



Copula-based frequency analysis of 105-year 10-minute precipitation data observed at Uccle, Belgium

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Multivariate frequency analysis of storms with the use of copulas recently has received a lot of attention. The copula method does not assume the independence of the rainfall variables, nor should they be normal or share the same marginal distribution. This study starts with the selection of 8665 storm events out of a 105 year precipitation data at Uccle, Belgium, with a 10-minute resolution. A method is introduced to avoid the statistical problem of “ties” in the observations, which surely affect the rank-based copula approach. A detailed study of the mutual dependence between the different rainfall variables and a tail dependence-analysis is provided. Then a bivariate copula is selected for modeling the dependence between the mean storm intensity and the storm duration. Further, a recently proposed theoretical framework for copula-based frequency analysis is used for the calculation of unconditional, conditional and secondary return periods of specific storm events. Intensity-Duration-Frequency (IDF)-curves obtained with this technique are finally compared to existing empirical IDF-relations for the same precipitation data. Results indicate the advantage of using copulas for future stochastic modeling.