



## **A post-processor for hydrologic ensemble forecasts**

**J. Schaake**

Consultant, Office of Hydrologic Development, NWS, NOAA

The mean and spread of hydrologic ensemble forecast model output are usually biased for complex reasons related to imperfections in all aspects of the hydro-meteorological forecast process. Hopefully, over time, better forecast procedures will lead to more skillful and more reliable hydrologic ensemble forecasts. But the process will always be imperfect. Therefore, some form of model output postprocessor will likely be an important part of the ensemble forecast process.

Hindcast verification studies for several basins in the U.S. have shown that the bias and spread problems depend on many factors, including: forecast lead time, basin response time, length of the forecast window, hydrologic model calibration, issues related to initial conditions, climatology and time of year. A number of post-processing approaches have been proposed. These will be reviewed briefly with examples and discussion of some of their strengths and limitations.

An approach that uses a long-term hydrologic simulation together with corresponding observations to adjust products computed from individual ensemble members will be presented. The strategy is to use the historical data to develop a conditional distribution for the observations, given model output. Then this conditional distribution is integrated with the “apriori” forecast model output distribution implied by the ensemble members to produce a “posterior” updated distribution of observations that are expected to occur. Examples for several test basins will be given that suggest this procedure corrects the bias and spread problems without reducing the skill of the forecast.