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Monthly river flow simulation using D-vine copulas

Wang Wenzhuo (1), Dong Zengchuan (2), Jia Benyou (3), and Ke Sujuan (4)

(1) College of Water Resources and Hydrology, Hohai University, Nanjing, China (wzwang25@hhu.edu.cn), (2) College of Water Resources and Hydrology, Hohai University, Nanjing, China (dongzengchuan@163.com), (3) Hydraulic Engineering Department, Nanjing Hydraulic Research Institute, Nanjing, China(byjia@nhri.cn), (4) Water Regulation Bureau, Yellow River Conservancy Commission of the Ministry of Water Resources, Zhengzhou, China(kesujuan@yrcc.gov.cn)

River flow simulation plays an important role in water resources planning and management. This paper proposes a model for monthly river flow simulation based on D-vine copulas. The model generates river flow time series by detecting the dependence structure among correlated months which are judged by the value of Kendall's tau between the streamflow of simulated month and lagged months. D-vine copulas are used to describe this multivariate distribution of multiple months by a cascade of bivariate distributions and conditional distributions for each pair of nearest adjacent months. The copula family of building block is selected with AIC. The simulation model is applied on the case of river flow simulation of Tangnaihai Site in Yellow River basin of China which works as the storage control site of Longyangxia reservoir. The D-vine copula with building block of Gumbel copula is elected for this case and the comparison of this model and ARIMA shown by boxplots of distributional statistics illustrates the well performance of this model.