

Hydrometeorological Prediction Center

2009 Accomplishments Report

1. Introduction

The Hydrometeorological Prediction Center (HPC) made progress on many fronts during 2009. HPC quantitative precipitation forecasts (QPFs) set a number of records for improvement over the numerical model guidance. Manually produced text products such as the Selected Cities and Travelers forecasts were combined and enhanced. HPC continued to provide products in additional formats such as KML to allow greater customization by users. HPC coordination with the emergency management community was enhanced by the upgrading of equipment and expanding the scope of HPC support beyond tropical systems. HPC demonstrated flexibility by quickly developing a suite of tools to assist the Hanson Dam support project. These tools included the expansion of QPF products for the first time out to 7 days.

2. Major Accomplishments

HPC Forecasts of Quantitative Precipitation Continue to Improve - HPC forecasters set a number of records in 2009 for QPF. The Government Performance and Results Act (GPRA) measure is based upon the Day 1, 1-inch rainfall amount, and the March threat score of 0.440 was the highest ever for March. The Day 2, 1-inch threat score (0.428) was not only the highest ever for March, but in fact was the highest Day 2 score for any month. The Day 3, 1-inch score (0.345) was also a March record. Records were also set for half-inch amounts on Days 2 and 3. In all cases the forecast scores were substantially higher than those for the numerical models.

HPC Provides Forecasts in Additional Formats - HPC made its precipitation products available in Keyhole Markup Language (KML) format, a format viewable by geographic information system (GIS) applications like Google Earth. HPC rainfall forecasts out three days and the River Flood Outlook are now available in this format. Additional products will be made available in this format in the future.

Selected Cities Summary Upgraded - The Selected Cities Summary, long issued by the HPC, has been modernized and automated. The new product is based on National Digital Forecast Database (NDFD) data and is user definable. The forecast portion is now totally automated, can include any cities the customer wants, and is updated every hour. HPC continues to append the national high and low temperatures every six hours using METAR reports and the summaries issued by the NWS Forecast Offices. The change took place January 13, 2009.

Last Travelers Forecast Issued - On April 14, the HPC issued the final Travelers Forecast (TAV). The TAV products, which provided weather and temperature forecasts for dozens of U.S. cities, have been replaced by a new product that includes more information for a larger number of cities. The NWS Meteorological Development Laboratory (MDL), in collaboration

with the NWS Office of Climate, Water, and Weather Services and the National Centers for Environmental Prediction's (NCEP's) HPC and Central Operations (NCO), developed two forecast products in eXtensible Markup Language (XML), the FOX3 and the FOX7. These new products are issued hourly and contain more forecast information, including three- and seven-day forecasts instead of the 2-day TAV forecasts.

HPC Tests Backup for QPF Products - Backup of HPC QPF products issued from the Storm Prediction Center (SPC) was tested in early March. HPC forecaster Mike Eckert traveled to SPC to lead the test.

Enhanced Support to FEMA - The installation of a new state-of-the-art videoteleconferencing capability between the Federal Emergency Management Agency (FEMA) and HPC was completed in September. As part of this new digital, high-definition system, HPC is now a drop on FEMA's internal communications network. The new capability greatly increases the reliability and video quality of HPC's participation in FEMA-led conference calls, such as those supported by the Hurricane Liaison Team run jointly by FEMA and the National Oceanic and Atmospheric Administration (NOAA). The new capability also positions HPC to assume a greater role in expanded NOAA support to FEMA in additional environmental areas.

HPC Provides Enhanced Support to the Hanson Dam Project - HPC, along with NCEP's Environmental Modeling Center (EMC) and Climate Prediction Center (CPC), supported NWS Western Region Headquarters, Weather Forecast Office (WFO) Seattle, and the Northwest River Forecast Center (NWRFC) by providing long-range precipitation forecasts for the Green River Valley of Washington. By November 24, 2009, HPC was providing QPF on days 6 and 7 twice daily at 6-hour intervals for the domain of NWRFC, QPF discussions identifying the confidence level of the QPFs in the specified area, and probabilistic QPF (PQPF) in gridded format through day 7 based on HPC forecaster-prepared QPF and ensemble numerical model output.

Outreach, conferences, and visitors

HPC - WFO Visiting Forecaster Program Completes Third Year - Under this highly successful program, forecasters from NWS WFOs visit HPC for three days to learn about HPC forecast procedures and capabilities and to share experiences from their home offices with HPC staff. As part of this, visitors provide a seminar highlighting the unique programs or capabilities of their home office. Six forecasters visited HPC in 2009:

Jeff Cupo, WFO San Juan, March 2-6
Bryan Mroczka, WFO Tallahassee, March 16-20
Gordon Strassberg, WFO Melbourne, April 6-10
Ingrid Amberger, WFO Albany, April 20-24
Pat Moore, WFO Greenville-Spartanburg, June 22-26
John LaCorte, WFO State College, July 21-23

HPC - RFC Visiting Forecaster Program Continues - In an ongoing effort to improve understanding between HPC meteorologists and RFC hydrologists, HPC hosts a forecaster

exchange program with RFCs. In 2009 two RFC visitors came to HPC and HPC sent two forecasters to the RFCs:

Lisa Holts from CBRFC (Salt Lake City, UT) to HPC	June 8-12
Mike Sowko (HPC) to NWRFC (Portland, OR)	June 15-19
Michael Musher (HPC) to MBRFC (Pleasant Hill, KS)	July 13-16
Theodore Rodgers from MARFC (State College, PA) to HPC	August 3-5

HPC Participates in Conference Calls Leading Up to Major Blizzard and Flooding - The March northern plains blizzard and subsequent flooding along the Red River of the North were well anticipated by HPC medium-range forecasters and NWS field offices. HPC became involved in conference calls with the forecast offices in the Red River basin as early as March 18. HPC storm summaries were started for this event on March 23.

HPC Forecaster Teaches at WMO Hurricane Course - HPC forecaster David Roth participated in the annual WMO-supported Hurricane Course at the Tropical Prediction Center in March. Dave served as an instructor for the portion of the course dealing with forecasting quantitative precipitation associated with tropical cyclones.

HPC and Alaska Region Conduct Forecaster Exchange Visits - Todd Foisy from WFO Anchorage visited HPC on May 11-15. Paul Kocin from HPC visited all three forecast offices in Alaska from May 18-22. All these visits were important in the further development of the Alaska Medium Range Forecast program at HPC. The focus of these visits was on the finer details of Alaskan weather, and HPC techniques and approaches to creating the medium-range forecasts for Alaska.

HPC Participates in NOAA HMT Workshop - Ed Danaher, Chief of the HPC Development and Training Branch, represented HPC at the first NOAA Testbed Workshop, held in Boulder, Colorado, April 28-29. Researchers involved in each of the NOAA testbeds discussed recent research and long-term plans.

HPC Participates in Severe Weather Workshop - Three HPC forecasters participated in the Severe Weather Workshop hosted by WFO Sterling in April. HPC attendees included Mike Eckert, Rich Otto, and Brendan Ruben-Oster. Mike Eckert gave a presentation entitled "Using Spatial Density for Excessive Precipitation Forecasting."

HPC Branch Chief Visits Alaska Region - Robert Kelly, Chief, HPC Forecast Operations Branch, visited both the Juneau and Anchorage forecast offices. The ongoing exchanges with forecast offices has benefitted HPC in a number of ways, and guided HPC in modifying forecast operations and schedules to work more effectively with forecast offices.

HPC Provides First Ever Winter Storm Briefings to FEMA - At the suggestion of FEMA Director Craig Fugate, HPC provided several short-notice proof-of-concept video teleconference (VTC) briefings on an upcoming East Coast winter storm. On December 17 HPC Deputy Director Kevin McCarthy provided the first briefing and discussed the expected track and timing of the storm along with the expected precipitation types and amounts. This was the first

operational use of the FEMA-installed VTC system at HPC. A follow up briefing was conducted the next morning by HPC's Robert Kelly.

Media activities

HPC forecasters were interviewed by numerous media outlets throughout the year, including radio, television, and the print media. CNN Radio, National Public Radio, and several other national networks contacted HPC for live and taped interviews on a number of occasions. As part of this, Mike Davison, HPC International Desks Coordinator, provided many interviews in Spanish.

Hydrometeorological Testbed

Hydrometeorological Testbed at HPC Expands Operations - After several years of being staffed by one part-time meteorologist, the NOAA Hydrometeorological Testbed at HPC (HMT-HPC) added a full-time meteorologist to the staff. The HMT-HPC had a number of major accomplishments, including conducting several research-to-operations projects and publishing several papers.

In January 2009, the HMT-HPC expanded to full-time operations. Faye Barthold was hired as a full-time contractor and joined the staff in January. During the year Mike Bodner, an HPC Development and Training Branch (DTB) meteorologist, was assigned to focus most of his work time (90%) to support the HMT-HPC.

The HMT-HPC participated in two planning meetings of the NOAA HMT for the HMT Southeast (HMT-SE) project. Ed Danaher attended the meeting on user needs and requirements in February and Mike Bodner attended the science plan workshop in June.

The HMT-HPC initiated a study of predecessor rain events (PREs) including a comparison of model performance between NCEP's North American Model (NAM) and the Global Forecast System (GFS) and an evaluation of HPC QPF to determine areas for improvement.

The HMT-HPC worked with EMC's Brad Ferrier to test rime factor output from the NAM, evaluating its utility for snow and ice accumulation forecasting, as well as precipitation type.

The HMT-HPC worked closely with other HPC meteorologists to develop a probabilistic QPF product. This technique uses output from the NCEP model ensembles and HPC operational forecasts to generate QPFs over the conterminous U.S.

The HMT-HPC worked with Jack Kain from the Hazardous Weather Testbed at the Storm Prediction Center to implement the spatial density approach to excessive rainfall forecasting into HPC operations.

The HMT-HPC partnered with several academic institutions to submit Collaborative Science, Technology, and Applied Research (CSTAR) proposals. Proposals included

"A Partnership to Develop, Conduct, and Evaluate Real-time High-Resolution Ensemble and Deterministic Forecasts for Convective-scale Hazardous Weather: Moving to the Next Level" with the University of Oklahoma;

"Improving Understanding and Prediction of Hazardous Weather in the Southeastern United States: Landfalling Tropical Cyclones and Convective Storms" with North Carolina State University; and

"Predictability of High-Impact Weather during the Cool Season over the Eastern U.S: from Assessment to the Role of the Forecaster" with Stony Brook University.

The HMT-HPC worked with Gary Wicks of NOAA's Earth System Research Laboratory in submitting a proposal to the NOAA THORPEX program entitled "Enhancement and Operational Application of an Objective Tool for Characterization of Water Vapor Transport and Precipitation in Forecast Fields."

HPC International Desks

The HPC International Desks is a program for training meteorologists from South and Central America and the Caribbean Basin in the techniques of advanced weather analysis and forecasting. Because of the large number of forecasters trained so far, well over 200, and the extensive training International Desks Coordinator Mike Davison has provided at workshops and international meetings, the International Desks has excellent contacts within the meteorological services of the countries served. When weather events are likely to have a significant impact, Mr. Davison is frequently contacted by former visiting scientists for his expertise. In addition, on many occasions Mr. Davison has been proactive in contacting foreign meteorological services to ensure they were aware of potential significant weather events.

HPC Provides QPFs for Puerto Rico - On April 13, the HPC International Desks began producing gridded precipitation forecasts for WFO San Juan, Puerto Rico. The grids are produced in a non-operational environment and serve as a proof of concept that may lead to an increased suite of HPC guidance products for Puerto Rico.

HPC Staff Visits WFO Puerto Rico - Ed Danaher, HPC Development and Training Branch Chief, and Michel Davison, HPC International Desk Coordinator, visited WFO San Juan on March 13. The trip followed by one week a visit to HPC by Science and Operations Officer Jeff Cupo of WFO San Juan. The purpose of the trip to San Juan was to familiarize the WFO staff with HPC products and services and to discuss ways HPC could enhance support to the WFO.

Workshop in Santo Domingo, Dominican Republic - Michel Davison and Ed Danaher presented a workshop in Santo Domingo, Dominican Republic, on March 16 – 20, at the request of Ingeniera Gloria Ceballos, Director of the Organización Nacional de Meteorología (ONAMET). The one-week training workshop was attended by 15 meteorologists and meteorological technicians. Attendee feedback indicated the workshop was very successful, meeting the training goals through formal presentations and a series of carefully selected lab exercises.

3. Awards and Certifications

HPC 2009 Isaac Cline Regional Award Winners:

Keith Brill - Hydrometeorology Category. Keith Brill, senior HPC Meteorologist Developer, made significant and far-reaching enhancements to the way HPC forecasters produced their products. These enhancements fell into two general categories: tools to assist forecasters in manually preparing products and products generated solely through postprocessing of other HPC manual products or model output.

Mike Davison - Outreach Category. Mike Davison, HPC International Desks Coordinator, has taken a broad view of training to include not only the in-residence training, but working with meteorologists in the Caribbean Basin, Central America, and South America on an on-going basis. In addition to the residence training, Mike presents one or two on-site workshops each year in various countries in the Caribbean Basin and Central and South America.

HPC 2009 Isaac Cline Local Award Winners:

Kevin McCarthy - Leadership Category. Kevin McCarthy serves as the Deputy Director for both HPC and the Ocean Prediction Center (OPC) and has thrived in this challenging environment. Kevin has taken the lead in many unpleasant but necessary tasks including preparing many of the budget and planning documents for both centers. An area where Kevin has shown a great deal of initiative and leadership is in the planning for the move of the two centers to the new building near the University of Maryland.

Marty Rausch - Meteorology Category. HPC forecaster Marty Rausch's contribution to meteorology within HPC displays a comprehensive approach to HPC operations. This involves forecasting skills, leadership among the staff, and his verification efforts. As a forecaster Marty is very thorough. He focuses on his forecasts, writing outstanding forecast discussions.

NCEP's 2009 Budget/Administration Award

Crystal Rickett - This award recognizes Crystal Rickett for her outstanding contribution in the NCEP budgetary and administrative areas during 2009. Crystal has established excellent budgetary and administrative controls and policies in HPC and OPC. She skillfully executes the HPC and OPC annual budgets according to the spending plan and the NCEP Technical Operating Plan.

4. HPC Staff

The listing below reflects the HPC staff assigned as of December 31, 2009.

Front Office

James E. Hoke, Director
Kevin C. McCarthy, Deputy Director
Crystal Rickett, Administrative Officer
Sharleta Hubbard, Secretary

Development and Training Branch

Edwin J. Danaher, Branch Chief
David Novak, Science and Operations Officer
Michel Davison, International Desks Coordinator
Meteorologist Developers: Chris Bailey, Michael Bodner, Keith F. Brill, Mark Klein, and Alan J. Robson

Forecast Operations Branch

Robert Kelly, Branch Chief
Senior Branch Forecasters: Michael T. Eckert, Brian Korty, Robert J. Oravec, Bruce Sullivan, and Bruce Terry.
Forecasters: Richard Bann, James Cisco, Kathleen Collins, Stephen Flood, Anthony Fracasso, Christopher Hedge, Kenneth James, Paul Kocin, Mike Musher, Andrew Orrison, Brendon Rubin-Oster, Richard Otto, Frank Pereira, Daniel Petersen, Robert Rausch, Franklin A. Rosenstein, David Roth, Michael Schichtel, Michael Sowko, Michael Vojtesak, and Paul Ziegenfelder
Surface Analysts: Mary Beth Gerhardt, David Hamrick, Kwan-Yin Kong, and Michael Soltow.
Meteorological Technicians: Rufus J. Jackson, Jr., and William McReynolds, Jr.

Staffing Changes During 2009

Departures: Paul Mausser (forecaster), Pamela Szatanek (forecaster), Jaclyn Kost (surface analyst), and Karl Schulze (surface analyst)

Arrivals: David Hamrick (surface analyst) and Michael Soltow (surface analyst)

Promotions: Katie Collins, Anthony Fracasso, Richard Otto, and Brendon Rubin-Oster

5. HPC Staff Publications in 2009

- Brill, K.F., 2009: A general analytic method for assessing sensitivity to bias of performance measures for dichotomous forecasts. *Wea. Forecasting*, **24**, 307-318.
[<http://journals.ametsoc.org/doi/full/10.1175/2008WAF2222144.1>]
- Brill, K.F., and F. Mesinger, 2009: Applying a general analytic method for assessing bias sensitivity to bias adjusted threat and equitable threat scores. *Wea. Forecasting*, **24**, 1748-1754. [<http://journals.ametsoc.org/doi/full/10.1175/2009WAF2222272.1>]
- Hoke, J.E., et al., 2009: Central United States Flooding of June 2008. Service Assessment, National Weather Service, 103 pp.
[http://www.weather.gov/os/assessments/pdfs/central_flooding09.pdf]
- Junker, N.W., M.J. Brennan, F. Pereira, M.J. Bodner, and R.H. Grumm, 2009: Assessing the potential for rare precipitation events with standardized anomalies and ensemble guidance. *Bull Amer. Meteor. Soc.*, **90**, 445-453.
[<http://journals.ametsoc.org/doi/pdf/10.1175/2008BAMS2636.1>]
- Novak, D.R., B.A. Colle, and R. McTaggart-Cowan, 2009: The role of moist processes in the formation and evolution of mesoscale snowbands within the comma-head of Northeast United States cyclones. *Mon. Wea. Rev.*, **137**, 2662-2686.
[<http://journals.ametsoc.org/doi/full/10.1175/2009MWR2874.1>]

6. Photos



Faye Barthold at work in the Hydrometeorological Testbed at HPC.



HPC Science and Operations Officer David Novak and forecaster Dan Petersen discuss a rainfall prediction.



Ed Danaher, HPC Development and Training Branch Chief (far left), and HPC International Desk Coordinator Michel Davison (second from the right) led a week-long workshop in the use of numerical weather prediction in weather forecasting in the Dominican Republic.



HPC staff works with Ocean Prediction Center staff in a sheltering-in-place drill, as Administrative Officer Crystal Rickett provides flawless leadership.



Senior Branch Forecaster Brian Korty tries to make sense of QPF verification.



HPC Deputy Director Kevin McCarthy performs the periodic cleaning of the refrigerators (known officially as a Refrigeration Sanitation Event.)