



Rainfall synthesis conditioned on circulation patterns

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For various hydrological applications, including that of rainfall runoff modelling, long continuous time series of precipitation are often required. Generally, available rain gauge data is too short or at an insufficient temporal resolution to be of use within these applications. As an alternative, stochastic precipitation time series can be used, an example being the alternating renewal precipitation model.

Large scale atmospheric conditions can be described by circulation patterns (CPs). CPs are strongly correlated with local weather variables such as precipitation. As such, a conditioning of the stochastic precipitation model by CPs should improve model performance in terms of its ability to better reproduce observed rainfall statistics, and in particular extreme rainfall.

This study attempts to improve the performance of an hourly alternating renewal precipitation model through conditioning by circulation patterns. An automated objective CP classification approach based on optimised fuzzy rules was undertaken using geopotential height data and other potentially significant climate variables as input data. An advantage of the chosen classification approach over others is that local precipitation is included in the objective function directly. The efficacy of the CP conditioned model was then validated against other simpler classifications for gauges across Germany.