The impact of global warming on the runoff in the Yangtze River Basin

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As the largest water system in China, the Yangtze River is important to China. The amount and distribution of water resources are a key impact factor to the ecology protection and the economy development in the Yangtze River basin. In this study, the impact of global warming on the runoff in the Yangtze River basin has been evaluated by coupling the GCMs (Global Climate Models) and a monthly water balance model. In the study hydro-meteorological data from 140 gauges and hydrological data from 20 stations are used. The spatial-temporal changing trends of the runoff, precipitation and temperature are analyzed by using the Mann-Kendall method during the period of 1960-2015. A bias correction method and a statistical downscaling method (MC-SVM, Markov Chain-Support Vector Machine) are used to deal with the temperature and precipitation from a regional climate model and their performances have been evaluated. To simulate the runoff in the basin, the two-parameter monthly water balance model is calibrated and validated in the 20 sub-basins. The CMIP5 projections downscaled from RCM are used as inputs into the water balance model to predict the future possible changes on runoff under global warming. The results will be helpful to maintain the health of the water ecology and the sustainability of water resources utilization in the basin.