

Seasonal drought ensemble predictions based on multiple climate models in the upper Han River Basin, China

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To predict droughts several months in advance and reduce the damage, the development of an experimental seasonal drought forecasting system is presented in this paper based on 29-yr (1982-2010) seasonal meteorological hindcasts from the North American Multi-model Ensemble (NMME) climate models via a bias correction and spatial downscaling method, and a distributed time-variant gain model (DTVGM) hydrologic model. The DTVGM model has been well calibrated with Nash efficiency coefficient values of 0.727 and 0.724 during calibration (1978-1995) and validation (1996-2005) periods at the Danjiangkou station. NMME-DTVGM has higher skill than reference forecast during the first lead and even up to 2-4 leads for the cold-dry season. Little improvements occur in spring and summer because of long memory of initial conditions in spring and lower predictive skill for precipitation in summer. The system also captured the pattern of the drought well for a hindcast case study of August-October 1997 drought.