



Joint modelling of flood peaks and volumes along the Danube River

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Flood frequency analysis is usually performed as univariate analysis of flood peaks using a suitable theoretical probability distribution of annual maximum flood peaks. However, other flood attributes, such as flood volume and duration, are necessary for the design of hydrotechnical projects. In this study, various copula families have been applied to bivariate analysis of discharge and volume in extreme flood incidents modelling. Streamflow data from numerous gauged stations of the Danube River have been used. The methodology consists of a combination of Annual Maximum Flood peaks (AMF) with corresponding volumes and independent annual maximum volumes of fixed duration at 5,10,15,20,25,30 and 60 days, respectively. The Kendall's tau coefficient quantifies the correlation in distinct discharge-volume settings. The Archimedean (e.g. Frank, Clayton and Ali-Mikhail-Haq) copulas revealed to be more capable for bivariate modeling of floods than the other examined copula families at the Danube River. Results showed in general that copulas are effective tools for bivariate modeling of the two random variables studied.