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Stochastic Precipitation for Deterministic Estimation of extreme Floods

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For the design of hydraulic structures floods with different recurrence intervals are required. These design values can be calculated by different methods. In the case of insufficiently long-term discharge observations it is possible to calculate the design values by using rainfall runoff models. Two different kinds of simulations can be subdivided, the single event-based and the continuous long-term simulation. Comparing both types of simulation one important disadvantage of the event-based simulation is obvious. It assumes that the simulated flood has the same recurrence interval as the corresponding precipitation. This assumption is rarely correct particularly while considering the different hydrologic history. In order to avoid this problem a continuous long-term simulation should be used. For this sufficiently long-term observed precipitation series, with a high temporal resolution are required. These data are rarely available, so stochastic precipitation is an alternative. Our purpose is to generate stochastical continuous long-term precipitation series with a high temporal resolution. These data are forming the input values for the deterministic estimation of design values using a rainfall runoff model. Starting point is an existing Alternating Renewal model (ARM). This model describes the precipitation process by separation of the time series into events - dry spell duration, wet spell duration and wet spell amount. The duration are generated by independent distribution functions. The modelling of the wet spell amount is more difficult, because the dependence between wet spell duration and wet spell amount has to be considered. In order to overcome this problem conditional probabilities are used. Study region is the Bode river basin (3.000 km^2). First, the existing ARM will be adapted to regional conditions. Then, modifications are made giving special attention to extreme value and spatial multivariate simulations.