

## **Performing k-means analysis to drought principal components of Turkish rivers**

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**Abstract.** In this study, the principal component analysis (PCA) was applied to the 31-year (1964-1994) monthly minimum streamflow data obtained from 23 catchments in Turkey. The ephemeral flows in winter are associated with non-melted snow or even ice and summer low flows are related to the semi-arid climate of Turkey with topography, leading high temperature in lowland catchments. The PC matrix (80x2), explaining the highest variance of the main data, was chosen as an input to k-means routine to define drought regions. The first 4 PCs explains more than 80% of the total variance, the first PC presents 52.44% by it self. The resulting maps and silhouette plots for this scheme reveal that the clustering scheme is not successful when the principal components are used for defining the drought zones of Turkey. However the visual inspection of those clusters defined only by the method of k-means confirms that the Mediterranean dynamics prevail over the western Anatolian region. Hence k-means approach produces a clear regionalization of the minimum monthly streamflow. The number of cluster (pattern groups) was chosen as 6, and the grouping among 80 streamflow gauging stations was highlighted by the silhouette plot of k-means analysis indicating a good separation.

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