Ensemble River Stage Forecasts From the Site Specific Hydrologic Predictor

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The National Weather Service Forecast Offices at Mount Holly, NJ, (PHI) and New York, NY (OKX), the Middle Atlantic River Forecast Center and Stony Brook University (SBU) recently completed a COMET Collaborative Project. The goal of this project was to explore the value of short-term quantitative precipitation forecasts (QPF) from mesoscale ensemble forecast systems (EFS) for hydrological forecasts of relatively small drainage basins. The role of the OKX and PHI offices was to use QPF from the EFS, in both post and real time, as input for the Site Specific Hydrologic Predictor (SSHP) program and to evaluate the value of an ensemble of stage forecasts from the SSHP for the small fast-responding hydrologic basins.

The points chosen for evaluation of the EFS with SSHP were Morristown, NJ on the Whippany River (PHI) and Lodi, NJ on the Saddle River (OKX). Both of these points are sub basins within the larger scale Passaic River basin in northern New Jersey. Several case studies were performed using QPF from the SBU WRF/MM5 EFS (13 members) and the NCEP Short Range EFS (SREF) (21 members), for selected heavy rain events ranging from 2006 through 2009. Because SSHP is currently not designed to process multiple QPFs at once, each ensemble member's QPF was input separately and the resulting stage forecast was output to a separate file. The collected files were imported into a spreadsheet for further analysis. It was originally hoped that this process could be automated and used in real-time forecasting, but the resources necessary for the re-programming of SSHP were not available.

The case studies reveal some interesting aspects of ensemble QPF and hydrologic forecasting for smaller hydrologic basins. The QPF "plumes" within a typical ensemble run varied by a factor of approximately two during the cool season, and the variability was greater during the warm convective season. In turn, the ensemble stage-height forecasts also showed considerable variation, as a function of both total QPF and of the time distribution of QPF. In some cases the observed hydrograph crest was outside the ensemble forecast envelope, due either to magnitude, timing, or both.

More detailed case study results will be presented at the conference. Additionally, some potential applications of this technique to operational hydrologic forecasting will be considered, along with some of the current limitations and potential improvements for SSHP.

An oral presentation is requested, if possible; otherwise a poster is acceptable.