

Application of three hydrological models in a semi-arid region and analysis of model uncertainty

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Abstract Three models, Xinanjiang, HEC and TOPMODEL, are used in flood simulation of the Kuancheng basin. Kuancheng basin is a sub-basin of the Panjiakou basin and it is located in the semi-arid region. Although the structures of runoff-formation of the three models are of the saturation runoff type, the simulated results are good. Because the time step is three hours for the hydrological data, the mechanism of runoff-formation through rainfall-excess could not be distinguished from the historic hydrological data. A simple and easy-to-use method is developed to study the uncertainty of TOPMODEL. The sensitivity parameters and their reasonable degree of variation are determined. For a practical rainfall time series, the reasonable parameter set is generated by the stochastic method and the flood hydrographs are simulated according to the parameter set. The forecast confidence interval with various significance levels can be estimated.

Key words TOPMODEL; Xinanjiang model; HEC model; semi-arid region; flood forecasting; uncertainty analysis; confidence interval
