

High-resolution rainfall time series for future climate

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BOOK OF ABSTRACTS



53 High-resolution rainfall time series for future climate

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Climate change is of great importance for urban water management today as the infrastructure planning horizon is often very long. Significant parts of the urban drainage systems is dimensioned using models that use rainfall time series as input which creates some challenges for considerations of climate change. In Denmark, the expectations for future climate is that different levels of extreme rainfall will change differently, and both seasonal and yearly precipitation will change significantly. We are lacking methods to make good artificial rainfall time series representing rainfall in future climate.

We present a method to perturb existing rainfall time series to reflect our expectations for future rainfall, both in terms of the different expectations to extremes and the expected opposing seasonal expectations. The method is based on a state space model and a technique to determine representative return periods on rainfall event basis across durations from 5 minutes to 12 hours. The return periods are used to classify the state of the event which in combination with an existing regional extreme rainfall model is used to determine an event specific change factor.

We have tested the method using ten long historical rainfall time series from Denmark and the official expectations to changes of the extremes combined with the most recent estimates for the seasonal and yearly changes. The method is able to generate synthetic rainfall series that describe all the changes in precipitation characteristics necessary to analyze and design the future of drainage systems.

The sensitivity of the methodology towards the absolute magnitude of the expected changes and towards the relative magnitude and direction of expectations to extremes and to seasonal changes are evaluated. The methodology is very robust to changes in the seasonal changes but the skill decreases with increased expectations to extremes.