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Application of a distributed hydrological model to the upper Yangtze River basin for drought estimate

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Abstract: The Yangtze River (also called Changjiang in Chinese) is the largest river basin in China, which has frequent natural disaster caused by flood. However more droughts had been happened in recent years, and it caused great loss. Building on the physically-based hydrological simulation, a distributed model has been established in the upper Yangtze River for drought estimate have been addressed in this study. For estimate of water resources and drought, a large scale distributed hydrological model has been firstly established in the upper Yangtze River with 1 million km2. In the model, the study basin is divided into a discrete grid system of 10km size, and each grid is represented by a number of geometrically-symmetrical hillslopes. Taking the meteorological inputs, the model simulated hydrological processes during 1961∼2000, including river discharges, and spatiotemporal changes of runoff, soil moisture and evapotranspiration, which provide an inside investigation into water resources in the study basin. Based on the results of hydrological simulation, a new monthly drought index, GBHM-PDSI, was proposed through referring to Palmer Drought Severity Index. It was found that the new drought index has obvious advantages on describing the temporal change of drought severity and the spatial variation of dryness.

Keywords: Yangtze River basin, distributed hydrological model, water resources, drought estimate, Palmer drought severity index