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Flow signatures and basin parameters for Hierarchical tunisian Catchments clustering and similarity assesement.

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Regional frequency approaches are frequently proposed in order to estimate runoff quantiles for non-gauged catchments. Partitioning methods such as cluster analysis are often applied in order to regionalize catchments.

This study presents an investigation based on the hierarchical clustering method related to watershed Hydro-geomorphic descriptors and aims to compare types of distances signatures involved in the clustering approach.

The delineation pooling groups (regions) is based on distances calculated between sites in multidimensional space: hydrological, physiographical and geomorphological characteristics.

Resulting clusters are then checked for homogeneity level by silhouette index.

We consider in this work A data set from nineteen (19) catchments situated in the Tunisian ridge, monitored since 1992, is used to apply this comparison.

Latitudes vary from 35°N to 37°N and longitudes from 8°E to 11°E; areas range between 1 km² and 10 km². These catchments are located in a semi-arid zone; with annual average rainfall fluctuating between 280 mm and 500 mm. The relief is moderately high to-high for the majority of the basins, which helps rapid runoff. These catchments are little permeable to impermeable. The rain gauge network consists of 20 gauges.

The delineation of regions in multidimensional space involves hydrological signatures, physiographical and geomorphological catchment characteristics. The last ones are : area, perimeter, maximum altitude, minimum altitude, specific height, global slope index, equivalent rectangle length, equivalent rectangle width, Gravellus index, the percentage of pasture land ; the percentage of forest cover, the percentage of cereal culture area, the percentage of arboriculture area and the percentage of area affected by anti-erosive practices. Hydrological signatures are: specific maximum discharge, runoff volume, time to peak, base time, infiltration index and runoff coefficient.

Hierarchical clustering are applied with several distances calculated from these signatures and characteristics. Two clusters are considered for basin regions. Nine distances are compared

(euclidean , Spearman, Cheybechev, cityblock, correlation, cosine, hamming, Jaccard, Minkowsky).

Silhouettes values are calculated for each cluster based on the distances calculated. All distances give satisfying results and correlation and Cosine distance give relative best silhouette values.