

Hydrometeorological Prediction Center 2010 Accomplishments Report

1. Introduction

The Hydrometeorological Prediction Center (HPC) made progress in a number of areas during 2010. HPC is one of nine centers of the National Centers for Environmental Prediction (NCEP) of the National Weather Service (NWS), a line office of the National Oceanic and Atmospheric Administration (NOAA). In response to requests from customers and partners, several products were extended further out in time and there was increased collaboration with Weather Forecast Offices (WFOs) and River Forecast Centers (RFCs). HPC continued to expand its suite of probabilistic products by adding probabilistic winter weather forecasts. HPC demonstrated increased flexibility by quickly implementing enhanced precipitation forecasts for the western U.S.

2. Major Accomplishments

HPC tested backup procedures for Quantitative Precipitation Forecasts - HPC sent a forecaster to the Storm Prediction Center (SPC) to test the backup capabilities for preparing HPC Quantitative Precipitation Forecasts (QPFs) from there as part of the HPC continuity of operations (COOP) process. Mike Eckert, HPC forecaster, trained several SPC forecasters on March 2. On March 3, the HPC products were prepared and issued from SPC. The test was successful.

HPC improved techniques for preparing dew point and sky cover forecasts - As part of a continuing effort to improve HPC medium range guidance, the methodology for deriving the dew point and sky cover gridded guidance forecasts over the conterminous U.S. was changed on April 15. The new technique derives these parameters from a blend of models selected by HPC forecasters. This change significantly improves the accuracy of the dew point and sky cover grids available for ingest by Weather Forecast Office forecasters into the Graphical Forecast Editor (GFE).

HPC developed improved probabilistic rainfall product - HPC worked with partners, including Central Region Headquarters and the North Central River Forecast Center (NCRFC), to implement an advanced, probabilistic quantitative precipitation forecast (PQPF) system. The NCRFC had been using an older probabilistic rainfall forecast from HPC. This major new capability is expected to enhance the quality of the probabilistic river flow forecasts provided by RFCs to the U.S. Army Corps of Engineers and other high-end users of RFC products.

HPC provided improved guidance forecasts for Alaska - On May 11, three improvements were made to the way HPC creates weather grids for Alaska. An improved method of converting the graphical forecasts created by HPC into grids was implemented. HPC forecasters employed the AWIPS GFE for the first time to edit the

grids created on the NCEP Advanced Weather Interactive Processing System (NAWIPS). The third change involved the use of the Real-time Meteorological Analysis (RTMA) to account for bias in the HPC wind forecast. These changes resulted in better quality gridded guidance from HPC for use by Alaska Region Forecasters.

New experimental Probabilistic Quantitative Precipitation Forecast - The HPC QPF suite was approved as an Experimental Product. These products are derived using a combination of the HPC manually prepared QPF and uncertainty information from the NCEP Short Range Ensemble Forecast system. The QPF products are available via the HPC public Internet pages in the form of probabilities of precipitation exceeding given amounts and percentile accumulations at 6-h intervals through 72 hours. Intended users are weather forecasters at WFOs and RFCs, hydrologists at RFCs, emergency managers, and others in the public and private sectors. This product represents an improvement over previous probabilistic rainfall products produced by HPC.

HPC extended precipitation forecasts 12 hours - On June 15, HPC began generating an additional 12 hours of QPF on the overnight shift. This extended the 6 hourly QPFs out to three and a half days. The additional half day was requested by the field to allow WFOs to prepare their daytime QPF earlier and not have to wait for the late afternoon updated forecast guidance from HPC.

HPC Media Room equipment upgraded - The display system used in the World Weather Building for presentations and for media interviews was significantly upgraded with new equipment on July 26. The upgrade was a cooperative effort of the NCEP Office of the Director, NCEP Central Operations, National Hurricane Center (NHC), Ocean Prediction Center, and HPC. The new digital equipment with a plasma display replaced the 7 year old rear projector and display equipment and provides much sharper images for the briefings and interviews.

HPC developed enhanced gridded guidance - HPC developed enhancements to the medium range (day 4 through 7) Probability of Precipitation (PoP) and weather grids to allow for easier use by field offices in the AWIPS GFE. In particular, a 6-hour PoP has been developed, the weather grid temporal resolution has been increased to 6 hours from 12 hours, and additional qualifiers (slight chance, chance) have been added. These grids, which were requested by the NWS Eastern Region, are being made available for evaluation. These new products more closely parallel the grids being produced by NWS field offices and will be easier to incorporate into forecast office operations.

HPC began issuing QPFs for Puerto Rico and US Virgin Islands - On December 1 HPC Forecast Operations Branch began daily QPFs for Puerto Rico and the U.S. Virgin Islands. This program was initiated as a result of a request from the NWS Southern Region to support WFO San Juan's QPF and Flash Flood programs.

HPC hosted four summer interns - Three of the student interns were participants in the NOAA Center for Atmospheric Sciences (NCAS) program at Howard University. Jason Francis, an undergraduate at Coppin State University in Baltimore, Maryland, and

Shayvonne Moxey-Bonamy, an undergraduate at Lynchburg College, spent the summer at the HPC International Desks. They helped prepare training materials for forecasting precipitation over Puerto Rico. Stephany Taylor worked in HPC's Forecast Operations Branch. She developed a slide show and paper explaining the range of programs at HPC. The fourth student, Michelle Cohen, an undergraduate at Tufts University, worked as a volunteer at HPC. Through her project she determined that a simple mandatory level temperature-based algorithm for diagnosing precipitation type from model output performed well enough to be used in HPC operations.

HPC provided support to FEMA during Hurricane Alex's threat to Gulf States - On June 30, HPC was asked by FEMA to participate in their video teleconference (VTC) briefings with the Gulf of Mexico state governments on Alex's potential impacts. NHC provided track and intensity information while HPC provided QPFs related to the storm. HPC forecasted 6-12 inches with isolated amounts up to 20 inches. The maximum observed rainfall was 19 inches.

Outreach, Conferences, and Visitors

HPC - WFO Visiting Forecaster Program completes fourth 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, most visitors provide a seminar highlighting the unique programs or capabilities of their home offices. Seven forecasters visited HPC in 2010.

Ryan Sharp (WFO Louisville, Kentucky)
Stephen Keebler (WFO Wilmington, North Carolina)
John Quinlan (WFO Albany, New York)
Michael Strickler (WFO Raleigh-Durham, North Carolina)
Carl Gorski (Western Region Headquarters, Salt Lake City, Utah)
Joe Rua (WFO Lake Charles, Louisiana)
Jason Elliot (WFO Huntsville, Alabama)

HPC - RFC Visiting Forecaster Program continues - In an ongoing effort to improve understanding between HPC meteorologists and River Forecast Center hydrologists, HPC hosts a forecaster exchange program with RFCs. In 2010 three RFC visitors came to HPC and HPC sent two forecasters out to the RFCs:

Greg Waller (West Gulf RFC) to HPC
Ken Kleeschulte (Lower Mississippi RFC) to HPC
Kyle Lerman (California Nevada RFC) to HPC
Rich Bann (HPC) to Middle Atlantic RFC
Chris Hedge (HPC) to California Nevada RFC

FEMA staff visited HPC to discuss Hurricane Liaison Team backup planning - On May 18, FEMA's Matthew Greene and John Juskie visited HPC to receive an overview of HPC Hurricane Liaison Team (HLT) participation and to discuss FEMA's contingency planning to use HPC as a base of operations for HLT briefings in the event of communications or other failures at the Tropical Prediction Center with a tropical cyclone threatening the Atlantic or Gulf Coasts. HPC's Jim Hoke and Kevin McCarthy provided details on HPC operations, including how HPC can help if the HLT needed backup support.

HPC leadership visits San Juan Weather Forecast Office (WFO) - HPC Director Jim Hoke, Director of Operations Robert Kelly, and NWSEO Steward Chris Hedge visited the San Juan WFO the week of August 9. The purpose of the visit was to determine the WFO's requirements for quantitative precipitation support from HPC, as requested by Southern Region Director Bill Proenza. As a result of the meetings, HPC will provide daily, real-time precipitation forecasts through two days as part of a year-long evaluation effort.

HPC and WFO San Juan staff visited the University of Puerto Rico at Mayagüez - On August 11, WFO San Juan Meteorologist-in-Charge Israel Matos, HPC Director Jim Hoke, and members of their staffs traveled to the University of Puerto Rico at Mayagüez. The group met with Dr. Héctor Jiménez, Chair of the Physics Department, under which the Meteorology Program resides, to explore ways NCEP can participate in the highly successful student intern program the university has with the WFO. Discussions were also held with Dr. Jorge Rivera Santos, Acting Chancellor of the University and Director of the Puerto Rico Water Resources and Environmental Research Institute, on opportunities for the NWS and university to work more closely in improving the prediction of tropical precipitation, flooding, and debris flows.

HPC co-leads COMET virtual QPF course - For the second consecutive year HPC Senior Branch Forecaster Michael Eckert and Science and Operations Officer David Novak served as instructors for the Virtual Quantitative Precipitation Forecast Course of the Cooperative Program for Meteorology, Education, and Training (COMET). This 4-day class explored the science of QPF using experts from the research and operational meteorological communities. Additionally, the course showed how QPF products are developed and collaborated between HPC at the national level and WFOs and RFCs. Mike was responsible for a significant portion of the curriculum covering the science in the forecast process, with both Mike and Dave teaching portions of the course on HPC's core production of deterministic and probabilistic QPF products. The 74 participants included WFO and RFC meteorologists and hydrologists. Participants rated the course 4.38 on a scale of 1 (poor) to 5 (excellent). The course is expected to lead to improved QPF and closer collaborations among HPC, WFOs, and RFCs.

HPC collaborated with Western Region on major winter storms - With a deep upper-level low pressure system off the Pacific coast, it was apparent there would be a series of heavy precipitation events for the western United States in December 2010. On

December 17, at the request of NWS Western Region, HPC initiated a program for issuing QPFs through seven days for the region. In the first week following the start of this program there were rainfall events of more than 12 inches and snow amounts in excess of 100 inches in the West Coast states, as well as into Nevada and Utah. Throughout the winter this longer-range forecast from HPC supported the Western Region's decision support services and other customer service.

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 or taped interviews on a number of occasions. As part of this, Mike Davison, HPC International Desks Coordinator, provided many interviews in Spanish.

National media interviews for heat wave - HPC conducted an unusually high number of interviews with national media related to the heat wave that affected the central, southern, and eastern states during June and July. The frequency of these national media interviews continued to increase as HPC's visibility as a national resource increased. CBS News, ABC's Good Morning America, Associated Press, CNN Radio, USA Today, NPR, Smart Money, and NHK News (Japan), all conducted multiple interviews with HPC forecasters throughout the month. China Central Television (English version, from mainland China) called to discuss the American heat wave on July 6.

Hydrometeorological Testbed

Hydrometeorological Testbed at HPC (HMT-HPC) participated in the SPC Spring Experiment - HPC actively participated in the SPC Spring Experiment which lasted five weeks beginning May 17. The experiment involved forecasters and researchers working together to evaluate new forecast techniques in a simulated operational environment. For the first time, the experiment included a section on quantitative precipitation forecasting. HPC had staff onsite at SPC each week to lead the QPF portion of the experiment. In addition, other HPC forecasters participated in a parallel part of the experiment at HPC for the final two weeks. Participating forecasters identified promising new techniques for forecasting rainfall, including the use of high-resolution numerical models.

HPC staff visited NOAA HMT in Boulder, CO - HPC meteorologists Mike Bodner, Faye Barthold, and Edwin Danaher of the HMT-HPC spent January 27 and 28 visiting with researchers and staff of the NOAA HMT. The goal of the meeting was to align better the work of the two groups.

HPC participates in NOAA HMT Workshop - Ed Danaher, Chief of the HPC Development and Training Branch (DTB), and Faye Barthold represented the HMT-HPC

at the second workshop of the NOAA Testbed and U. S. Weather Research Program (USWRP) held in Boulder, Colorado, May 4-5, 2010.

HMT-HPC partnered with several institutions for R&D proposals – Three proposals were submitted to the NWS Collaborative Science, Technology, and Applied Research Program (CSTAR). These proposals were "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 SUNY Stony Brook. In addition, the HMT-HPC worked with Gary Wicks of NOAA's Earth System Research Laboratory (ESRL) 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."

International Desks

The HPC International Desks is a program for training meteorologists from South, Central, and Caribbean America in the techniques of weather analysis and forecasting. Because of the large number of forecasters trained -- over 200 -- and the extensive training International Desks Coordinator Mike Davison and HPC/DTB Chief Ed Danaher have provided at workshops and international meetings, HPC has excellent relationships with the meteorological services of the countries served. When weather events are likely to have a significant impact, Mike is frequently contacted by former visiting scientists for his expertise. On many occasions during the year, Mike contacted the foreign meteorological services in order to ensure they were prepared for significant weather events.

HPC International Desks coordinated with Brazil on Tropical Storm Anita - A rare tropical system developed off the southern coast of Brazil on March 9, with the National Environmental Satellite, Data, and Information Service (NESDIS) and the NHC determining the system was a tropical depression. Mike Davison coordinated with meteorological authorities in Brazil the previous Friday and alerted them to the possibility of the development of this tropical system. He then coordinated information from NHC and NESDIS with Brazil several times daily through the life of the storm. A forecaster at the MetSul Weather Center in Brazil sent the following comments to HPC "We have to express how thankful we are for the International Desks at the HPC. Believe me, your daily bulletins were extremely important to us and to other centers."

World Meteorological Organization (WMO) training officials visited HPC International Desks - On March 17 Jeff Wilson, Director of the WMO's Education and Training Department and Nelle Alegre, Administrative Assistant, Education and Training Office at the WMO, visited NCEP to learn more about the International Desks of HPC

and the Climate Prediction Center (CPC). Michel Davison briefed them on the activities of the South American and Tropical Desks. They also visited with the visiting scientists at the desks and toured the HPC operations area.

HPC provided support to FEMA concerning rainfall over Haiti - On July 21, HPC received a request from the NOAA Liaison to FEMA for information concerning rainfall over Haiti. Mike Davison provided current forecast information as well as a link to climatological data for the region.

3. Training, Awards, and Certifications

HPC forecaster participated in DoC's Executive Leadership Development Program (ELDP) - On July 19, Kenneth James began a 4-month rotational assignment at NOAA Headquarters as the NOAA Assistant Deputy Chief of Staff. The assignment is part of Kenny's involvement with DoC's ELDP, into which he was accepted earlier in 2010. During the assignment, Kenny provided senior-level staff support for NOAA leadership, provided advice on strategic and operational issues, and developed and implemented solutions to increase the overall effectiveness of NOAA Headquarters processes and communications.

HPC 2010 Isaac Cline Regional Award Winners:

Robert Oravec - Hydrometeorology

For demonstrating exceptional skill as a Quantitative Precipitation Forecaster and shift supervisor for the Hydrometeorological Prediction Center.

David Novak - Leadership

For outstanding leadership in identifying new and innovative techniques to improve HPC products and services.

Mark Klein - Support Services

For outstanding technical and scientific support to the Hydrometeorological Prediction Center, improving the accessibility and usability of HPC products.

HPC 2010 Isaac Cline Local Award Winners:

Mike Sowko, Mike Musher, and Jim Cisco – Meteorology

For outstanding performance in predicting the snow storm of February 5-8.

Katie Collins – Outreach

For outstanding leadership in NOAA Heritage Week as part of the NOAA Preserve America Initiative.

4. HPC Staff

The listing below reflects the HPC staff and associates as of December 31, 2010.

Front Office

James Hoke, Director
Kevin McCarthy, Deputy Director
Vacant – Administrative Officer
De Verah Petersen, Secretary

Development and Training Branch

Edwin Danaher, Chief
David Novak, Science and Operations Officer
Michel Davison, International Desks Coordinator
Meteorologist Developers: Chris Bailey, Michael Bodner, Keith Brill, Mark Klein, and Alan Robson.
Hydrometeorological Testbed – Faye Barthold (associate)

Forecast Operations Branch

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

Staffing Changes During 2010

Departures: Kyle Griffin, SCEP student

Arrivals: Michael Sean Ryan, surface analyst; De Verah Petersen, secretary

Promotions: Katie Collins, Mary Beth Gerhardt, and Michael Soltow

5. HPC Staff Publications in 2010

Brill, K.F., and M. Pyle, 2010: The response of performance metrics for binary forecasts to hedging that approaches random change. *Wea. Forecasting*, **25**, 1307–1314.
<http://journals.ametsoc.org/doi/pdf/10.1175/2010WAF2222381.1>

Colle, B.A., and D.R. Novak, 2010: The New York Bight Jet: Climatology and dynamical evolution. *Mon. Wea. Rev.*, **138**, 2385–2404.
<http://journals.ametsoc.org/doi/pdf/10.1175/2009MWR3231.1>

Jensen, T.L., M. Harrold, B.G. Brown, S.J. Weiss, P.T. Marsh, M. Xue, F. Kong, A.J. Clark, K.W. Thomas, J.S. Kain, R.S. Schneider, D.R. Novak, F.E. Barthold, J.J. Levit, and M.C. Coniglio, 2010: An overview of the objective evaluation performed during the Hazardous Weather Testbed (HWT) 2010 Spring Experiment. *25th Conference on Severe Local Storms*, 11-14 October 2010, Denver, CO.
<http://www.patricktmarsh.com/research/pubs/abstracts/2010sls.jensen.abstract.pdf>

Novak, D.R., B.A. Colle, and A.R. Aiyyer, 2010: Evolution of mesoscale precipitation band environments within the comma head of northeast U.S. cyclones. *Mon. Wea. Rev.*, **138**, 2354–2374.
<http://journals.ametsoc.org/doi/pdf/10.1175/2010MWR3219.1>

Weiss, S.J., A.J. Clark, I.L. Jirak, C.J. Melick, C.W. Siewert, R. Sobash, P.T. Marsh, A.R. Dean, M. Xue, F. Kong, K.W. Thomas, J. Du, D.R. Novak, F.E. Barthold, M.J. Bodner, J.J. Levit, C.B. Entwistle, T. Jensen, J.S. Kain, M.C. Coniglio, and R.S. Schneider, 2010: An overview of the 2010 NOAA Hazardous Weather Testbed spring forecasting experiment. *25th Conference on Severe Local Storms*, 11-14 October 2010, Denver, CO.
<http://www.spc.noaa.gov/publications/weiss/hwt-2010.pdf>

6. Photos



WMO Training Officials Jeff Wilson, Director of the Education and Training Department, and Nelle Alegre, Administrative Assistant, Education and Training Office, visited NCEP to learn more about the HPC International Desks.



Heavy equipment was needed to clear the snow from the HPC parking lot after one of the February snowstorms.



In February HPC staff celebrated Branch Chief Bob Kelly's 40 years of government service,



Tom Skilling, Chief Meteorologist at superstation WGN-TV Chicago, visited HPC on March 24, 2010, in preparation of a major series he was producing on severe weather forecasting.