

Diagnostic Verification of 6-90 Day Ensemble Streamflow Predictions for AHPS

Principal Investigators:

A. Allen Bradley¹, Stuart S. Schwartz², Anton Kruger¹

¹IIHR–Hydroscience & Engineering
The University of Iowa

²Center for Urban Environmental Research and Education (CUERE)
University of Maryland-Baltimore County (UMBC)

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Project Objective

For water resource managers, ensemble streamflow predictions represent one of the most significant products of the National Weather Service's (NWS) Advanced Hydrologic Prediction Services (AHPS). This project seeks to advance a distributions-oriented (DO) framework for verification of probability distribution forecasts derived from ensemble streamflow predictions. DO forecast quality measures provide a consistent diagnostic framework to quantify the relative sources of forecast skill, which would allow water managers to match decision tools to forecast attributes, and enable forecasters to target research, resources, and development efforts to the most valuable improvements. Expected outcomes from this research include: (1) a consistent framework for verifying probability distribution forecasts, which will be demonstrated through the evaluation and comparison of forecast quality of 6-90 day NWS AHPS ensemble streamflow forecasts for the North-Central and Ohio River Forecast Centers, and (2) a set of diagnostic verification tools for elucidating relevant forecast quality attributes, for the management and targeted improvement of forecasts systems, and interpretation of forecasts for their operational use.

Progress Report

Our efforts during this period have focused (1) development of a prototype online AHPS verification system, and (2) retrospective forecasting for the North Central and Ohio River Forecast Centers.

Development of a Prototype Online AHPS Verification System

To be able to explore the vast amount of forecast verification information for an RFC, and compare forecasts within an RFC, we have developed a web-based verification system for AHPS ensemble forecasts. The AHPS Verification System has access to the entire verification data base of (1) retrospective ensemble streamflow traces, (2) processed ensemble forecasts (and observations) for a suite of variables, and (3) computed forecast quality measures for the ensemble products. The system can quickly display detailed forecast quality information for individual locations and forecast dates, or make custom plots comparing summary forecast quality measures at multiple sites or multiple basins within the domain of an RFC. Interactive exploration of the verification data base can provide

forecasters with diagnostic information to identify pathways for improvement of the forecasting system.

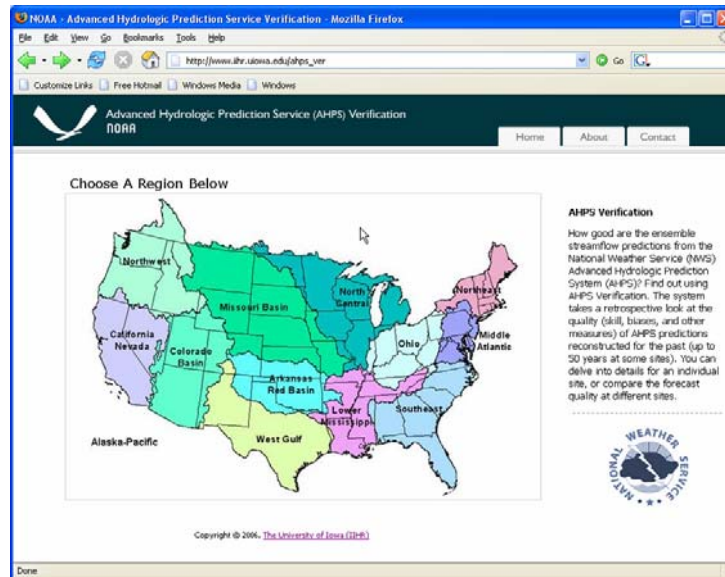


Figure 1: Web-based interactive system for forecast verification of AHPS ensemble streamflow predictions (http://www.ihr.uiowa.edu/ahps_ver).

Our work over this period has continued to implement portions of the system. We have redesigned the data base system to utilize a MySQL data base, which maintains an inventory of pre-computed plot files, forecast quality metrics for each forecast (identified by the location, product, and forecast date), or data files. This allows the AHPS verification system to construct MySQL queries that return either the plots to display, the data to be plotted (in the case of forecast quality metrics), or a list of data files (ESP forecasts and output data files) that contain the data needed to generate plots. This information is then passed on to Linux scripts that perform the necessary computational or plot-making tasks. We have also developed tools to populate the MySQL data base by periodically searching (with a *cron* job) through the directory structure and updating itself, so that changes in the forecasts and/or forecast verification information are found and made available to the AHPS verification system. These changes have been made to speed up the creation and display of forecast verification information, keep the online system up to date, and to provide a general framework for implementing planned expansion of the system capabilities.

Retrospective Forecasting for the North Central and Ohio River Forecast Center

Currently, the AHPS Verification System has been implemented with prototype verification data sets for the North Central River Forecast Center (NCRFC). Recent efforts have focused on generating similar data sets for the Ohio River Forecast Center (OHRFC). We have been testing a system that integrates the OHRFC model configuration for NWSRFS within the existing NCRFC system, but implementation differences between the RFCs have forced up to create separate NWSRFS implementations (on separate Linux machines) for both the OHRFC and NCRFC. In addition, we have reprocessed the retrospective forecasts made for the NCRFC to update the data base of forecast quality metrics with new measures developed as part of this research.