Geophysical Research Abstracts
Vol. 17, EGU2015-462-2, 2015
EGU General Assembly 2015

Rainfall disaggregation for urban hydrology: Effects of spatial consistence

Hannes Müller and Uwe Haberlandt

Institute of Water Resources Management, Hydrology and Agricultural Hydraulic Engineering, Leibniz Universität Hannover, Hannover, Germany

For urban hydrology rainfall time series with a high temporal resolution are crucial. Observed time series of this kind are very short in most cases, so they cannot be used. On the contrary, time series with lower temporal resolution (daily measurements) exist for much longer periods. The objective is to derive time series with a long duration and a high resolution by disaggregating time series of the non-recording stations with information of time series of the recording stations.

The multiplicative random cascade model is a well-known disaggregation model for daily time series. For urban hydrology it is often assumed, that a day consists of only 1280 minutes in total as starting point for the disaggregation process. We introduce a new variant for the cascade model, which is functional without this assumption and also outperforms the existing approach regarding time series characteristics like wet and dry spell duration, average intensity, fraction of dry intervals and extreme value representation.

However, in both approaches rainfall time series of different stations are disaggregated without consideration of surrounding stations. This yields in unrealistic spatial patterns of rainfall. We apply a simulated annealing algorithm that has been used successfully for hourly values before. Relative diurnal cycles of the disaggregated time series are resampled to reproduce the spatial dependence of rainfall. To describe spatial dependence we use bivariate characteristics like probability of occurrence, continuity ratio and coefficient of correlation. Investigation area is a sewage system in Northern Germany. We show that the algorithm has the capability to improve spatial dependence. The influence of the chosen disaggregation routine and the spatial dependence on overflow occurrences and volumes of the sewage system will be analyzed.