Urban drainage uncertainty analysis: should we break our back for normally distributed residuals?

C. B. S. Dotto, A. Deletic and D. T. McCarthy

Centre for Water Sensitive Cities, Monash University, Victoria, Australia, 3800
cintia.dotto@monash.edu; ana.deletic@monash.edu; davidmccarthy@monash.edu

ABSTRACT

This study presents results on the assessment of the application of a Bayesian approach to evaluate the sensitivity and uncertainty associated with urban rainfall runoff models. The software MICA was adopted, in which the prior information about the parameters is updated to generate the Posterior Distribution. The likelihood function adopted in MICA assumes that the residuals between the measured and modelled values have a normal distribution. This is a trait of many uncertainty/sensitivity procedures. This study compares the results from three different scenarios: (i) when normality of the residuals was checked but if they were not normal then nothing was done (unverified); (ii) normality assumption was checked, verified (using data transformations) and a weighting strategy was used that gives more importance to high flows; and, (iii) normality assumption was checked and verified, but no weights were applied. The modelling implications of such scenarios were analysed in terms of model efficiency, sensitivity and uncertainty assessment. The overall results indicated that verifying the normality assumption required the models to fit a wider portion of the hydrograph, allowing a more detailed inspection of parameters and processes simulated in both models. Such outcome provided important information about the advantages and limitations of the models' structure.

KEYWORDS

Urban drainage models, uncertainty analysis, Bayesian approach, structure of modelling residuals, normality assumption.