



A spatial-temporal rainfall generator for urban drainage design

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ABSTRACT

The work presented here is a contribution to the Thames Water project of improving the sewerage system draining the Counters Creek area in London. The need for further improvements to the system has been highlighted by an increase in the number of floods affecting basement flats in the area. However, the cost of designing appropriate additional components for the system is potentially very high, so it is important to know whether any substantial overestimation results from using the traditional approach of 30-year spatially uniform design storm events. This work therefore developed a simple spatial-temporal stochastic rainfall tool to generate simulations of spatially distributed rainfall events, from which 30-year storms can be extracted.

Storm events are modelled as clusters of Gaussian rainfall cells by extending the method implemented by Willems (2001) to radar rainfall data. The parameters describing the cells and their motion are sampled from probability distributions derived from estimates of the parameters gained from 45 historical storm events within the catchment from the past ten years. The spatial-temporal stochastic rainfall generator combines the parameter distributions to produce a two dimensional time series of simulated storm events from which events of given return period can be identified.

KEYWORDS

Gaussian, radar rainfall, rainfall cell, spatial-temporal, stochastic, urban hydrology