



## **State-space adjustment of radar rainfall and stochastic flow forecasting for use in real-time control of urban drainage systems**

Roland Löwe<sup>1</sup>, Peter Steen Mikkelsen<sup>2</sup>, Michael R. Rasmussen<sup>3</sup>, Henrik Madsen<sup>4</sup>

<sup>1</sup> Department of Informatics and Mathematical Modelling, Technical University of Denmark (DTU), Denmark, rolo@imm.dtu.dk

<sup>2</sup> Department of Environmental Engineering, Technical University of Denmark (DTU), Denmark, psmi@env.dtu.dk

<sup>3</sup> Department of Civil Engineering, Aalborg University, Denmark, mr@civil.aau.dk

<sup>4</sup> Department of Informatics and Mathematical Modelling, Technical University of Denmark (DTU), Denmark, hm@imm.dtu.dk

### **ABSTRACT**

Merging of radar rainfall data with rain gauge measurements is a common approach to overcome problems in deriving rain intensities from radar measurements. We extend an existing approach for adjustment of C-band radar data using state-space models and use the resulting rainfall intensities as input for forecasting outflow from two catchments in the Copenhagen area. Stochastic greybox models are applied to create the runoff forecasts, providing us with not only a point forecast but also a quantification of the forecast uncertainty. Evaluating the results, we can show that using the adjusted radar data improves runoff forecasts compared to using the original radar data and that rain gauge measurements as forecast input are also outperformed. Combining the data merging approach with short term rainfall forecasting algorithms may result in further improved runoff forecasts that can be used in real time control.

### **KEYWORDS**

Flow forecast, greybox model, radar rainfall, state space model