



Improved simulation of peak flows under climate change in Lanjiang catchment, East China

Yue-Ping Xu (1), Xujie Zhang (1), and Martijn J. Booij (2)

(1) Institute of Hydrology and Water Resources, Department of Civil Engineering, Zhejiang University, Hangzhou, Zhejiang, China, (2) Department of Water Engineering and Management, University of Twente, Enschede, the Netherlands

Global warming brings huge challenge to water and disaster management. Climate change is expected to have impacts on hydrology and extreme flows. However, large bias exists in the simulation of extreme flows by hydrological models. This work has the objective to improve the simulation of peak flows under climate change in Lanjiang catchment, East China, by employing two different approaches: post-processing of peak flows and composite objective calibration. Two hydrological models, namely SWAT and GR4J, are used to simulate the flows and the peaks-over-threshold (POT) method is used to extract peak flows. Three post-processing methods, namely the quantile mapping method and two generalized linear models, are set up to correct the biases in the simulated raw peak flows. Besides, a composite objective calibration of the GR4J model by taking the peak flows into account in the calibration process is carried out. Finally, a regional climate model PRECIS is applied to produce the climate data for the baseline period and the period 2011-2040 and to investigate how the peak flows will probably change in the future. The results show that the post-processing methods, particularly quantile mapping method, can correct the biases in the raw peak flows effectively. The composite objective calibration also resulted in good simulation of peak flows. The final estimated peak flows in the future period show an obvious increase compared with those in the baseline period, indicating there are probably more floods in Lanjiang catchment in the future.