IMPORTANCE OF DYNAMIC RIVER NETWORK IN DISTANCE DISTRIBUTION DYNAMICS HYDROLOGICAL MODEL

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ABSTRACT

The dynamics of runoff in distance distribution dynamics (DDD) hydrological model has been derived from the catchment features using GIS combined with a runoff recession analysis. The method for describing the runoff dynamics of a catchment is based on the distance distribution derived from the catchment topography. The distances from the points in the catchment to the nearest river reach are calculated for marsh and non- marsh portion of a hillslope. The distance distributions help in developing unit hydrographs, which account the delays and storages of water in the hillslope. The distance distributions of the river network are also important component of the model since the delays and storages in the river network affect the hydrographs at the outlet of the catchment. In the existing DDD model, the hillslope and the river network distance distributions are constant for the whole simulation periods. We hypothesize that, in reality, the river network density increases during extreme precipitation events and saturations of the subsurface, and t reating it as constant during low, medium and high (flood) flows only approximates the real behavior of the catchment. In this study, dynamic river networks are introduced to improve the approximations i. e. a river network denser than the observed river network is included in the model and is activated during subsurface saturation and higher precipitation events. The study results show that the dynamic river network improves the model, and this improvement would be important in using the model for practical flood forecasting and design of infrastructures in small catchments.