

Hydrometeorological Prediction Center 2011 Accomplishments Report

1. Introduction

The Hydrometeorological Prediction Center (HPC) made progress in many areas during 2011. A strategic plan was drafted outlining HPC's vision for the organization for the next five years. HPC was actively engaged in supporting the response of the National Oceanic and Atmospheric Administration (NOAA) to the Japan earthquake and nuclear radiation hazard. Several new products were introduced, including National Forecast Charts for days two and three, a Spanish-language version of the National Forecast Chart for day one, a chart showing the probability of freezing temperatures, and 6-hour precipitation forecasts for days four and five. In addition, improvements were made to the *Daily Weather Map* publication.

2. Major Accomplishments

HPC Provided Wind and Precipitation Forecasts in Support of NOAA Response to Japan Earthquake and Nuclear Radiation Hazard - On March 21, at the request of the Assistant to the President for Science and Technology and of the National Security Staff, HPC began providing them and a long list of others with wind and precipitation forecasts twice daily. The forecasts were derived from the Global Forecast System of the National Centers for Environmental Prediction (NCEP) and extended out 7 days at 6-hour intervals. The wind forecasts were at 100 foot intervals up to 1000 feet. These forecasts were provided for Tokyo and Fukushima, location of the crippled nuclear power plant. On March 31, the preparation of the products was streamlined and the frequency was increased to four times per day.

Draft of HPC Strategic Plan Completed - Following an intense 2-month effort involving HPC employees, stakeholders, and key National Weather Service (NWS) leadership, the first draft of the HPC Strategic Plan was completed on June 22. Developed at the recommendation of the review panel of the University Corporation for Atmospheric Research (UCAR) for HPC and with the encouragement of the NWS Director, the plan envisions HPC's role in future NWS operations.

HPC Improved Forecasts of East Coast Winter Storms with Winter Reconnaissance Flights - To improve the effectiveness of the Atlantic Reconnaissance Program for East Coast winter storms, HPC collaborated with NCEP's Environmental Modeling Center (EMC), NCEP Central Operations (NCO), and CARCAH (Chief, Aerial Reconnaissance Coordination, All Hurricanes) to revise flight tracks and apply a more objective targeting method. An objective methodology (Ensemble Transform Kalman Filter) is now applied to identify the optimal locations for additional observations, as is accomplished for the Pacific Winter Storms Reconnaissance Program. Additionally, Atlantic flight tracks were revised to allow six more dropsondes per flight (for a total of 10). The additional dropsondes are expected to make a larger impact in the numerical forecasts.

HPC Completed Backup Test with Storm Prediction Center (SPC) - HPC Senior Branch Forecaster Mike Eckert oversaw the test of the HPC Quantitative Precipitation Forecast (QPF) backup system at the SPC in Norman, Oklahoma. Mike worked with Israel Jarik of SPC to issue the afternoon's package of HPC QPF products from SPC on March 8. This backup of an essential HPC program is tested at least twice yearly.

HPC Spanish Version of National Forecast Chart Made Operational - On March 1, a Spanish-language version of the popular HPC chart depicting significant weather across the continental U.S. became operational. The chart depicts such weather as the threat of severe thunderstorms, snow storms, and flash flooding, as well as fronts and general weather expected for the day. The original (English version) chart is HPC's most popular web product with approximately 500,000 hits per day.

National Forecast Charts for Days 2 and 3 Became Operational - On June 6, the HPC began providing a version of the National Forecast Chart for day 2 (http://www.hpc.ncep.noaa.gov/national_forecast/natfcst.php?day=2), complementing the popular graphic depicting significant weather for day 1. The day 3 version of the chart was implemented on September 12. Both new charts were added to the HPC product suite at the request of the Department of Homeland Security.

HPC Forecasts of Probability of Freezing Temperatures Became Operational - On March 1, a chart showing the probability of freezing temperatures across the contiguous U.S. out seven days became operational. The chart is based on the official NWS temperature forecasts and the output from the NCEP Global Ensemble Forecast System. The product was requested by an NWS Weather Forecast Office in the Central Region. The chart is used for situational awareness and planning purposes by users within and outside the NWS.

HPC Made Improvements to the Daily Weather Map Publication - The Daily Weather Map (<http://www.hpc.ncep.noaa.gov/dwm/dwm.shtml>), the oldest publication of the NWS, having been published since January 1, 1871, received a facelift on January 3. The main chart showing weather conditions at the surface, which has been specially prepared since the inauguration of the publication, was replaced by a version of the operational map, while duplicating the look and presentation of the chart. This version provides customers with a more detailed map and can be produced using fewer staff resources. On June 20, the production of the Daily Weather Map was totally automated. At that time the remaining manually produced charts, the maximum and minimum temperature and 24-hour precipitation charts were also automated. While the look of the publication is unchanged, the content has been improved with more detail depicted in the surface and precipitation charts.

GOES-R Proving Ground Activity Begun at HPC - Dr. Michael Folmer of the University of Maryland Cooperative Institute for Climate Studies (CICS) began his tenure as the GOES-R satellite champion of the Ocean Prediction Center (OPC), National Environmental Satellite, Data, and Information Service (NESDIS), and HPC. He will lead the preparation of the three offices for GOES-R products and the improvement of the present use of geostationary satellite products.

HPC Forecasts of Precipitation in Six-hour Intervals for Days Four and Five Became Operational - On July 5, HPC forecasts for days 4 and 5 at six-hour intervals became operational. While HPC has long prepared rainfall forecasts for the 48-hour day 4-5 time period,

several River Forecast Centers (RFC) requested HPC provide the forecasts at six-hour intervals, as is done for days 1-3. By providing the forecasts in six-hour intervals, the HPC forecasts can be used in RFC river forecast models. They are also used for situational awareness and planning purposes within and outside the NWS.

HPC Inaugurated Storm Summaries for Excessive Heat – In early July, much of the country was gripped in a period of excessive heat stressing agriculture, livestock, and people. On July 15, at the request of NWS Headquarters, HPC began issuing daily storm summaries on the dangerous heat that was impacting much of the contiguous U.S. A daily, early morning summary of the maximum heat indices for the previous day was prepared for the duration of the event. The new storm summaries were well received by the media.

HPC Provided Briefing for Hurricane Irene Rainfall to FEMA - On August 25, the Federal Emergency Management Agency (FEMA) requested HPC participate in the Hurricane Liaison Team briefing to provide information on the rainfall associated with Hurricane Irene. Kevin McCarthy made the presentation, which was hosted by Department of Homeland Security Secretary Janet Napolitano and FEMA Director Craig Fugate. HPC highlighted the swath of heavy rain (10 to 12 inches) forecast to extend from eastern North Carolina up the East Coast and into New England. HPC received many accolades for its precipitation forecasts for Irene because of their accuracy in this life-threatening event.

HPC Conducted Backup Test of Hurricane Operations - On August 16 HPC backed up the National Hurricane Center (NHC) and issued all 15 UTC forecast products related to Tropical Storm Gert in the Atlantic. All forecasts were issued on time with no interruption of services to the users. HPC and NHC conduct these backup tests twice each hurricane season to ensure HPC systems and staff are prepared to step up in an emergency as the backup for the NHC.

HPC Initiated Quantitative Precipitation Forecasts through Day 7 for Western Region - On October 4 HPC began issuing QPF through Day 7 for the NWS Western Region in response to a request by the NWS Western Region Director. This very successful program was first initiated the previous winter (2010-2011) because of the unusually heavy precipitation in the region and the concern for flash flooding and major river flooding. The WFOs in the Western Region also found the product useful through the spring because of the flooding threat from the rapid melting of the heavy snow pack.

Outreach, conferences, and visitors

HPC Participated in National Aeronautics and Space Administration (NASA) Future Forum - NCEP was represented by Dr. David Novak at the 2011 NASA Future Forum, held at the University of Maryland on August 11. The forum brings NASA astronauts, scientists, and engineers together with local, state, and federal officials to discuss how space exploration benefits the economy and education. Maryland Congresswoman Donna F. Edwards and NASA Administrator Charles Bolden, Jr., headlined the event. Dr. Novak was invited as a panelist to discuss scientific discoveries, societal benefits of science, and the future of science in inspiring a new generation. He emphasized the NASA-NOAA collaboration on weather science and highlighted aspects of the NWS Strategic Plan, including the ongoing revolutions in probabilistic weather forecasting, earth system modeling, and decision support. The event was broadcast live on NASA TV and the internet, with live interaction via Twitter.

HPC Hosted Three Summer Interns - All three summer interns at HPC were participants in the NOAA Center for Atmospheric Sciences (NCAS) program. This program is a joint program between NOAA and Howard University. The program ran from June 13 to July 29.

Joe Puma was a rising senior and a weather enthusiast with a web page where he posts his daily weather forecasts for Chicago. He worked in the Hydrometeorological Testbed (HMT) at HPC helping to analyze some of the results from the Winter Weather Experiment. Mr. Puma plans to major in meteorology in college and become a weather forecaster.

William Davis was a graduate of DeMatha Catholic High School, where he was a member of the National Honor Society, and a scholar in the Howard University Upward Bound program. He started his studies at The Pennsylvania State University in the fall after his internship. Mr. Davis worked with Keith Brill on a project involving clustering of ensemble members.

Karimar Ledesma Maldonado was a student at the University of Puerto Rico at Mayagüez, where she had finished her freshman year in the Department of Industrial Engineering. During the summer of 2009 she had the opportunity to participate in the Puerto Rico Weather Camp, where she developed an interest in meteorology. Ms. Ledesma Maldonado worked with Mike Davison translating learning materials from Spanish into English.

HPC Fostered Visiting Forecaster Program with RFCs - In an ongoing effort to improve understanding between HPC meteorologists and RFC hydrologists, HPC led a forecaster exchange program with the RFCs. In 2011 three RFC visitors came to HPC and HPC sent two forecasters to the RFCs:

Victor Stegemiller of the Northwest River Forecast Center (NWRFC) to HPC
 Andy Wood of the Colorado Basic River Forecast Center (CBRFC) to HPC
 Jessica Smith of the Lower Mississippi River Forecast Center (LMRFC) to HPC
 Bob Kelly to the Ohio River Forecast Center (OHRFC)
 Mike Eckert to the Arkansas-Red Basin River Forecast Center (ABRFC)

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 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.

Hydrometeorological Testbed

HPC Inaugurates Winter Weather Experiment: The NOAA Hydrometeorological Testbed at HPC (HMT-HPC) inaugurated the Winter Weather Experiment on January 10. The experiment, modeled after the Hazardous Weather Testbed Spring Experiment in Norman, Oklahoma, brought forecasters, researchers, and modelers together in a simulated operational environment to evaluate new forecast techniques. Participants included forecasters from WFOs, HPC, and other NCEP service centers, as well as modelers from NCEP's Environmental Modeling Center and researchers from NOAA's laboratories. The vision of the experiment was that techniques deemed ready will be incorporated into forecast operations quickly, while techniques showing promise but needing further development will become a focus for the research community.

HPC Participated in the Hazardous Weather Testbed Spring Experiment – HPC once again actively participated in the Spring Experiment of the Storm Prediction Center (SPC) and the National Severe Storms Laboratory (NSSL). The experiment lasted five weeks in May and June. The experiment involves forecasters and researchers working together to evaluate new forecast techniques in a simulated operational environment. Participating HPC staff included Kenny James and Dan Petersen. Participants identified promising new techniques for forecasting rainfall, including the use of high-resolution numerical models.

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 weather analysis and forecasting. Because of the large number of forecasters trained 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.

HPC International Desks Coordinated with National Hurricane Center and Brazilian Officials on Formation of Subtropical Storm - On March 15, a rare subtropical storm developed off the coast of Brazil. On March 8, Michel Davison of the HPC International Desks began coordinating information concerning the formation of the storm with NHC and Brazilian weather officials. Daily coordination continued through the lifetime of the storm. On March 15, the Brazilian Navy's Marine Meteorological Service classified the system as Subtropical Storm Arani and issued a special warning. In addition to the marine impacts, coordination focused on heavy rains over portions of southeastern Brazil. Alaor Moacyr Dall'Antonia, Jr., the Coordinator General for Agrometeorology of the Instituto Nacional de Meteorologia (INMET), complemented Mr. Davison's contribution, stating "It was a pleasure to work together in this event. Thanks for the special products and very good discussions".

HPC Staff Led a One-week Workshop in El Salvador - On the request from Luis Garcia Guirola, Permanent Representative to the WMO from El Salvador, and the NWS International Activities Office, Michel Davison and Edwin Danaher conducted a training workshop on numerical weather prediction for the meteorological technicians and hydrologists of El Salvador's weather service (MARN). The 13 participants were exposed to diverse topics such as tropical waves, tropical upper tropospheric troughs, satellite interpretation, and quantitative precipitation forecasting. The workshop ran from July 17-22.

3. Training, Awards, and Certifications

NCEP 2011 Isaac Cline Regional Award Winner:

Alan Robson - *Support Services*

For exceptional support to HPC operations from product and tool development to troubleshooting problems with the generation and dissemination of products.

HPC 2011 Isaac Cline Local Award Winners:

Mike Musher, Andrew Orrison, Frank Pereira, and Bruce Sullivan – *Hydrometeorology*
HPC's QPF program set an outstanding standard the past winter and spring with accurate forecasts of several major precipitation events. Although the entire center has delivered accurate forecasts, these four forecasters specifically led the way with forecast accuracy, as determined by verification scores through Days 1, 2, and 3.

Robert Rausch – *Leadership*

Mr. Rausch has continuously shown solid leadership in HPC's forecast process. He heads the Model Diagnostic Program for HPC and on shift tirelessly keeps forecasters up to date on the behavior and consistency of the enormous suite of operational numerical models and the ensembles. He sets the example with his operational discussions, which are thorough and well-reasoned.

Steve Flood and Frank Rosenstein – *Meteorology*

Forecasters Flood and Rosenstein have consistently led the way with forecast discussions and forecast grids for days 3-7 identifying significant weather events. These forecasts have led into the short-term forecasts with such consistency that HPC has established a reputation for long lead times on significant events.

4. HPC Staff

The listing below reflects the HPC staff assigned as of December 31, 2011.

Front Office

James Hoke, Director

Kevin McCarthy, Deputy Director

Crystal Rickett, Administrative Officer

Marsha Morstad, Secretary

Development and Training Branch

David Novak, Branch Chief (acting) and 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 (acting)

Senior Branch Forecasters: Michael Eckert, Brian Korty, Robert Oravec, Bruce Sullivan, and Bruce Terry.

Forecasters: Richard Bann, James Cisco, Stephen Flood, Anthony Fracasso, Mary Beth Gerhardt, David Hamrick, Christopher Hedge, Brian Hurley, 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: Amanda Fanning, Kwan-Yin Kong, Jason Krekeler and Sean Ryan

Meteorological Technicians: Rufus Jackson, Jr., and William McReynolds, Jr.

Hydrometeorological Testbed – Faye Barthold and Thomas Workoff

Staffing Changes During 2011

Departures: Kathleen Collins, DeVerah Petersen, Michael Soltow

Arrivals: Amanda Fanning, Brian Hurley, Jason Krekeler

Promotions to GS-12: Mary Beth Gerhardt, David Hamrick

5. HPC Staff Publications in 2011

Barthold, Faye E., David A.R. Kristovich, 2011: Observations of the Cross-Lake Cloud and Snow Evolution in a Lake-Effect Snow Event. *Mon. Wea. Rev.*, **139**, 2386–2398.
doi: <http://dx.doi.org/10.1175/MWR-D-10-05001.1>

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. *Natl. Wea. Dig.*, **35**, 103-119.

Clark, A. J., F.E., Barthold, M.J. Bodner, D.R. Novak, and CoAuthors, 2011: An Overview of the 2010 Hazardous Weather Testbed Experimental Forecast Program Spring Experiment. *Bull. Amer. Meteor. Soc.*, **93**, 55-74.

6. Photos



Mike Davison and Ed Danaher lead a discussion during a workshop in El Salvador. (Photograph by Luis García, El Salvador Ministry of the Environment and Natural Resources [Ministerio de Medio Ambiente y Recursos Naturales, MARN])



Jim Hoke unveils the banner depicting some of the many functions of HPC. (Photograph by Ed Danaher)



Faye Barthold looks on as participants Steve Zubrick, Bruce Entwistle, and Frank Pereira discuss a forecast during the Winter Weather Experiment. (Photograph by David Novak)

HPC staff participates in a planning session that was an important step in creating the HPC Strategic Plan. Lynne Carbone was the facilitator. (Photograph by Jim Hoke)