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Stochastic long term modelling of a drainage system with estimation of return period uncertainty

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Long term prediction of maximum water levels and combined sewer overflow (CSO) in drainage systems are associated with large uncertainties. Especially on rainfall inputs, parameters, and assessment of return periods. This paper proposes a Monte Carlo based methodology for stochastic prediction of both maximum water levels as well as CSO volumes based on operations of the urban drainage model MOUSE (Lindberg and Joergensen 1986) in a single catchment case study. Results show quite a wide confidence interval of the model predictions especially on the large return periods. Traditionally, return periods of drainage system predictions are based on ranking, but this paper proposes a new methodology for the assessment of return periods. Based on statistics of characteristic rainfall parameters and correlation with drainage system predictions, it is possible to predict return periods more reliably, and with smaller confidence bands compared to the traditional methodology.