



Application of a developed hydrological ensemble model based on single numerical weather prediction in the Huaihe River

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A hydrological ensemble model, based on single numerical weather predictions (NWP), was developed for hydrological forecast purpose of Huaihe River in China. The incorporation of numerical weather predictions into hydrological forecasting systems can increase forecast lead times from a few hours to a few days. A single NWP precipitation, however, is insufficient as it involves considerable non-predictable uncertainties. Reliable and skillful precipitation ensemble forecasts are necessary for hydrological ensemble forecasting. A probability forecast model based on conditional meta-Gaussian distribution is presented to construct ensemble forecasts from single-value forecasts of precipitation in the Huaihe River of China. The distribution is modeled as a mixed-type in which the relationship between the positive observed precipitation and positive forecast precipitation is assumed to be bivariate meta-Gaussian. We also describe and comparatively evaluate the producing ensemble forecast precipitation with the root mean square error (RMSE) and Brier Skill Score. The Xinanjiang model was used for hydrological rainfall-runoff modeling. The upper reaches of the Huaihe River above Wangjiaba station in China was taken as the test catchment. The developed hydrological ensemble model was applied to forecast 12 representative hydrological events of the test case from 1981 to 2003. The results show that, overall, the developed hydrological ensemble model driven by ensemble precipitation can capture observed hydrologic process better than that driven by single numerical weather predictions in the test case.

Keywords: hydrological ensemble forecast, Ensemble precipitation, probability QPF Bivariate meta-Gaussian distribution, the Xinanjiang model, Huaihe River

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