Probabilistic Hydrologic Forecasts for Decision Support at the North Central River Forecast Center

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Advanced Hydrologic Prediction Service (AHPS) Ensemble Streamflow Prediction provides probabilistic forecasts with an extended window of analysis for long-range risk assessment and planning. Forecasts at the NCRFC are created using 60+ years of observed temperature and precipitation as inputs to drive NWS Hydrologic model simulations. Historical data and current model states are combined with forecast temperature and precipitation inputs to generate an expected range of possible streamflow, stage or volume hydrographs within a forecast window of interest (currently 90 days).

Assessing Flood Risk

Across the Midwest, risk analysis for spring flooding is a combination of antecedent conditions (snowpack, soil moisture, and frozen ground, for example) and expected future conditions of temperature and precipitation. Antecedent conditions are determined with continuous simulation snow and soil moisture accounting models. The expected future conditions can be simulated from a meteorological model and historical climate observations. The current applications of the Advanced Hydrologic Prediction system utilize more than 60 years of historical temperature and precipitation observations as input scenarios for future expected conditions. Future observed variations in AHPS will integrate ensembles of meteorological model forecasts to account for short-range uncertainty. This ensemble is part of the Hydrometeorological Ensemble Forecasting System (HEFS).

Bridging Probabilistic and Deterministic Forecast Horizons

NOAA’s National Weather Service (NWS) is implementing a short to long-range hydrologic ensemble forecast service (HEFS). The NWS statement is the recent development uncertainty in hydrologic forecasting for flood risk management, water supply management, streamflow regulation, recreation needs, and ecosystem management among other applications. The HEFS extends the existing hydrologic ensemble forecasting to include short-range forecasts, incorporate additional weather and climate information, and better quantify the major uncertainties in hydrologic forecasting. It is designed to bridge the gap between short-term ensemble forecasts and deterministic products that can be used for flood assessment. "Tests in the recent study of the observed temperatures for Iowa, US starting at day 15 and other historic seasons for the period 1980-2012. With an observational ensemble forecast and as shown in the NAEFS + Climatology graph, a constrained forecast percent at climatological data is observed; at this ensemble shows the possibility of even lower temperatures than zero actually observed. This will allow for improved decision-making in a shorter-term outlook, prior to issuing deterministic forecasts.

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References:

http://www.crh.noaa.gov/ncrfc/