Geophysical Research Abstracts
Vol. 17, EGU2015-4329, 2015
EGU General Assembly 2015

Climate change and probabilistic scenario of streamflow extremes in a cryospheric alpine region

Tao Yang (1) and Cheng Gao (2)
(1) Hohai University, China (yang.tao@ms.xjb.ac.cn), (2) Hohai University, China (gchohai@163.com)

Future projections of streamflow extremes are of paramount significance in assessing the climate impacts on social and natural systems, particularly for the Himalayan alpine region in the Tibetan Plateau known as the Asian Water Tower. This study strives to quantify the uncertainties from different sources in simulating future extreme flows and seeks to construct reliable scenarios of future extreme flows for the headwater catchment of the Yellow River Basin in the 21st century. The results can be formulated as follows: (1) The revised snow model based on a daily active temperature method is superior to the commonly used degree-day method in simulating snowmelt processes. (2) In general, hydrological models contribute more uncertainties than the downscaling methods in high flow and low flow over the cryospheric alpine regions characterized by the snow-rainfall induced runoff processes under most scenarios. Meanwhile, impacts to uncertainty vary with time. (3) The ultimate probability of high-flow exhibits a downward trend in future by using an unconditional method, whereas positive changes in probability of low-flow are projected. The method in the work includes a variety of influence from different contributing factors (e.g. downscaling models, hydrological models, model parameters, and their simulation skills) on streamflow projection, therefore can offer more information (i.e. different percentiles of flow and uncertainty ranges) for future water resources planning compared with the purely deterministic approaches. Hence, the results are beneficial to boost our current methodologies of climate impact research in the Himalayan alpine zone.