



Hydrological extremes in China during 1971-2000: from observations and models

Xingcai Liu (1), Jun He (1), Mengfei Mu (1,2), and QiuHong Tang (1)

(1) Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing, China (xingcailiu@igsnr.ac.cn), (2) University of Chinese Academy of Sciences, Beijing, China

Hydrological cycle in China has been greatly affected by both significant climate change and human disturbance since the 1970s. The ISI-MIP2 project provides such a framework by involving multiple hydrological models to reproduce the global hydrological cycle considering both climate change and human impacts. However, the multimodel simulations yet need validation at regional applications. In this study, we evaluate the multimodel simulations of river flow using monthly observations from about 300 hydrological stations in China during the 1970-2000 period. The Nash-Sutcliffe (NS) coefficient and mean relative errors (MRE) are computed for each station to measure the performance of multimodel simulations. Trends in river flow are also compared for observations and simulations. On the basis of overall comparison, we evaluate the hydrological extremes derived from observations and simulations. The hydrological extremes are identified using a standardized discharge index (SDI), which resembles the standardized precipitation index (SPI), based on monthly river flow. The performance of multimodel simulations in reproducing hydrological extremes shows regional difference, and which seems to be greatly associated with the intensity of human activities in the basins. The uncertainty in multimodel simulations may be from models and input data. The uncertainties from both the hydrological models and forcings are investigated, and uncertainty from human impact related input (irrigated area and reservoir storage) is discussed with respect to reported data in China.