Evaluation of ECMWF System 4 product for ensemble streamflow forecast in Upper Hanjiang River Basin

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This study attempts to investigate the application of ECMWF System 4 forecast dataset for long term streamflow forecasts with the lead time of 0-2 months in China. The case study is Upper Hanjiang River Basin (UHRB), where forecast results are essential for the central route of South to North Water Diversion Project (SNWDP) in China. A semi-distributed hydrological model (THREW) was applied to simulate the rainfall-runoff processes over the UHRB during the period of 2001-2008. The accuracy of streamflow prediction decreases with lead time, while it is no significant relationship with the drainage areas. All the stations become more reliable as lead time increases, but the Yangxian station shows less reliable than others. The forecast uncertainty is effectively estimated by applying the ECMWF System 4 forecast dataset for the ensemble streamflow forecasts. Significant differences in the performance of ECMWF system 4 are found in seasonal predictions. The forecast is more skillful in Post-dry season than otherwise in term of accuracy and reliability. This study will broaden the application field of ECMWF System 4 dataset to long term streamflow forecast for similar climate region. The results would provide effective guidelines for reservoir operation and be helpful for potential users to employ ECMWF System 4 dataset in other basins over China.