

Hydrometeorological Prediction Center 2012 Accomplishments Report

1. Introduction

The Hydrometeorological Prediction Center (HPC) completed several milestones during 2012, including a historic building move to the NOAA Center for Weather and Climate Prediction, and historic forecasts for Superstorm Sandy. Several new products were introduced, including 6-hour precipitation forecasts for days six and seven, night-time medium-range forecasts, and probabilistic winter weather forecasts. Activities were guided by the newly completed HPC strategic plan.

2. Major Accomplishments

HPC Moved to the NOAA Center for Weather and Climate Prediction - After over 37 years of making analysis and forecasts from the World Weather Building, and after 13 years of planning and anticipation, HPC moved into the brand-new NOAA Center for Weather and Climate Prediction (Fig. 1) on the weekend of August 17-19. The building houses units of the National Centers for Environmental Prediction (NCEP) of the National Weather Service (NWS), the National Environmental Satellite, Data, and Information Service (NESDIS), and the Office of Oceanic and Atmospheric Research (OAR), representing a unique collaborative atmosphere. There is office space reserved for visiting scientists to facilitate greater collaboration with the research community. The environmentally-friendly building features a large library, a variety of different-sized conference rooms, break rooms on each floor, a fitness center, a deli with an outdoor eating terrace, and a conference center consisting of a 464-seat auditorium and three break-out rooms. The College Park Metro Station is a short ten-minute walk away and the nearby main campus of the University of Maryland offers opportunities for collaboration and synergy. Media interest in the new building is high.

HPC Provided Decision Support for Historic Superstorm Sandy - As part of the life-saving work of the NWS during Sandy, the HPC participated in a range of unique activities to ensure customers and the public were adequately prepared for the hazards posed by Sandy. During the early stages of Sandy, HPC's medium-range forecasters used ensemble model forecasts to sound the alarm of a potentially hazardous storm to the East Coast of the U.S. more than a week in advance of landfall there. As Sandy approached the U.S. coast, HPC provided daily briefings to NOAA and NWS leadership, provided numerous interviews to national and international media partners, and hosted government officials (Fig. 2), who had a keen interest in Sandy. Throughout the lifetime of the storm, HPC quickly adapted its homepage to support a common message from the NWS, especially regarding the public advisory statements, the latest rainfall forecasts, and the flooding-potential forecasts from the NWS Middle Atlantic River Forecast Center. Three hours after Sandy made landfall, HPC took over the responsibility for issuing the public forecasts for the remaining hazards, including strong inland winds and heavy rainfall over a very large portion of the northeastern U.S. This was the strongest system HPC ever assumed responsibility for from the National Hurricane Center. One of the primary hazards that was included in the forecast (and is not often associated with storms of tropical origin) was heavy snowfall in the Appalachians!

HPC Hosted Senator Barbara Mikulski as Hurricane Sandy Approached - U.S. Senator Barbara Mikulski (Maryland) spent nearly an hour and a half visiting HPC and the fourth-floor operations area of the NOAA Center for Weather and Climate Prediction (NCWCP) on Sunday, October 28, as Hurricane Sandy approached the U.S. East Coast (Fig. 2). The purpose of her visit was to express her gratitude for the efforts of NWS forecasters. She emphasized the importance of the life-saving work the NWS and NOAA conduct each day. Senator Mikulski was joined by NOAA Administrator Dr. Jane Lubchenco.

HPC Expanded Medium-Range Guidance - In an effort to serve NWS Weather Forecast Offices (WFOs), River Forecast Centers (RFCs), and other HPC partners and customers better, on December 18, 2012, HPC added a nighttime issuance of medium-range (day three through seven) guidance. This guidance complements the daytime package, providing WFOs and RFCs around-the-clock medium-range guidance (grids, graphics, and discussions) for the contiguous U.S. This allows HPC customers more flexibility in using these products, which are now never more than 12 hours old.

HPC Extended Quantitative Precipitation Forecasts through Seven Days - At the requests of the NWS Western Region for the past couple of cool seasons, HPC extended quantitative precipitation forecasts (QPFs) to days 6 and 7 for the western U.S. once daily. In response to additional requests, HPC began producing 6-hourly QPFs for days six and seven year-round for the entire contiguous U.S. twice daily. These changes were implemented December 18, 2012. These products result in a complete set of QPFs to HPC partners and customers out 7 days.

HPC Increased Frequency of the Day 2 and Day 3 National Forecast Chart - At the request of the Department of Homeland Security (DHS), on January 21 HPC began providing the Day 2 and Day 3 versions of the National Forecast Chart on Saturday and Sunday. HPC had originally been asked to generate the charts Monday through Friday. The additional charts help support NWS briefings to DHS on weekends.

HPC Completed Backup Test with Storm Prediction Center (SPC) - HPC Senior Branch Forecaster Mike Eckert took advantage of his participation in the National Severe Weather Workshop at SPC to oversee a test of the QPF backup system. Mike worked with Israel Jirak of SPC to issue the afternoon's package of HPC QPF products from SPC on February 29. All forecasts were successfully issued. The twice-yearly test of the backup system is essential to assure continuity of service for HPC's precipitation forecasts in the event of an emergency.

GOES-R Proving Ground Activity Expanded - The GOES-R Proving Ground Activity expanded under the direction of Dr. Michael Folmer. Dr. Folmer interacted with operational forecasters and satellite analysts from HPC and several other centers to prepare them for new satellite-dependent products that will become available operationally following the launch of the GOES-R satellite series. The Proving Ground started evaluating the Red Green Blue (RGB) air-mass product during January 2012. This product provides additional value as a complement to current satellite imagery by identifying features such as stratospheric intrusions, potential vorticity anomalies, and baroclinic zones. HPC forecasters were also introduced to model-simulated satellite imagery and 1-minute-frequency 'super rapid scan' imagery during the year.

HPC Probabilistic Winter Precipitation Forecasts Become Operational - The HPC Probabilistic Winter Precipitation Forecasts became operational March 13, 2012. This expanded

suite of probabilistic graphical and gridded data is generated using the HPC Winter Weather Desk deterministic forecasts along with a model-based ensemble. Users can view the probability of exceeding multiple snow and ice accumulation thresholds over a variety of accumulation periods via a user-friendly web interface. Partner feedback has been overwhelmingly positive. This activity supports the goal of the HPC strategic plan to be a leader in probabilistic forecasting.

HPC Conducted National Training on the Winter Weather Desk - HPC partnered with the Warning Decision Training Branch (WDTB) to provide training to local WFOs on the HPC Winter Weather Desk (WWD). The purpose of the WWD is to provide guidance to serve as a catalyst for winter weather collaboration among NWS field offices. The training reviewed the forecast products and services available via the desk, the techniques used to generate the information, and forecast verification. Half (61) of all WFOs took the live training over the course of three separate sessions. The presentation was recorded and subsequently served as a resource for all forecast offices.

NHC Provided Training to HPC Forecasters - Dr. Richard Pasch, Hurricane Specialist from the NHC, visited HPC the week of September 17-21 to provide in-person hands-on training for HPC forecasters. The training was intended to strengthen HPC's ability to backup NHC if necessary. Several HPC forecasters spent an entire shift with Dr. Pasch preparing NHC products. Products for Tropical Storm Nadine were sent from HPC and were the official NWS forecasts for the system. This was a great opportunity for HPC forecasters to get some firsthand training from an experienced NHC forecaster.

Outreach, conferences, and visitors

HPC staff participated in 15 different conferences through the year. National conferences included the Annual Meeting of the American Meteorological Society, the Annual Meeting of the National Weather Association, and the Weather Analysis and Forecasting Conference. Staff also participated in regional conferences, such as the Great Lakes Operational Meteorology Workshop, Great Divide Workshop, and Southwest U.S. Workshop.

HPC was visited by several academic partners during the year, including Dr. Jim Steenburgh and Jonathan Rutz (University of Utah), Russ Schumacher and Charles Yost (Colorado State University), and Andrew Molthan (NASA).

Media activities

HPC forecasters were interviewed by numerous media outlets throughout the year, including radio, television, and the print media. For example, CNN Radio, National Public Radio, CBS Radio, Associated Press, Christian Science Monitor, Fox News, and 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, and José Gálvez provided many interviews in Spanish (Fig. 3). HPC, including the International Desks, was also highlighted by TV Globo Brazil, the most popular Brazilian TV network. The network special report highlighted how important NWS operations are to the welfare of the U.S. and similarly showed the importance of the Brazilian weather services.

Hydrometeorological Testbed

Hydrometeorological Testbed Conducted Second Annual Winter Weather Experiment -

The Hydrometeorological Testbed at the Hydrometeorological Prediction Center (HMT-HPC) hosted 21 forecasters, researchers, and model developers at its second annual Winter Weather Experiment from January 9 to February 10, 2012. This year's experiment focused on using ensemble systems to help quantify and communicate uncertainty in winter weather forecasts. The experiment featured a parallel version of the NCEP Short-range Ensemble Forecast System (SREF), a 10-member 4-km convection-allowing ensemble of the Air Force Weather Agency, and several new forecast diagnostics. During the experiment, participants issued experimental probability forecasts, wrote forecast confidence discussions, and subjectively evaluated the experimental ensemble guidance. The experiment also partnered with the University of North Carolina Institute for the Environment to create mock briefings to decision makers focused on the societal impacts of pending events. This activity helped identify effective ways to communicate the forecast uncertainty information provided by ensemble systems. The experiment also revealed several modeling issues which are being explored through continued collaboration with the Environmental Modeling Center (EMC) and other partners. The experiment continues to be a well-received focusing mechanism for advancing winter weather forecasts for the Nation.

HPC Conducted Prototype Testing of Mesoscale Precipitation Discussions: On May 16, through the facilitation of the HPC-HMT, HPC began preparing prototype Mesoscale Precipitation Discussions (MPDs) for the contiguous U.S. on a prototype basis. These discussions were modeled after the Mesoscale Convective Discussions (MCDs) prepared by the Storm Prediction Center, but with an emphasis on heavy rainfall rather than severe weather. HPC was asked by representatives of the NWS Regions to produce the discussions to assist WFOs and RFCs in identifying flash flood potential. The prototype testing offered the opportunity to gather feedback from these offices and develop technical and meteorological infrastructure before going operational in 2013. Feedback from the field offices was positive.

Hydrometeorological Testbed Conducted Atmospheric Rivers Experiment - HPC

collaborated with the OAR's Earth Systems Research Laboratory (ESRL) to conduct the Atmospheric Rivers Retrospective Forecast Experiment (ARRFEX) under the auspices of the HPC Hydrometeorological Testbed. The two-week experiment (September 17-28) focused on improving forecast performance for West Coast events involving atmospheric-river-induced heavy precipitation, and included forecasters from western U.S. forecast offices, research scientists from the University of Utah, model developers from EMC, and HPC forecasters (Fig. 4). Participants used both traditional and experimental guidance to create forecast products for eight retrospective events. Preliminary feedback showed the ESRL reforecast dataset and high-resolution ensemble were favored.

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 the years in residence at HPC – over 200 – and the extensive additional training International Desks Coordinator Mike Davison has provided at workshops

and international meetings, Mr. Davison and the HPC International Desks are well known in the meteorological services of the countries served. When weather events are likely to have a significant impact, Mr. Davison is frequently contacted by former students for his expertise. In addition, on many occasions he has been proactive in contacting foreign meteorological services to ensure they were aware of impending significant weather events.

Dr. José Gálvez Joined the International Desks - In February, the International Desks welcomed Dr. José Gálvez to the training instructor team. He received his Ph.D. from the University of Oklahoma, where he studied urban meteorology. After an initial familiarization period, José joined Mike Davison, HPC International Desks Coordinator, in the daily training activities of the students. In addition to this daily training, José started the development of operational techniques to enhance the training and improve forecasts issued by the Desks.

HPC Staff Led Two Intensive Training Workshops - Michel Davison led a teletraining workshop in April for the island nations of the Caribbean under the auspices of the Caribbean Institute of Meteorology and Hydrology (CIMH) in Barbados. The training attracted over 50 participants and included presentations on tropical waves, upper troughs, and boundary detection. The workshop enhanced CIMH's support to aviation interests and the general public. In June, Mike led a five-day in-residence training workshop in Mexico City, under the auspices of Servicio Meteorológico Nacional de Mexico (SNM). The workshop focused on extratropical and tropical weather phenomena affecting Mexico. Twenty-six students completed the 40-hour course. In addition, Mike participated in a week-long, WMO-sponsored training event in Peru for meteorological instructors, where he shared some of his experiences on distance learning.

Special Support for Hurricane Sandy - Four days prior to the formation of Sandy, the International Desks alerted the U.S. Agency for International Development (USAID) and the U.S. Southern Command on the potential risk for tropical-cyclone development across the Caribbean. As Sandy formed and evolved into Hurricane Sandy, the International Desks issued a high-confidence forecast of excessive rainfall amounts for Haiti and eastern Cuba. As the weather worsened, the International Desks provided twice-daily decision support updates to USAID and the U.S. Southern Command in support of their life-saving work. After the event, Dr. Ayse Sezin Tokar, Hydrometeorological Hazard Advisor with the Office of Foreign Disaster Assistance (OFDA), noted, "The information helped us to be prepared for potential U.S. government response and reduce potential impacts of Hurricane of Sandy. My team and I greatly appreciate Mike and Jose's timely and valuable information."

3. Training, Awards, and Certifications

Training

Several forecast staff completed the NWS Dual-Polarization training, in conjunction with the national upgrade of the radar network.

HPC 2012 Isaac Cline Local Award Winners:

Crystal Rickett – Program Management and Administrative Services

For providing the highest level of timely service and exceeding expectations. Effective weather services require efficient administrative support.

Keith Brill – Leadership

For leading the development and implementation of an extensive suite of operational probabilistic winter precipitation forecasts.

Chris Bailey – Meteorology

For creating techniques that used the forecaster's model choices and blended the respective gridded model output. This approach improved the accuracy and efficiency of the forecasts.

Mary Beth Gerhardt – Support Services

For major contributions to HPC operations in support of our Hydrometeorological Testbed (HMT), including web development for the Meteorological Watch Desk, Winter Weather Desk product archive, and MODE object-oriented verification.

Anthony Fracasso – Hydrometeorology

For developing tools that facilitate easier access to newer and more complex datasets, including creating an HPC internal web page for real-time display of individual members of ECMWF 50-member ensemble guidance through day 7 for both the contiguous U.S. and Alaskan areas.

4. HPC Staff and Contractors

The listing below reflects the HPC staff and contractors assigned as of December 31, 2012.

Front Office

James Hoke, Director
 Kevin McCarthy, Deputy Director
 Crystal Rickett, Administrative Officer
 Marsha Morstad, Secretary

Development and Training Branch

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

Forecast Operations Branch

Edwin Danaher, Branch Chief
 Senior Branch Forecasters: Brian Korty, Robert Oravec, Bruce Sullivan, and Bruce Terry.
 Forecasters: Richard Bann, Patrick Burke, James Cisco, Anthony Fracasso, Mary Beth Gerhardt, David Hamrick, Brian Hurley, Kenneth James, Paul Kocin, Mike Musher, Andrew Orrison, Richard Otto, Frank Pereira, Daniel Petersen, Robert Rausch, David Roth, Sean Ryan, Brendon Rubin-Oster, Michael Schichtel, Michael Vojtesak, and Paul Ziegenfelder.
 Surface Analysts: Amanda Fanning, Kwan-Yin Kong, Jason Krekeler, and Allison Monarski
 Meteorological Technician: William McReynolds, Jr.

Contractors

Faye Barthold and Thomas Workoff, Hydrometeorological Testbed Meteorologists
 José Gálvez, International Desks Instructor

Staffing Changes During 2012

Departures: Mike Eckert, Stephen Flood, Christopher Hedge, Rufus Jackson, Jr., Frank
 Rosenstein, and Michael Sowko

Arrivals: Patrick Burke, José Gálvez, Wallace Hogsett, Allison Monarski

Promotion to GS-13: Brendon Rubin-Oster

5. HPC Staff Publications in 2012

Clark, A.J., F.E., Barthold, M.J. Bodner, D.R. Novak, and Co-Authors, 2012: An Overview of
 the 2010 Hazardous Weather Testbed Experimental Forecast Program Spring
 Experiment. *Bull. Amer. Meteor. Soc.*, **93**, 55-74.
 doi: <http://dx.doi.org/10.1175/BAMS-D-11-00040.1>

Moore, B.J., Paul J. Neiman, F. Martin Ralph, and Faye E. Barthold, 2012: 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., **140**, 358–378.
 doi: <http://dx.doi.org/10.1175/MWR-D-11-00126.1>

Novak, D.R, and B.A. Colle, 2012: Diagnosing Snowband Predictability Using a Multimodel
 Ensemble System. *Wea. Forecasting*, **27**, 565–585.
 doi: <http://dx.doi.org/10.1175/WAF-D-11-00047.1>

White, A.B., K.F. Brill, and Co-Authors, 2012: NOAA's Rapid Response to the Howard A.
 Hanson Dam Flood Risk Management Crisis. *Bull. Amer. Meteor. Soc.*, **93**, 189–207.
 doi: <http://dx.doi.org/10.1175/BAMS-D-11-00103.1>

6. Photos



Fig. 1. The last operational crew turned out the lights on Sunday, August 19, at 19 UTC at the World Weather Building in Camp Springs, Maryland, ending nearly 40 years of United States meteorological history at the building. From left to right – Sean Ryan, David Hamrick (standing), Dustin Sheffler (NESDIS Satellite and Analysis Branch), Kevin McCarthy, Mike Musher, Mike Schichtel, Jim Cisco, and Patrick Burke. HPC began operations at the NOAA Center for Weather and Climate Prediction in College Park, Maryland, on August 17, 2012. (Photograph courtesy of Jim Cisco)



Fig. 2. (left to right) NOAA Administrator Jane Lubchenco, HPC forecaster Mike Schichtel (seated), U.S. Senator Barbara Mikulski, HPC forecaster Bruce Sullivan (foreground, seated), and HPC Director Jim Hoke discuss the forecast track of Sandy. (Photograph courtesy of Ed Danaher)



Fig. 3. Mike Davison on camera in an interview with Telemundo/Telenoticias.
(Photograph courtesy of Jana Goldman)



Fig. 4. HPC forecaster Rich Otto (background at workstation) leads participants (left to right) Ben Moore, Yan Luo, Victor Stegemiller, and Jonathan Rutz through the forecast during the Atmospheric Rivers Retrospective Forecast Experiment in the Collaboration Room at the NCWCP. (Photograph courtesy of Ellen Sukovich)