



Disaggregation of continuous Rainfall Time Series for Applications in Urban Hydrology – a Case Study

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Many hydrologic applications require long time series of rainfall data with high temporal resolution. In practical hydrology this kind of data is rarely available. Therefore alternative solutions are gaining relevance. Rainfall disaggregation is a recent approach in this scientific field. These models transform rainfall data from low to high scales. One of these models was presented by Güntner et al. (2001). It is a random multiplicative cascade model with a branching number of 2 and was developed for the purpose of disaggregating daily to hourly values.

The output resolution of numerous rainfall models is one hour, e.g. downscaling of climate models. Simulation in urban hydrology however demands a higher resolution. To provide these data the model was adjusted to be capable of transforming hourly to 5-minute time series. The adjusted model was applied to data of a high-resolution rain gauge in northern Germany. The data were aggregated to hourly values and afterwards disaggregated back to 5-minute time series. The resulting data were validated against the original time series by statistical analyses, which confirmed that the model generally performed well, though the extreme values tended to be under-estimated.

Despite the satisfying results of the rainfall statistics, the ability of the model for providing suitable time series of rainfall input data can only be assessed by the results of urban drainage modelling. Therefore the various time series of 5-min data (original, disaggregated and even distribution of hourly data) were used as inputs to the hydrodynamic rainfall-runoff model HYSTEM-EXTRAN representing a mid-size urban drainage system. The results were analysed for surcharged man-holes and combined

sewer overflow volumes.