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Bivariate Frequency Analysis with Nonstationary Gumbel/GEV Marginal Distributions for Rainfall Event

Kyungwon Joo, Sunghun Kim, Hanbeen Kim, Hyunjun Ahn, and Jun-Haeng Heo
School of Civil & Environmental Engineering, Yonsei University, Seoul, South Korea (kwjy1@yonsei.ac.kr)

Multivariate frequency analysis has been developing for hydrological data recently. Particularly, the copula model has been used as an effective method which has no limitation on deciding marginal distributions. The time-series rainfall data can be characterized to rainfall event by inter-event time definition and each rainfall event has rainfall depth and duration. In addition, changes in rainfall depth have been studied recently due to climate change. The nonstationary (time-varying) Gumbel and Generalized Extreme Value (GEV) have been developed and their performances have been investigated from many studies. In the current study, bivariate frequency analysis has performed for rainfall depth and duration using Archimedean copula on stationary and nonstationary hourly rainfall data to consider the effect of climate change. The parameter of copula model is estimated by inference function for margin (IFM) method and stationary/nonstationary Gumbel and GEV distributions are used for marginal distributions. As a result, level curve of copula model is obtained and goodness-of-fit test is performed to choose appropriate marginal distribution among the applied stationary and nonstationary Gumbel and GEV distributions.