



Changes in the characteristics of hydrological droughts over a semi-arid watershed within Yellow River basin

Yang Jiao (1), Xing Yuan (1), and Dawen Yang (2)

(1) Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China, (2) Department of Hydraulic Engineering, Tsinghua University, Beijing 100084, China

Due to climate change and human interventions, significant decreases in river discharges have been observed in many large river basins over China during the past five decades, especially in the Yellow River basin, the second longest river in China. This suggests an intensified water resources shortage and an increasing hydrological drought risk. In this study, we aimed at analyzing the changes in the characteristics of hydrological droughts over a semi-arid watershed located in the middle reach of Yellow River basin from 1960s to the end of the 21st century. Firstly, historical climate forcing and river discharge data during 1961~2005 were collected from meteorological and hydrological stations, and climate forcing data from 2006 to 2099 were collected from several CMIP5 simulations under different representative concentration pathways (RCPs). Secondly, the frequency and severity of historical hydrological droughts were calculated based on the observed streamflow data and simulated streamflow by using the VIC land surface model and a newly developed eco-hydrological model CLM-GBHM. CLM-GBHM introduced detailed description of river network and sub-basin topological relationships into CLM, and performed quite well in streamflow simulations. The responses of hydrological droughts to historical and future climate change are being analyzed, causes of the changes in terms of natural and anthropogenic influences will be investigated, and the uncertainty for future projections will be estimated. This study will facilitate the implementation of adaptation strategies for hydrological drought over the semiarid watershed in a changing environment.