

Probabilistic runoff volume forecasting in risk-based optimization for RTC of urban drainage systems - DTU Orbit (08/11/2017)

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This article demonstrates the incorporation of stochastic grey-box models for urban runoff forecasting into a full-scale, system-wide control setup where setpoints are dynamically optimized considering forecast uncertainty and sensitivity of overflow locations in order to reduce combined sewer overflow risk. The stochastic control framework and the performance of the runoff forecasting models are tested in a case study in Copenhagen (76 km² with 6 sub-catchments and 7 control points) using 2-h radar rainfall forecasts and inlet flows to control points computed from a variety of noisy/oscillating in-sewer measurements. Radar rainfall forecasts as model inputs yield considerably lower runoff forecast skills than "perfect" gauge-based rainfall observations (ex-post hindcasting). Nevertheless, the stochastic grey-box models clearly outperform benchmark forecast models based on exponential smoothing. Simulations demonstrate notable improvements of the control efficiency when considering forecast information and additionally when considering forecast uncertainty, compared with optimization based on current basin fillings only.

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