation analysis highlighted homogeneous sub-regions, similar catchments and resulted with a new cartography for Mediterranean catchments hydrological characteristics.

Key words: Canonical Correlation Analysis, Regionalisation, Mediterranean hydrology, physio-climatic similarity