Geophysical Research Abstracts, Vol. 7, 08648, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08648

Short-term meteorological ensembles from single-value forecasts for Ensemble Streamflow Prediction

J. Demargne, J. Schaake, L. Wu, E. Welles, H. Herr and D.J. Seo

Hydrology Laboratory, Office of Hydrologic Development, NOAA/National Weather Service, USA (Julie.Demargne@noaa.gov)

An ensemble pre-processor was developed to produce short-term precipitation and temperature ensembles from single-value forecasts in order to quantify the uncertainty in the meteorological forecasts while incorporating the skill of available single-value forecasts. For each meteorological variable, historical pairs of forecast and observed values are used to model the joint distribution of forecasts and observations. The probability distribution function of the future events that may occur given a particular single-value forecast is then the conditional distribution of observations corresponding to the forecast. To generate individual ensemble members for each lead time and each location, the climatological observations are re-scaled according to the conditional distribution based on the Schaake Shuffle method (Clark et al. 2004). By re-scaling climatological observations, this method actually maintains the space-time patterns between any two meteorological variables (e.g., precipitation and temperature).

The ensemble pre-processor was developed and tested at four NOAA National Weather Service River Forecast Centers in the U.S.A. using the operational deterministic forecasts for lead times of one to five days. Retrospective validation was performed for the Juniata River basins (Pennsylvania), the Spring and Elk Rivers basins (Missouri), and the American River basins (California) for precipitation, maximum temperature, and minimum temperature. The verification statistics showed that the probabilistic forecasts were skillful and reliable even out to lead day five.

These meteorological ensemble forecasts could be then ingested in the National Weather Service Ensemble Streamflow Prediction system to produce probabilistic streamflow forecasts that reflect the meteorological uncertainty.

Clark, M., S. Gangopadhyay, L. Hay, B. Rajagopalan, and R. Wilby, 2004: The

Schaake Shuffle: a method for reconstructing space-time variability in forecasted precipitation and temperature fields. Journal of Hydrometeorology, 5, 243-262.