



Analysis of flow signatures and catchment similarity indices for catchment classification in Yesilirmak Basin

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Catchment classification schemes aim to identify groups of hydrologically similar catchments to enable a mapping between catchment physical characteristics and hydro-climatic conditions with the catchment functioning. This mapping, together with the quantified uncertainties, potentially facilitates improved process understanding, transfer of this understanding to ungauged catchments, model parameter regionalization and hence improve operational applications and watershed management. Although many studies focusing on the topic of catchment classification exist in the literature, there is yet no general consensus on the number and type of similarity metrics that should be included in such analysis. The aim of this study is to first carefully derive hydrologically relevant similarity metrics from catchment physical (elevation, area, slope, geology, soils, land use etc.), climatic (seasonality, temperature, aridity index etc.) and hydrologic response characteristics (flow signatures) and then utilize Affinity Propagation clustering algorithm to determine the optimal number of groupings based on individual as well as a combination of these similarity metrics. The study area is comprised of 24 sub-catchments located in the Yesilirmak Basin, Turkey, where daily streamflow and meteorological variables are available. The metrics that are based on flow signatures summarize a number of behavioral functions of the watershed system including those derived from flow duration curve (overall water balance, vertical redistribution) as well as temporal redistribution of flow (seasonality etc.). Our initial results indicated that inclusion of information on geology and seasonality (climate and flow) appears to be promising in delineating the hydrologic functioning of the catchments.