



Preprocessing atmospheric precipitation forecasts to produce ensemble forcing for US NWS hydrologic forecasts

J. Schaake

Consultant, Office of Hydrologic Development, National Weather Service, Silver Spring, MD, USA (john.schaake@noaa.gov)

A critical requirement to produce skillful and reliable Ensemble Streamflow Predictions (ESP) is skillful and reliable ensemble atmospheric forcing. Current atmospheric ensemble forecasts contain biases that must be removed before they are used as input to hydrological models. Also the spread of the adjusted ensembles underestimates the true uncertainty. Correcting these limitations of weather and climate ensemble forecasts is essential to produce reliable ensemble streamflow forecasts. This paper presents the technique being used in the NWS Ensemble Streamflow prediction (ESP) system to produce ensemble forecasts for the Advanced Hydrologic Prediction Service (AHPS) program. This technique re-scales space-time patterns of historical observations for different lead times and averaging periods so that the marginal distributions of the re-scaled data are consistent with marginal distributions corresponding to current forecasts. The technique accounts for effects of temporal scale dependent uncertainty in precipitation forecasts. Since the “true” future space-time covariance structure is unknown, it assures that the space-time Spearman rank correlation structure of the ensemble members is the same as the historical data at all space and time scales and between all atmospheric variables. It also assures that ensemble members from different tributaries (and different forcing variables) are mutually consistent so that they can be combined to produce skillful and reliable ensemble hydrologic forecasts at all forecast points in a large river basin.