Geophysical Research Abstracts
Vol. 14, EGU2012-3337, 2012
EGU General Assembly 2012

Impact of past climate variability and change on catchment ecohydrology in China

X. Xu, D. Yang, and H. Yang

State Key Laboratory of Hydroscience and Engineering, Department of Hydraulic Engineeing, Tsinghua University, Beijing, China (xu-xy07@mails.thu.edu.cn)

Abstract: Understanding the controls of climate change on water balance and vegetation cover is important in ecohydrology. In this paper, both the climate elasticity model considering the effect of soil moisture storage change and the analytical method based Budyko hypothesis are used to quantify the sensitivity of runoff and vegetation cover to inter-annual variations in climatic variables, such as precipitation and potential evapotranspiration. The elasticity parameters among 296 study catchments in China are compared and used to analyze the spatial pattern of variation among catchments. From the results of elasticity analysis on runoff from 1956 to 2005, we can conclude that precipitation is the most important factor affecting the change in annual runoff. Change of precipitation by 10% causes a 19.7% change of runoff, on average. The precipitation elasticity is larger in northern catchments than that in southern catchments. The significance of other controlling factors is in the order of soil moisture storage and annual potential evapotranspiration. A wider range of elasticities is found for drier catchments than relatively wetter catchments. Larger soil moisture storage elasticity for forest dominated catchments is found compared to grass dominated catchments due to the deep root of forest. The elasticity results estimated by regression analysis are compared with the curves derived from the water-energy balance model, which indicates a good agreement. Results of elasticity analysis on growing season vegetation cover indicate that radiation during growing season is the most important factor affecting the change in vegetation cover. The significance of other causative factors is in the order of precipitation during growing season, precipitation during non-growing season and mean temperature during growing season. Non-growing season precipitation is more significant for forest dominated catchment than that for grass dominated catchments.