Universität Stuttgart

Water Resources Engineering and Management

akkreditiert durch ASIIN
im Auftrag des Akkreditierungsrats (KMK / HRK)

Universität Stuttgart · WAREM · Pfaffenwaldring 7a · 70569 Stuttgart

Pfaffenwaldring 7
70569 Stuttgart
Telefon: (0711) 685 - 66615 / 66616
Telefax: (0711) 685 – 66600
warem@iws.uni-stuttgart.de
http://www.warem.uni-stuttgart.de/

Anne Weiss M.A., M.Sc.
(Durchwahl: - 66616)

seminar_abtract_template

Master Thesis Abstract

of Abbas El Hachem

Application of a Cascade Model for Temporal Rainfall Disaggregation

Stochastic precipitation models offer the necessary long-term rainfall time series for a target region required in planning and decision-making process. In this thesis, two microcanonical multiplicative discrete random cascade models were applied to disaggregate rainfall data from hourly to sub-hourly resolution. The Basic and Dependent models were applied using data from stations in the regions of Ancash, Peru and Stuttgart, Germany. The models differ in the parameter estimation methodology. The disaggregation process was repeated 1000 times and the ensemble of simulations was evaluated. The results show that both models are capable of replicating the intermittency and characteristics of the natural rainfall process. No major difference between the two models was seen. Rainfall volumes were well conserved by the simulations. In the mean, both models seem to underestimate the generated small rainfall values. Overdispersion in the ensemble of the simulation for the stations in Ancash and undervariability for the station in Stuttgart were present. The reliability of the simulated time series strongly depended on the quality of the input data. For certain simulations, extreme values were underestimated. Nonetheless, original extremes were always falling within the bounds of the simulations. Additional parameter dependency concepts are suggested to improve the behaviour of the models. The simulated data are to be coupled with an urban drainage network for a detailed inspection of their validity in real life applications.

Keywords: rainfall, stochastic simulation, cascade model, temporal disaggregation.