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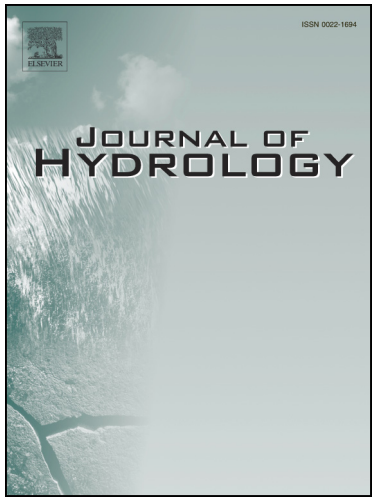

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H. Müller, U. Haberlandt

PII: S0022-1694(16)00049-4
DOI: http://dx.doi.org/10.1016/j.jhydrol.2016.01.031
Reference: HYDROL 20990

To appear in: *Journal of Hydrology*

Please cite this article as: Müller, H., Haberlandt, U., Temporal rainfall disaggregation using a multiplicative cascade model for spatial application in urban hydrology, *Journal of Hydrology* (2016), doi: http://dx.doi.org/10.1016/j.jhydrol.2016.01.031

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Temporal rainfall disaggregation using a multiplicative cascade model for spatial application in urban hydrology

H. Müller[a,1] and U. Haberlandt[a,2]

[a]Institute of Water Resources Management, Hydrology and Agricultural Hydraulic Engineering, Leibniz Universität Hannover, Appelstraße 9a, 30167 Hannover

[1]Corresponding author: mueller@iww.uni-hannover.de

[2]haberlandt@iww.uni-hannover.de

Abstract

Rainfall time series of high temporal resolution and spatial density are crucial for urban hydrology. The multiplicative random cascade model can be used for temporal rainfall disaggregation of daily data to generate such time series. Here, the uniform splitting approach with a branching number of 3 in the first disaggregation step is applied. To achieve a final resolution of 5 minutes, subsequent steps after disaggregation are necessary. Three modifications at different disaggregation levels are tested in this investigation (uniform splitting at Δt=15 min, linear interpolation at Δt=7.5 min and Δt=3.75 min). Results are compared both with observations and an often used approach, based on the assumption that a time steps with Δt=5.625 min, as resulting if a branching number of 2 is applied throughout, can be replaced with Δt=5 min (called the 1280 minutes approach). Spatial consistence is implemented in the disaggregated time series using a resampling algorithm. In total, 24 recording stations in Lower Saxony, Northern Germany with a 5 minute resolution have been

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