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Probabilistic calibration of the distributed hydrological model RIBS applied to real-time flood forecasting: the Harod river basin case study (Israel)

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An automatic probabilistic calibration method for distributed rainfall-runoff models is presented. The high number of parameters in hydrologic distributed models makes special demands on the optimization procedure to estimate model parameters. With the proposed technique it is possible to reduce the complexity of calibration while maintaining adequate model predictions. The first step of the calibration procedure of the main model parameters is done manually with the aim to identify their variation range. Afterwards a Monte-Carlo technique is applied, which consists on repetitive model simulations with randomly generated parameters. The Monte Carlo Analysis Toolbox (MCAT) includes a number of analysis methods to evaluate the results of these Monte Carlo parameter sampling experiments. The study investigates the use of a global sensitivity analysis as a screening tool to reduce the parametric dimensionality of multi-objective hydrological model calibration problems, while maximizing the information extracted from hydrological response data. The method is applied to the calibration of the RIBS flood forecasting model in the Harod river basin, placed on Israel. The Harod basin has an extension of 180 km2. The catchment has a Mediterranean climate and it is mainly characterized by a desert landscape, with a soil that is able to absorb large quantities of rainfall and at the same time is capable to generate high peaks of discharge. Radar rainfall data with 6 minute temporal resolution are available as input to the model. The aim of the study is the validation of the model for real-time flood forecasting, in order to evaluate the benefits of improved precipitation forecasting within the FLASH European project.