A Combination Method for Improving the Flood Predictability in the Three Gorges Region, China

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Abstract: There are different types of hydrologic models that can be chosen for flood prediction, but none of them can do the best job because of their different forecasting performance in different regions. In this study, a physically based distributed hydrological model (GBHM) and a conceptual hydrological model (the Xinanjiang model) are exanined for flood forecasting using the observed rainfall in the Three Gorges Region. Through an inter-comparison of the two models at several catchments in the study area, it is aimed to establish a combination method for improving the flood predictability.

Firstly, we compared the two models from the aspects of model complexity and performance in flood simulation. Secondly, the prediction uncertainties of the two models resulting from input errors, model parameter estimates, as well as model structure deficiency are examined using the extended Shuffled Complex Evolution Metropolis (SCEM). And finally we use the Bayesian model averaging (BMA) scheme to develop a combination method using the two models. Application of the combination method to the Three Gorges region for simulating the flood events occurred in the past 3 years show that the combination method has better predictability than either single model used in this study.

Key words: model; uncertainty; flood forecasting; Three Gorges