



## **Hourly precipitation synthesis using an Alternating Renewal Model conditioned on atmospheric Circulation Patterns**

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Stochastic series of hourly precipitation can be used as input for rainfall runoff models to obtain design flows through derived flood frequency analysis.

For the design of hydraulic structures climate change should be considered. This requires the development of a precipitation model with instationary character. One simple possibility is the conditional synthesis of precipitation. The parameters of the precipitation model will be estimated conditioned on atmospheric circulation patterns. Based on the knowledge of future large scale pressure conditions provided for instance from GCM simulations precipitation for future climate can be generated.

The investigations are carried out for the 3200 km<sup>2</sup> Bode river basin in Germany. Starting point for precipitation synthesis is a modern Alternating Renewal model based on univariate frequency distributions for wet spell duration, dry spell duration, wet spell amount and wet spell peak as well as a 3D copula linking wet spell amount, duration and peak. The parameters of the precipitation model are estimated conditioned on typical circulation patterns. For classification a fuzzy rule based method is used, which gives special consideration to extreme precipitation conditions with short durations.

The precipitation model is applied comparatively for present and future climate. The obtained results are discussed regarding basic statistical characteristics and extreme value behaviour.