



## Regional Frequency Analysis of Various Rainfall Data in Ankara Province, Turkey, with Index-Storm Method

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In this study, at-site and regional frequency analysis of rainfall data are carried out through methods of  $L$ -moments in Ankara province. Annual maxima and partial-duration series are formed using daily rainfall records obtained from rainfall gauging stations. In the first stage,  $L$ -moments and  $L$ -moment ratios, and probability distribution parameters of these series are computed and quantile values are estimated for various distribution and return periods for at-site frequency analysis.

In the second stage, four data sets extracted from annual maxima series and annual exceedance and non-annual exceedance series are used for regional frequency analysis. Firstly, whole stations in Ankara province are assumed one region and then stations are split up three and four region using cluster analysis according to discordant stations. A set of analysis is carried out through index-storm procedure and regional homogeneity is obtained for each data set, and suitable distribution is selected for each region and probable rainfall values are estimated for various return periods via regional  $L$ -moment algorithm.

In the last stage, regional growth curves are obtained with Monte Carlo simulation experiments for assessment of the accuracy of estimated rainfall quantiles. Absolute bias, bias root mean square errors and error bounds of estimated quantiles are computed for selecting the best-suitable data set.

As a result, it is said that the case of entire period of annual maxima series is the best data set for annual maxima series. As compare with the selected data set and the partial duration series, especially for higher frequencies ( $F > 0.90$ ), it is generally thought that *non-annual exceedance series* and *annual maxima series* are more accurate for each region and could be used for estimation of at-site and regional quantile values for Ankara province.