

Analysis of the Spatial and Temporal Variability of Water Resources in the Upstream of Yangtze River Basin Using the Distributed Hydrological Model

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The Yangtze River basin is the largest basin in China, with its ineffaceable property of frequent flood disaster in history. However, water shortage is also becoming a serious problem in somewhere, due to recently fast development of economics, as well as the decrease of available water resource caused by the factors of mankind activities and climate's change. For better management of water resources and flood resourcification in the Yangtze River basin, water resources assessment is most important. Firstly, the spatial and temporal variability of precipitation and runoff during the last half century in the Yangtze River has been analyzed in the present study, using precipitation data from 165 meteorological gauges together with runoff data from 22 main hydrological gauges. The TFPW-MK (Mann-Kendall test with trend-free pre-whitening procedure) statistical test has been applied to assess the significance of trends. Then, a distributed hydrological model has been developed to simulate the spatial-temporal characteristics of hydrology in the upstream of Yangtze River basin (about 1 million km2). Present research attempted to incorporate all available spatial information (e.g., land uses, topography, geology and soil conditions) into the hydrological model by a distributed approach. Based on the physical governing equations, a comprehensive hydrological model has been developed. Using a 50-years metrological data set, the runoff characteristics and distribution of water resources in the upstream of Yangtze River Basin are discussed, according to results estimated by this model, combining with the records at hydrological gauge. The impacts of spatial and temporal variability of precipitation on the distribution of water resources are also addressed in the paper.