Geophysical Research Abstracts, Vol. 7, 05802, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05802

Statistical evaluation of global model ensemble precipitation forecasts in support of hydrological ensemble prediction

J. Schaake (1) and **S. Perica** (2)

(1) Hydrology Laboratory, National Weather Service, Silver Spring, Maryland, USA, (2) University of Utah, Salt Lake City, Utah, USA (perica@eng.utah.edu)

Atmospheric models ensemble forecasts provide information on large scale spatial patterns of atmospheric variables that may be useful for hydrologic applications, but they do not describe the finer-resolution variability of atmospheric data that is needed as input for hydrologic models. In addition, forecasts contain biases in all statistical moments at the scale at which they are issued that have to be removed before they are used as input to hydrological models.

The work that we will present here will be directed at evaluating and calibrating daily global model ensemble precipitation forecasts produced in the Climate Diagnostic Center (CDC). Retrospective 2-week ensemble reforecasts were computed using a version of the National Centers for Environmental Prediction (NCEP) medium-range forecast model with physics operational during 1998. Ensemble re-forecasts were archived on a 2.5 degree grid and were available for the 1979 – 2002 period. Ensembles contained 15 members; the forecasts were run to 348 hours from model initialization at 00Z. The study area is the continental USA. The daily "ground-truth" precipitation data were derived from the National Climatic Data Center climate data archives and the Snow telemetry data collected by the Natural Resources Conservation Service (NRCS). The NRCS Parameterelevation Regressions on Independent Slopes Model (PRISM) was incorporated to calculate gridded estimates of precipitation at 1/8

degree resolution. That allowed accounting for the effects of orography and sharp climate gradients within each grid element on mean areal precipitation estimates. Areal estimates were calculated only for those grid elements that had at least 10 daily observations.

In this study, precipitation ensemble forecasts are evaluated first based on the comparison of monthly and seasonal statistical properties of observed and forecasted data for all lead times. It is clear that the atmospheric model sees important climatological differences in precipitation amounts over the U.S., but significant biases in forecast precipitation magnitudes exist that have to be removed. The biases exist in higher order moments, as well. For example, ensemble forecast spread is too narrow relative to the spread of the observed data, which indicates that the model does not account for all sources of uncertainties. The degrees of biases vary with location, season, and forecast lead time.

Also, we are analyzing the effects of scale-dependency of precipitation forecasts. It is well known that some of the skill in precipitation forecasts comes from aggregation, both in space and time. The effects of time aggregation and lead time are explored in order to obtain optimal time periods for which forecast calibration will be done. We also examine the scale dependency of forecast properties for spatial scales varying from a 2.5 degree grid box to a 0.125 degree grid box. Among calculated statistics, the probability of precipitation and the conditional mean precipitation on wet days are the most sensitive to change in a spatial scale. This type of scale dependency appears to be consistent across the U.S., but varies with seasons.