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Space-time variability of random cascade model parameters for rainfall disaggregation

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Rainfall time series with a high temporal resolution are needed in many hydrological and water resources management fields. Observed time series of this kind are very short in most cases, so they cannot be used. Contrary to this, time series with lower temporal resolution (daily measurements) exists 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 cascade model can be used for temporal rainfall disaggregation (Olsson, 1998). The parameters of this model can be estimated using time series of nearby recording stations. For the implementation of the model to disaggregate rainfall time series the consistence of the parameters has to be evaluated in space and time. The parameters in time are estimated using different time periods with varying lengths. The consistence in space is analyzed comparing 135 recording stations in the Aller-Leine-Oker-catchment in Lower Saxony/Germany.

Only slight changes of the parameters are recognizable in space and time. The estimated probabilities vary in general less than 10 %. The influence of the space-time variability of the cascade model parameters on disaggregated rainfall and derived flood frequencies from rainfall runoff simulations has also to be quantified. The former is analyzed comparing rainfall characteristics like rainfall intensities, average dry spell duration, wet spell duration and wet spell amount. The latter is validated comparing relative values of different flood quantiles from rainfall runoff simulations in one catchment in Lower Saxony.

OLSSON, J. (1998): Evaluation of a scaling cascade model for temporal rainfall disaggregation, Hydrology & Earth System Sciences 2 (1), 1998