

# **NOAA Hydrometeorological Testbed at the Hydrometeorological Prediction Center**

## **FY2011 Accomplishments**

### **Goals**

The goal of the Hydrometeorological Prediction Center (HPC) Hydrometeorological Testbed (HMT-HPC) is to accelerate the assessment and implementation of new technology, research results, and other scientific advancements from the research and development communities to enhance HPC products and services.

### **Experimental Forecast Activities**

#### **HMT-HPC Winter Weather Experiment**

The inaugural HMT-HPC Winter Weather Experiment was held at HPC January 10-February 9, 2011. The experiment focused on exploring the role of high resolution convection-allowing models in improving forecasts of precipitation type, snow and freezing rain accumulations, and the location of mesoscale snow bands. During the experiment, 14 forecasters and researchers from HPC, WFOs, other NCEP centers, and NOAA research labs issued experimental forecasts of snow and freezing rain for two 24 hour periods. Participants then wrote forecast confidence discussions detailing uncertainties in the forecast and rating their overall level of confidence. In addition to the forecasting activities, participants also subjectively evaluated the quality of model precipitation type, snow, and freezing rain forecasts. Organizing the experiment required considerable development work in order to display winter weather parameters from the high resolution models.

#### **QPF Component of the 2011 HWT Spring Experiment**

HPC again collaborated with the Hazardous Weather Testbed (HWT) to facilitate the QPF component of the 2011 Spring Experiment. During the five week experiment, over 80 forecasters, researchers, and academics rotated through the QPF component. Participants issued experimental forecasts for the probability of exceeding 0.50" and 1.0" of precipitation during three near-term 6 hour periods. In addition to the experimental forecasts, participants subjectively evaluated the available model guidance with the goal of determining whether high resolution convection-allowing models provide improved warm season QPF guidance. QPF component leaders were Faye Barthold (May 9-13), Bob Oravec (May 16-20), Bruce Sullivan (May 23-27), Dave Novak (May 31-June 3), and Andrew Orrison (June 6-10). Preparing for the QPF

component required frequent collaboration with SPC to ensure that all of the necessary data was available in the Hazardous Weather Testbed.

## **Research to Operations Projects**

### **High Resolution Guidance**

One of the highlights of the QPF component of the 2011 Spring Experiment was the Storm Scale Ensemble of Opportunity (SSEO), a 7-member time lagged ensemble made up of readily available high resolution convection-allowing model runs. Subjective evaluations conducted during the experiment revealed that the SSEO mean provided better forecast guidance than the SREF, and this guidance is now available to HPC forecasters in NAWIPS. Additionally, results from both the Spring Experiment and the Winter Weather Experiment have increased forecaster confidence in the 4km NMMB nest, which will become operational with the NAM upgrade in mid-October 2011.

### **MET/MODE Tool**

HMT-HPC continues to investigate the MET/MODE tool for object-oriented verification. Working with Mary Beth Gerhardt and Mark Klein, an internal website was developed to allow forecasters to view 24hr MODE verification output on a daily basis. The website is designed to update prior to the 11am HPC-CPC map discussion. As a result of the website, a number of suggested improvements are being investigated. In addition, 6hr MODE verification is available offline for HPC forecasts and model forecasts from the NAM, GFS, CMC, ECMWF, NCEP HRW-ARW and HRW-NMM (east windows), and SPCWRF4.

HPC also collaborated with researchers from Texas A&M University on a COMET Partners project that used the MODE tool to investigate whether models have a consistent displacement bias in the predicted location of elevated warm season convective systems.

### **Wave Packet Tool**

As the result of CSTAR-funded collaboration with Stony Brook University, a Rossby Wave Packet tool has been implemented at HPC. Mike Bodner collaborated with Brian Colle, Edmund Chang, and Matt Sounders of Stony Brook to develop a tool that displays wave packet envelope forecasts from both the GFS and ECMWF in NAWIPS. The tool was developed using an experimental algorithm written by Alexander Zimin that computes the wave packets using stream flow rather than standard zonal averaging methods. Introductory training was provided to HPC forecasters in August 2011, and medium range forecasters will test and evaluate this tool during the 2011-2012 cold season.

## **Recruit second contractor for HMT-HPC**

The position was advertised and several candidates have been interviewed. Expect to have contractor on board by December, 2011.

## **Workshops, Meetings, and Papers**

**DTC-HMT Project Update Meeting**—Faye Barthold attended the DTC-HMT Project Update Meeting November 1, 2010 in Boulder, CO. The purpose of the meeting was to discuss current and future collaborations between the Developmental Testbed Center (DTC) and NOAA HMT.

**AMS Annual Meeting**—Faye Barthold and Dave Novak attended the AMS Annual Meeting January 24-27, 2011 in Seattle, WA. Faye Barthold presented results from the QPF component of the 2010 Spring Experiment while Dave Novak gave a presentation about HPC's efforts to better quantify extreme rainfall threats.

**Great Lakes Operational Meteorology Workshop**—Faye Barthold attended the Great Lakes Operational Meteorology Workshop March 21-23, 2011 in Ithaca, NY to present lessons learned and next steps in HPC's exploration of object-oriented verification.

**NCEP Ensemble User's Workshop**—Dave Novak and Mike Bodner attended the NCEP Ensemble User's Workshop May 10-13, 2011 in Laurel, MD. Dave Novak presented "HPC Ensemble Uses and Needs" and highlighted the role of the HMT in integrating ensembles into operations.

**NWP Workshop on Model Physics with an Emphasis on Short-Range Prediction**—Dave Novak, Faye Barthold, and Mike Bodner attended the NWP Workshop on Model Physics July 26-28, 2011 in Camp Springs, MD. Dave Novak presented "Operational Model Successes and Needs" and highlighted testbeds as a continuing success story in spurring model development that addresses operational needs.

**National Weather Association Digest paper accepted**—Mike Bodner was the lead author on a paper comparing the atmospheric conditions associated with the 2008 Midwest floods to those from the 1993 Midwest floods that was accepted for publication in the National Weather Association Digest.

Bodner, M.J., N.W. Junker, R.H. Grumm, R.S. Schumacher, 2011: Comparison of the 2008 Midwest floods to the historic 1993 floods: Atmospheric Circulation and Processes. National Weather Association Digest, Paper accepted March 2011.

**Bulletin of the American Meteorological Society paper accepted**—Dave Novak, Faye Barthold, and Mike Bodner are coauthors on a paper summarizing the 2010 HWT Spring

experiment that was accepted for publication in the Bulletin of the American Meteorological Society.

Clark, A.J., S.J. Weiss, J.S. Kain, I.L. Jirak, M. Coniglio, C.J. Melick, C. Siewert, R.A. Sobash, P.T. Marsh, A.R. Dean, M. Xue, F. Kong, K.W. Thomas, Y. Wang, K. Brewster, J. Gao, X. Wang, J. Du, D.R. Novak, F.E. Barthold, M.J. Bodner, J.J. Levit, C.B. Entwistle, T.L. Jensen, and J. Correia, Jr., 2011: An Overview of the 2010 Hazardous Weather Testbed Experimental Forecast Program Spring Experiment. Bull. Amer. Meteor. Soc., Paper accepted July 2011.

**Monthly Weather Review paper accepted**—Faye Barthold was a coauthor on a paper examining the role of atmospheric rivers and mesoscale convective systems in the May 2010 Nashville, TN floods that was accepted for publication in Monthly Weather Review.

Moore, B.J., P.J. Neiman, F.M. Ralph, F.E. Barthold, 2011: Physical Processes Associated with Heavy Flooding Rainfall in Nashville, Tennessee, and Vicinity during 1-2 May 2010: The Role of an Atmospheric River and Mesoscale Convective Systems. Mon. Wea. Rev., Paper accepted August 2011.

## **Training and Professional Development for HMT Staff**

**Advanced Warning Operations Course Winter Track (AWOC Winter)**—Faye Barthold completed the NWS AWOC winter weather training course.

**National Hurricane Center-Tropical Cyclone Intensity Forecasting**—Mike Bodner completed VISIT training from the National Hurricane Center on tropical cyclone intensity forecasting.

**National Hurricane Center-Tropical Cyclone Track Forecasting**—Mike Bodner completed VISIT training from the National Hurricane Center on tropical cyclone track forecasting.

**Dual-Polarization Familiarization Session**—Mike Bodner and Faye Barthold completed training provided by WDTB on the dual-pol radar upgrade.