



Application of a global probabilistic hydrologic forecast scheme to the Ohio River Basin

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We evaluate a 10-day globally applicable flood prediction scheme over the Ohio River basin for the period 2003-2007. The hydrological core of the scheme is the Variable Infiltration Capacity (VIC) hydrology model, which we forced with the European Centre for Medium Range Weather Forecasts (ECMWF) temperature and wind analyses, and Tropical Rainfall Monitoring Mission (TRMM) precipitation up to each forecast starting day. In forecast mode, the VIC model was then forced with calibrated and downscaled 10-day forecasts from the ECMWF ensemble prediction system (EPS). We also tested a parallel setup where the EPS ensemble forecasts were interpolated to the spatial scale of the hydrology model. Each set of forecasts was extended by 5 days using monthly mean climatological variables and zero precipitation in order to account for the effect of initial conditions (the EPS was extended to 15 days only in March 2008). The 15-day spatially distributed ensemble runoff forecasts were then routed to four locations in the basin. Surrogates for observed daily runoff and streamflow were provided by the reference run, i.e. the VIC simulations forced with ECMWF analysis fields and TRMM precipitation. Mean forecast errors and skills for the two sets of forecasts were evaluated with respect to the reference. The flood prediction scheme using the calibrated and downscaled ECMWF EPS forecasts was generally more accurate and reliable than interpolated forecasts for both daily distributed runoff forecasts and daily flow forecasts. The streamflow forecasts were dominated by initial conditions for 1 to 5 days depending on forecasted precipitation amounts and drainage area of the sub-basins. The flood prediction scheme generally had useful skill for at least 10 days at all sites. Relative biases and ensemble reliabilities for high and average flow forecasts were similar. Relative RMSEs were lower for high flow forecasts than for average flow forecasts and so was correlation.