Meteorological Model Ensemble River Forecasts

Part I – Mission Connection

1. **Product/Service Description** – The National Weather Service (NWS) Meteorological Model Ensemble River Forecasts web pages, graphics and text products are being produced by Eastern Region River Forecast Centers (RFCs) and the Southeast RFC to provide useful hydrologic information to users. The objective of this information is to provide short lead-time (<7 days) ensemble river forecasts using forcing fields provided by various meteorological ensemble systems.

These ensemble river forecast are produced at the RFCs using a collection of software entitled Meteorological Model-based Ensemble Forecasting System (MMEFS). The MMEFS uses the temperature and precipitation output from the National Centers for Environmental Prediction (NCEP) Global Ensemble Forecast System (GEFS), the Short Range Ensemble Forecasts (SREF), and the North American Ensemble Forecast System (NAEFS). These ensemble members are processed through the Community Hydrologic Prediction System (CHPS) to generate an ensemble of river forecasts. These individual river forecasts are turned into probabilistic forecasts. “R” software is used to generate a suite of graphics to display this information (see Attachment 1 for some examples).

2. **Purpose** – The purpose of the ensemble river forecasts is to provide users with a short-term (<7 days) situational awareness by providing the probabilistic exceedence information relative to NWS flood categories and providing the ensemble river forecasts that in turn show a range of outcomes. These web pages complement information contained in the current short-term deterministic hydrologic forecasts and internal NWS WFO-requested subjective contingency forecasts. This service will support the NOAA mission goals of serving society’s need for weather and water information and supporting the nation’s commerce, economy, and planning for the protection of life and property.

3. **Audience** – The target audience for this service is the hydrologic community, including but not limited to the US Army Corps of Engineers (USACE), US Geologic Survey (USGS), NWS Weather Forecast Offices (WFOs) and the emergency management community. Additional users include water reservoir managers (e.g. water supply managers for the large cities in the northeast or the power companies of the southeastern states), recreational interests, and the general public.
4. Presentation Format – The ensemble river forecasts can be viewed at http://www.erh.noaa.gov/mmefs/index.php. The interface utilizes a Google map with an optional River Forecast Center (RFC) map overlay. The products are accessible by individual forecast points and by individual states. The information is selectable by “Ensemble/Model” type and the “Chance of Exceedence” for action, minor, moderate, and major flood stages is depicted for that “Ensemble/Model” type on the Google map.

Alternatively, there is also a table view for each River Forecast Center at http://www.erh.noaa.gov/mmefs/index_table.php. Please see Attachment 1 for some examples.

Part II – Technical Description

1. Format and Science Basis – This service uses forcing parameters provided by various meteorological ensemble systems as input to the hydrologic model hosted by the RFC’s Community Hydrologic Prediction System (CHPS). At this time, these products are generated for river forecast locations in the Northeast, Ohio River Valley, Mid-Atlantic and Southeast U.S using model outputs from the National Centers for Environmental Prediction (NCEP) 21-member Global Ensemble Forecast System (GEFS), the 21-member Short Range Ensemble Forecast (SREF) system and the 42-member the North American Ensemble Forecast System (NAEFS) produced at NCEP. The design of software supporting these products is flexible enough to easily add other meteorological ensemble sources. Even though the system has been automated, the staff of each RFC monitors the output and provides status messages to users as needed.

These ensemble river forecasts were developed for several reasons.

- Hydrologic forecast uncertainty is closely linked to the uncertainties associated with precipitation and temperature forecasts used by hydrologic simulation models.
- This service explicitly uses short-range meteorological model ensemble temperature and precipitation data, eliminating the need for historical precipitation and temperature data for its results.
- This service provides a means to further users' understanding of the effects of model inputs used in hydrologic simulations.
- These ensembles river forecasts are useful surrogates for multiple contingency runs that are typically used by river forecast centers to convey quantitative precipitation forecast (QPF) or quantitative temperature forecast (QTF) uncertainty for worst case scenarios.

2. Availability – The ensemble river forecast web pages are available 24-hours per day and 7-days a week and are monitored by Eastern Region RFCs and the Southeast RFC staff.
3. **Additional Information**

   a. A [Help Page](#) that describes the ensemble process and the site navigation is available on the ensemble river forecast web site.
   
   b. An online course, designed to help [understand numerical weather prediction (NWP) models](#), which includes a section on ensembles, is available from UCAR's COMET. Another online course from COMET provides an [Introduction to NAEFS](#).
   
   c. A slide presentation of an Introduction for Ensemble Streamflow Prediction, based on this [UCAR COMET distance learning module](#), is available.

4. **Contact** – Comments on this product can be emailed to [ahps.webmaster@noaa.gov](mailto:ahps.webmaster@noaa.gov).

   Comments may also be provided to:

   NOAA/NWS/Eastern Region Headquarters  
   Attn: Laurie Hogan  
   630 Johnson Ave, Suite 202  
   Bohemia, NY 11716  
   631-244-0114
Attachment 1. Examples of various displays from the web pages for the Meteorological Model Ensemble River Forecasts.

This figure is an example of the Google map main page for this service.
This figure is an example of single state display capability from this service.
This figure is an example of tabular view capability from this service.
This figure is an example of the text product capability from this service.

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This figure is an example of the “R” graphic capability from this service.
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