

Reducing uncertainty in derived flood frequency analysis related to rainfall forcing and model calibration

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Abstract Hourly precipitation data sets are generated with a stochastic rainfall model and using a statistic disaggregation approach. The synthetic rainfall data are used as input for a continuous hydrological model applied to a mesoscale catchment in the Bode River basin in Germany. The simulated flows are analysed regarding the derived probability distributions of annual peak flows. The results show significant differences in flood probabilities for using spatially random rainfall, homogeneous rainfall or spatially structured rainfall. The direct calibration of the hydrological model using stochastic rainfall on flood probability distributions generally reduces both the bias and the variability in the simulated flows compared to the standard procedure using observed rainfall and runoff time series for calibration.

Key words derived flood frequency analysis; continuous hydrologic modelling; stochastic rainfall; rainfall disaggregation; model calibration; uncertainty