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# Cascade-based temporal rainfall downscaling method with climatic factor correction

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In urban environment, the response time of catchments to rainfall events is very short. Modeling of urban runoff processes requires high temporal and spatial resolution rainfall time series as an input. To estimate the effect of climate change on future rainfall conditions, climate projections are available from different regional climate models, but they mostly provide coarse (e.g. daily) resolution data. Numerous statistical techniques have been developed to downscale these series to finer time-steps. Multiplicative random cascade models are popular disaggregation methods, which distribute rainfall on successive regular subdivisions with a chosen branching number. The core of these methods is the cascade weight, which describes the statistical connection among different disaggregation time levels, and it is characterised by defined model parameters. In traditional cascade methods, the parameters are only estimated based on the rainfall cells.
As characteristics of precipitation events are strongly dependent on other climatic factors too, including these in parameter estimation may provide better estimations for future changes on finer time levels. In this study, we investigated the dependence of model parameters of a micro-canonical cascade disaggregator on temperature and wind. For the analysis, the measurements of 22 meteorological stations across all Switzerland were used with different elevation and climatic conditions. Relationships among precipitation, temperature, wind, and orographic conditions are established to develop a new downscaling method. The new model is able to reproduce better the expected future changes on smaller finer temporal resolutions.