

Weather Prediction Center 2014 Accomplishments Report

1. Introduction

The Weather Prediction Center (WPC) completed several milestones during 2014, including successful forecasts of major events, record collaboration and interaction with field offices regarding winter weather, and vigorous interactions with the applied science and international communities.

2. Major Accomplishments

WPC Forecasts Major events

The Southwest U.S. was hit with two major rainfall events during September. On the 8th-9th, moisture associated with former Hurricane Norbert resulted in heavy rainfall and flash flooding across the Southwest. Phoenix set an all-time calendar-day record rainfall on the 9th (3.29"). Widespread flash flooding occurred in the Phoenix metro area. Further north, flash flooding destroyed a 2 mile section of I-15 in Nevada (Fig. 1). Later, heavy rainfall from the remnants of Hurricane Odile, fell from the 17th-22th, resulting in widespread flash flooding, with debris flows and dozens of swift water rescues reported in New Mexico and Texas. In both cases, WPC predicted these events with significant lead time. In the Phoenix event, WPC provided a forecast of a 100 year rainfall event an amazing 6 days prior to the record rains. Further, there was excellent collaboration between WPC and NWS field offices, with several conference calls occurring, resulting in a well-collaborated NWS forecast and a consistent DSS message.

The season's first snowstorm in the northeast urban corridor occurred the day before Thanksgiving, and was well forecast and messaged. This was a high-stakes forecast occurring on one of the busiest travel days of the year in the most populated corridor of the nation. And of course, it was uncertain. Leading up to the event WPC and Eastern Region held collaboration calls to ensure a consistent forecast and message. The WPC Winter Weather Desk emphasized it would be a close call for the big cities, with the heaviest snow just to their west, and the new Winter Weather Watch Collaborator highlighted criteria would be met just inland. Advisories were issued near the big cities, with collaborated warnings just inland. The consistent forecasts and messaging was accurate, highlighting the power of an integrated field structure. NWS Director, Louis Uccellini commented, "I was more than impressed with how NCEP and Eastern Region worked the collaborative effort to bring about the coherent forecast and communication of the evolution of this event."

WPC Increases FEMA Interactions

WPC has become a monthly briefer for the high-profile national FEMA Headquarters daily briefing. This involvement speaks to the growing FEMA – WPC relationship in building a Weather-Ready Nation.

In terms of specific events, WPC partnered with the Storm Prediction Center to provide a special briefing to FEMA on Friday, April 25. The discussion focused on the severe weather outbreak expected over the coming weekend but WPC also discussed the likelihood of flooding with this

event. WPC worked with the NWS FEMA liaison over the weekend to highlight flooding over the eastern states after the weekend severe weather.

As a core partner, FEMA's feedback is critical to WPC. FEMA has long used the WPC-produced National Forecast Chart to raise situational awareness of hazardous weather. They requested a GIS format of this product to better integrate with their operations. Per FEMA request, on May 14th, WPC started providing a GIS format of the significant weather depicted on the Day 1, 2 and 3 National Forecast Charts. The data are publically available. The new format is expected to be used extensively by each Regional FEMA Watch Office, as well as in daily briefings to FEMA leadership.

Colloquium on Advances in Extratropical Cyclone Understanding and Prediction

On Wed 28 May, the OPC and WPC co-hosted a one day colloquium to reflect on the 1979 Presidents' Day snowstorm, the advances to our understanding and predictive capabilities as a result of an ensuing decade and a half of research and improvements, and to address future challenges. Dr. Louis Uccellini, Director of NWS, and Dr. Lance Bosart, Prof. from SUNY Albany anchored the group of twelve speakers from the research and operational communities.

Formal gatherings and associated time constraints often restrict the interaction and discussion between scientists; this event did allow for exchange and some discussion. Lunch was held in the conference center and was a rare opportunity for people to sit and talk informally. An impromptu discussion concerning the challenges of messaging, communication, and the social science aspects of communication was held with Dr. Uccellini and former TV Meteorologist and past President of the AMS Bob Ryan taking the lead. Talks were recorded so that the questions, observations, and comments will be available to a broader audience and on the web. The Ocean Prediction Center is strongly considering hosting an annual colloquium with the focus being aspects of maritime extratropical cyclones.

Winter Weather Desk Sets Collaboration and Training Records

The collaboration statistics from the 2013-14 Winter Weather Desk season have been compiled and show the most WPC-WFO collaboration since records started in 2009. There were 254 questions from WFOs via 12Planet chat, 63 telephone calls from WFOs, and 4 regional conference calls, involving a total of 33 WFOs. This collaboration supports the NWS strategic goal of an integrated field structure. WPC is looking to expand collaboration tools and processes to increase collaboration even further during the upcoming 2014-15 season.

The Weather Prediction Center's annual Winter Weather Desk training, facilitated by the Warning Decision Training Branch, appears to have set a record for the most participation by NWS offices. Among the three sessions there were 93 unique offices attending, including 84 WFOs. This is nearly 70% of all WFOs. The session was presented by Winter Weather Desk focal point, Dan Petersen, and covered collaboration resources, verification, and the probabilistic winter weather forecast suite. The session also highlighted the new Winter Weather Watch Collaborator as well as the prototype Day 4-7 Winter Weather Outlook. Both internal products are intended to aid WFOs to extend and improve winter storm forecasts. Through this training there is the potential for a very high impact on NWS performance.

WPC Hosts Meeting of Regional Service Division Chiefs on Winter Weather

On September 2-3, WPC hosted a meeting to discuss ways to improve the support of and collaboration between WPC and NWS regional and field offices in dealing with winter weather (Fig. 2). The first “WPC-Regional Winter Weather” meeting, brought members of WPC and EMC together with representatives from each of the four CONUS regional service centers. Two NWS portfolio managers attended the 2-day meeting (Andrew Stern-AFS and Ming Ji-STI). The frank and open discussion that occurred during the meeting has started the necessary WPC organizational culture change to achieve a fully-integrated field structure. The meeting resulted in the development of over a dozen actions/needs, which have been prioritized for further work, with 4 key issues that WPC has already committed to actively completing.

VIPs visit WPC

WPC hosted two key visitors during August. On August 5, Philip Duffy, Senior Advisor to the U.S. Global Change Research Program, visited the International Desks to understand the ongoing international capacity building efforts. He was joined by representatives from the White House's Office of Science and Technology Policy. On August 14, NOAA's new Chief Scientist, Dr. Rick Spinard, visited to understand NOAA's capabilities housed at the NCWCP. Dr. Spinard engaged in discussions with senior managers, forecast staff, and early-career scientists in the building. Both of these VIP visits highlight the intense interest in the activities of WPC and NCEP in general.

WPC Achieves Top 10 Publication Successes

During November, WPC simultaneously had two papers achieve status as the top ten most read AMS papers over the past year - one in *Monthly Weather Review* and another in *Weather and Forecasting*. The first was written by Keith Brill and is titled “[Revisiting an Old Concept: The Gradient Wind](#).” The second was coauthored by several WPC staff and is titled, “[Precipitation and Temperature Forecast Performance at the Weather Prediction Center](#).” These two AMS journals publish ~400 articles per year. Thus, it is rare for an organization to achieve a top-ten article, and exceedingly rare to have two top-ten articles at the same time. This speaks to the intense community interest in the work of WPC and associated forecasting topics.

A New Precipitation Verification Resource

Through the collaborative efforts of the Hydrometeorological Testbed at WPC (HMT-WPC) and the Developmental Testbed Center, an object-oriented precipitation verification resource is now available on WPC's public webpage:

<http://www.wpc.ncep.noaa.gov/verification/mode/mode.php>. The website displays both graphical and statistical comparisons of 24 hr precipitation forecasts and is updated daily. Object-oriented verification methods evaluate forecast quality in a manner similar to a forecaster completing a subjective forecast evaluation. The pursuit of such innovative verification approaches is encouraged by NCEP's UCAR Review Committee.

Outreach, conferences, and visitors

WPC staff participated in 16 different conferences through the year, including the Annual Meeting of the American Meteorological Society, the Annual Meeting of the National Weather Association, the Flash Flood Summit, the Great Lakes Operational Meteorology Workshop, the NOAA Satellite Conference, and the NOAA Testbeds Meeting, among others.

In addition to the above congressional visitors and media visits below, the WPC hosted more than 30 tours through the Center in 2014.

In December, the Weather Prediction Center (WPC) achieved 100,000 followers on Facebook, making it the 3rd NCEP Center to reach this milestone. This milestone represents creative work by the WPC Social Media Team to expand WPC's reach. For example, besides providing several posts per day on national weather forecasts, WPC held a winter weather town hall. Further, interviews of WPC forecasters have been conducted and posted. This expansion into social media is another way WPC stays engaged with the public to support a Weather-Ready Nation.

Media activities

WPC 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 WPC for live or taped interviews on a number of occasions (Fig. 3).

In March, Dave Novak, Acting Deputy Director, Joe Dellicarpini (SOO at WFO Taunton), and Steve Zubrick (SOO at WFO Sterling) were featured guests on Bill Murray's 'Weather Brains' internet weather show. The live show featured discussion of the new winter weather probabilistic suite of products that was piloted at Sterling and Taunton during the 13-14 season. This event provided national exposure to this project, which was expanded during the 14-15 season.

Mike Davison, WPC International Desks Coordinator, and José Gálvez provided numerous interviews in Spanish.

Hydrometeorological Testbed

HMT-WPC Completes Fourth Annual Winter Weather Experiment

The Hydrometeorological Testbed at the Weather Prediction Center (HMT-WPC) hosted 23 on site forecasters, researchers, and model developers at its third annual Winter Weather Experiment from January 21 - February 21, 2014. For the first time remote participation was accomplish for 13 forecasters from selected offices. The focus of the experiment was the continued exploration of micro-physics based snowfall forecasting methods, along with a first time look at the coupling of NAM micro-physics with the Noah Land Surface Model to generate snowfall accumulation forecasts. Another first in this year's experiment was the exploration of medium range probabilistic winter weather forecasts. Participants evaluated several medium range guidance data sets, and generated Day 4-7 forecasts each day. The experiment continues to be a well-received focusing mechanism for advancing winter weather forecasts for the Nation.

HMT-WPC Hosts 2nd Annual Flash Flood and Intense Rainfall Experiment

The Hydrometeorological Testbed at the Weather Prediction Center (HMT-WPC) hosted its second annual Flash Flood and Intense Rainfall Experiment (FFaIR) from July 7-25, 2014 (Fig. 4). As part of the experiment, 23 participants from across the weather enterprise explored proposed changes to the definition of WPC's Excessive Rainfall Outlook and evaluated the utility of convection-allowing models and ensembles for short term flash flood forecasts. This activity aims to improve flash flood prediction and services, and supports the NWS's strategic goal of an integrated field structure.

International Desks

The WPC International Desks is a program for training meteorologists from South, Central, and Caribbean America in the techniques of weather analysis and forecasting. The WPC International Desks are well known in the meteorological services of the countries served. When weather events are likely to have a significant impact, the Desks are frequently contacted by former students. In addition, on many occasions the Desks have been proactive in contacting foreign meteorological services to ensure they were aware of impending significant weather events.

WPC International Desks Highlighted By the President

On the 23rd, the President, speaking before a UN Climate Summit in New York City, announced several initiatives to build climate change resilience. One NCEP-relative initiative is focused on *'Equipping Meteorologists in Developing National with the Latest Tools and Knowledge'* on climate change. Specifically, the White House directed NOAA to “...*significantly expand the reach of its highly successful international “Training Desk” program, which brings developing-country meteorologists to the United States for state-of-the-art training and education*”. This direct reference to WPC and CPC International Training Desks highlights the important work accomplished ([full press release](#)).

WPC International Desk Unveils the Galvez-Davison Index

On Tuesday March 11, after two years of research and development, the WPC introduced the Galvez-Davison Index for Convective Instability (GDI) for field testing. The index was developed by Dr. Jose Galvez, WPC Contractor, as an aid to accurately forecast the potential for convective precipitation events in the Tropics. The index provides substantial improved skill in the Tropics relative to traditional indices, such as the K-index. Numerous groups have been trained on the use of the GDI, including NCEP Centers, the San Juan Forecast Office, the USAF Weather Agency, as well as WMO Region-III and Region-IV members. The experimental GDI guidance is available in real-time at: <http://www.wpc.ncep.noaa.gov/international/gdi/>. This innovation represents a successful research to operations project of benefit to the international community.

Improving Access to GFS Data for International Users

The International Desks at NOAA have developed a set of programs to ease the download and processing of GFS model data. Instead of downloading GFS-1-degree data from the whole globe, the programs developed extract 0.5-degree-GFS grib data for specific sectors of the Americas, download the data from the NCEP NOMADS server, and convert them to Wingrids3.2 format. The new grib files could also be used to initialize regional models. As a result, users are able to save disk space, accelerate download times, accelerate processing times and improve horizontal resolution simultaneously. More information is available at:

http://www.wpc.ncep.noaa.gov/international/gfs_sector_data/

WPC Conducts Training Workshop in Paraguay

As part of the WPC International Desks' support to South America, Dr. Jose Galvez, Researcher and Assistant to the Coordinator, conducted a Workshop on Severe Weather Forecasting Techniques in Asuncion, Paraguay during the week of December 15-19 (Fig. 5). The workshop took place at the main Weather Service Office and included the participation of 25 meteorologists. Aside from covering theoretical concepts, the workshop focused on a thorough

analysis of six case studies of severe weather events that ranged from strong straight line winds, hail and tornadoes, to severe flash flooding. The outcome was very successful and included the identification of new important predictors for different types of severe convection in Paraguay. The successful workshop highlights NWS' continuing commitment to build improved weather forecasting capabilities on the South American continent

3. Training, Awards, and Certifications

WPC 2014 Isaac Cline Local Award Winners

Tony Fracasso - Meteorology

For proactive and innovative ensemble application development.

Mike Bodner - Hydrometeorology

For leading the technical development and implementation of a new extended-range winter weather product.

Alan Robson - Support Services

For leading the implementation and ongoing enhancement of Meteorological Watch Desk tools.

Crystal Rickett - Program Management/Administration

For incredible dedication and talent in simultaneously coordinating with WFMO on several vacancies, and assisting management in formulating new budgets for a historic budget transition.

David Novak - Leadership

For leading WPC through a time of challenge and change.

4. WPC Staff and Contractors

The listing below reflects the WPC staff and contractors assigned as of December 31, 2014.

Front Office

David Novak, Director

Kathryn Gilbert, Acting Deputy Director

Crystal Rickett, Administrative Officer

Development and Training Branch

David Novak, Acting Branch Chief

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: Robert Oravec, Bruce Sullivan, Bruce Terry, and Brian Hurley

Forecasters: Richard Bann, Patrick Burke, James Cisco, Anthony Fracasso, Mary Beth Gerhardt, David Hamrick, 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 2014

Departures: Kevin McCarthy (retirement)
 Brian Korty (retirement)
 Marsha Morstad
 Wallace Hogsett

Arrivals: None

Promotions: None

5. WPC Staff Publications in 2014

Baxter, M. A., G. M. Lackmann, K. M. Mahoney, T. E. Workoff, T. M. Hamill, 2014: Verification of quantitative precipitation reforecasts over the southeastern united states. *Wea. Forecasting*, **29**, 1199-1207.

Brill, K. F., 2014: Revisiting an old concept: The gradient wind, *Mon. Wea. Rev.*, **142**, 1460-1471.

Novak, D. R., C. Bailey, K. F. Brill, P. Burke, W. A. Hogsett, R. Rausch, and M. Schichtel, 2014: Precipitation and temperature forecast performance at the weather prediction center. *Wea. Forecasting*, **29**, 489-504.

Novak, D. R., K. F. Brill, and W. A. Hogsett, 2014: Using percentiles to communicate snowfall uncertainty. *Wea. Forecasting*, **29**, 1259-1265.

Sukovich, E. M., F. M. Ralph, F. E. Barthold, D. W. Reynolds, and D. R. Novak, 2014: Extreme quantitative precipitation forecast performance at the weather prediction center from 2001 to 2011. *Wea. Forecasting*, **29**, 894-911.

6. Photos



Fig. 1. (left) Mesoscale Precipitation Discussion issued just hours prior to (right) a severe flash flood on I5 in southern Nevada (from media sources).



Fig. 2. Acting Director, David Novak (standing), kicks off the Winter Weather Services meeting among an audience of principals from local field offices, Regional and National Headquarters, and NCEP



Fig. 3 Senior Branch Forecaster, Brian Hurley, provides a taped interview to the Japan Broadcasting Corporation regarding the “polar vortex” and associated harsh winter conditions over the United States.



Fig. 4. WPC forecasters Andrew Orrison (standing) and Patrick Burk (sitting) discussion new datasets at the Flash Flood and Intense Rainfall Experiment.



Fig. 5. Group during the Friday morning Workshop session held at the Paraguay Forecast Office. Dr. Jose Galvez (front right) lead the workshop.



Fig. 6. Long-time Senior Branch Forecaster, Brian Korty (yellow shirt) with over two generations of fellow Senior Branch Forecasters at Brian Korty's retirement party.