Regional analysis of annual maximum rainfall using TL-moments method

Abstract

Information related to distributions of rainfall amounts are of great importance for designs of water-related structures. One of the concerns of hydrologists and engineers is the probability distribution for modeling of regional data. In this study, a novel approach to regional frequency analysis using L-moments is revisited. Subsequently, an alternative regional frequency analysis using the TL-moments method is employed. The results from both methods were then compared. The analysis was based on daily annual maximum rainfall data from 40 stations in Selangor Malaysia. TL-moments for the generalized extreme value (GEV) and generalized logistic (GLO) distributions were derived and used to develop the regional frequency analysis procedure. TL-moment ratio diagram and Z-test were employed in determining the best-fit distribution. Comparison between the two approaches showed that the L-moments and TL-moments produced equivalent results. GLO and GEV distributions were identified as the most suitable distributions for representing the statistical properties of extreme rainfall in Selangor. Monte Carlo simulation was used for performance evaluation, and it showed that the method of TL-moments was more efficient for lower quantile estimation compared with the L-moments.