



A comparison of low flow clustering methods: streamflow grouping

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Clustering methods are often used in hydrology for regional analysis of floods, low flows, rainfall and other variables. If the clustering scheme is successful, strong relationships between streamflow properties (e.g., mean, standard deviation, and correlation of monthly streamflows) can be realized. These relationships can be utilized to develop useful streamflow information at ungauged watersheds featuring similar characteristics. During the last two decades, considerable efforts have gone into analysis and development of clustering procedures. However, as no single procedure has been demonstrated to yield universally acceptable results, several methods of hierarchical clustering methods are available. In this study, three clustering algorithms which use agglomerative clustering procedure to identify groups of similar catchments are investigated to determine their effectiveness in clustering. The hierarchical clustering algorithms are single linkage, complete linkage and Ward's algorithms. A 31-year (1964-1994) monthly minimum streamflow data from 23 catchments in Turkey are subjected to the analysis procedures.

In conclusion, the effectiveness of the cluster analysis algorithms is investigated by using data from watersheds in Turkey. Further, one of cluster validity indices, namely cophenetic correlation coefficient index is tested to determine their effectiveness in identifying optimal partition provided by the clustering algorithms. The clusters given by the clustering algorithms are, in general, not statistically homogeneous. The hierarchical cluster analysis is found to be useful in minimizing efforts needed to identify homogeneous clusters. Among others, the Ward's algorithm is the one recommended. The results of the analysis are also presented in a geographical map.