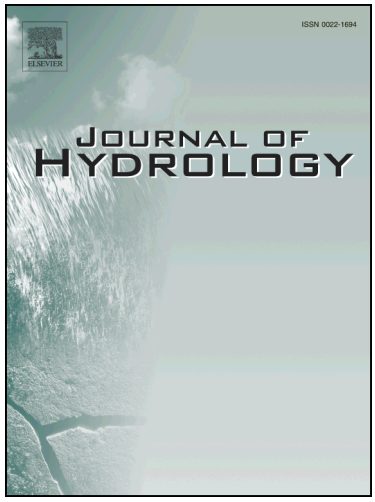


Research papers

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# Model uncertainty reduction for real-time flood control by means of a flexible data assimilation approach and reduced conceptual models

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**Abstract**

Recently, a combination of model predictive control and a reduced genetic algorithm (RGA-MPC) has shown to be an efficient control technique for real-time flood control, making use of fast conceptual river models. This technique was so far only tested under ideal circumstances of perfect model predictions. Prediction errors originating from hydrodynamic model mismatches, however, result in a deterioration of the real-time control performance. Therefore, this paper presents two extensions of the RGA-MPC technique. First, a new type of conceptual model is introduced to further increase the computational efficiency. This reduced conceptual model is specially tailored for real-time flood control applications by eliminating all unnecessary intermediate calculations to obtain the flood control objectives and by introducing a new transport element by means of flow matrices. Furthermore, the RGA-MPC technique is extended with a flexible data assimilation approach that analyzes the past observed errors and applies an appropriate error prediction scheme. The proposed approach largely compensates for the loss in control performance due to the hydrodynamic model uncertainty.