



Catchment classification based on characterisation of streamflow and precipitation time-series, Part II: Application to ungauged catchments

Elena Toth

DICAM, University of Bologna, Bologna, Italy (elena.toth@unibo.it)

One of the primary practical objectives for delineating hydrological homogeneous regions is to assess the membership of ungauged sites, thus inferring indications on the response behaviour of such catchments. An important feature of a cluster analysis aimed at identifying homogeneous clusters is therefore the ability to discriminate between them on the basis of variables that are different from the streamflow signatures, that is, a set of physical and climatic characteristics of the watersheds.

The first part of the study (companion presentation: Part I: Classification of streamflow signatures) illustrates a SOM-based approach for catchment grouping on the basis of their hydrological response, through a representation, albeit simplified, of the properties of fine time-scale flow series and in particular of the dynamic components of the hydrometric data.

In order to assign ungauged sites to such groups, the catchments are here represented through a parsimonious set of morphometric and pluviometric variables, including also indexes that attempt to synthesize the variability and correlation properties of the precipitation time-series, thus providing information on the type of weather forcing that is specific to each basin.

Following a principal components analysis, needed for synthesizing and better understanding the morpho-pluviometric catchment properties, a Discriminant Analysis finally classifies the ungauged catchments, through a leave-one-out cross-validation, to one of the above identified hydrologic response classes. The approach delivers quite satisfactory results for ungauged catchments, since the comparison of the two cluster sets shows an acceptable overlap.

Overall results indicate that the inclusion of information on the properties of the fine time-scale streamflow and rainfall time-series may be a promising way for better representing the hydrologic and climatic character of the study catchments.