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Comparison of different Approaches for Derived Flood Frequency Analysis

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The design of hydraulic structures requires design floods with different recurrence intervals. For monitored profiles these values can be obtained using observed discharge values and extreme value statistics. For this purpose however, sufficiently long time series of measurements are needed. If such discharge observations are not available there are different ways to generate design floods by rainfall-runoff modelling instead.

The aim of this contribution is the comparison of deterministically generated design floods using three different rainfall inputs on an hourly time step. On the one hand design storms are used as single events. On the other hand disaggregated daily precipitation data based on a multiplicative random cascade model are applied and synthetic precipitation data from a hybrid stochastic model are used.

The specific focus of this study lies on the investigation of an optimal calibration of a rainfall-runoff model for derived flood frequency analysis using different precipitation data. For rainfall-runoff modelling the conceptual model HEC-HMS is used. The study area is a mesoscale catchment within the Bode catchment in north-eastern Germany. The following calibration strategies are investigated: a) on observed single events b) on observed discharge time series and c) on the fitted distribution function of the observed annual discharge maxima. The discharge values of the simulated runoff time series are statistically analysed and compared with the simulated design floods from single events and extreme value statistics of the observed annual maxima.