

NCEP Quarterly Newsletter - November 2015

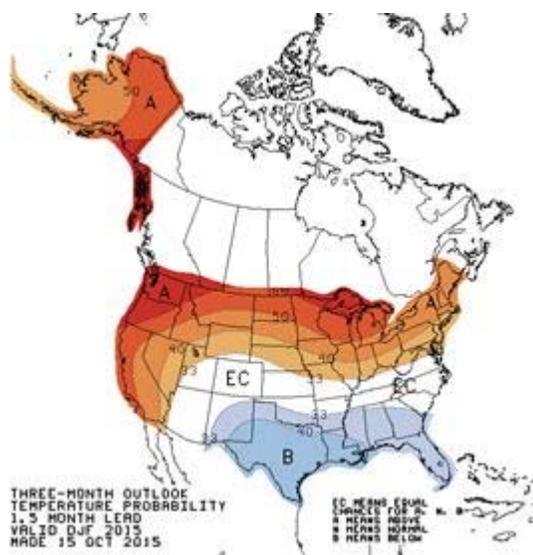
Climate Prediction Center Issues 2015-16 Winter Outlook

The [Climate Prediction Center](#) issued the Winter Outlook for December 2015 – February 2016 via a press teleconference and press release on October 15, 2015. The temperature outlook favors a warmer-than-normal winter over Alaska, much of Hawaii, the Western United States, and across the northern half of the contiguous U. S., while below-normal temperatures are favored across much of the south-central and southeastern regions. The winter precipitation outlook favors wetter-than-normal conditions across the southern tier of the nation extending northward along the East Coast, as well as in southeastern Alaska, and drier-than-normal conditions in western and central Alaska, Hawaii, parts of the Pacific Northwest and northern Rockies and around the Great Lakes and Ohio Valley. Probabilities are quite high this year across parts of the country—particularly for precipitation in the Southeast, where the chance of a wetter-than-normal winter exceeds 70% for much of Florida.

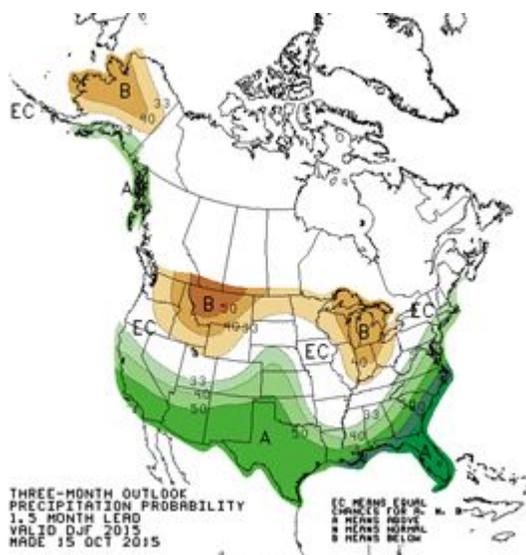
The drought outlook shows some improvement is likely in central and southern California by the end of January, but not drought removal. Additional statewide relief is possible during February and March, but one season of above-average rain and snow is unlikely to erase four years of drought. Drought removal is likely across large parts of the Southwest, while improvement or removal is also likely in the southern Plains. However, drought is likely to persist in the Pacific NW and northern Rockies, with drought development likely in Hawaii, parts of the northern Plains and in the northern Great Lakes region.

The press release with a link to a winter outlook video can be found here:

<http://www.noaaweather.com/stories/2015/10/15/15-noaa-strong-el-nino-sets-the-stage-for-2015-2016-winter-weather.html>



Three-Month Outlook Temperature Probability



Three-Month Outlook Precipitation Probability

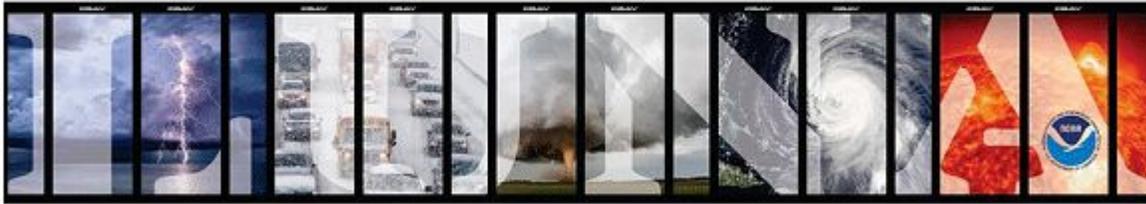
Status of the Next WCOSS Upgrade

Through the execution of Task Order 04, IBM is in the process of implementing a major service pack upgrade to the existing Weather and Climate Operational Supercomputing System ([WCOSS](#)). The upgrade consists of software and firmware improvements to enhance overall system performance with IBM also testing new software to improve the shared storage capability for users.

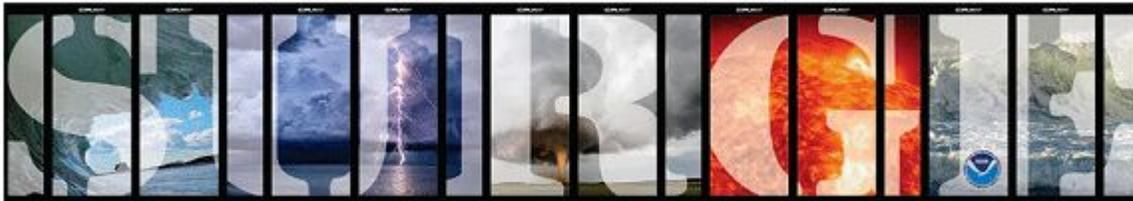
During the last three months, IBM completed a major service pack upgrade to the [WCOSS](#) Tide and Gyre systems in Reston, VA and Orlando, FL, respectively. The upgrade consisted of software and firmware improvements to enhance overall system performance. On September 29, the new CRAY system, LUNA, in Reston, VA, was

formally accepted. In parallel, the site installation and customization of the new Cray system, SURGE, in Orlando, FL, was completed. By November 2015, the combined IBM/Cray systems will be operating with 2.8 PFlops, 3748 Nodes, 84,512 Cores, and 8.124 PB of storage.

Reston: IBM System – Tide / Cray System – Luna



Orlando: IBM System – Gyre / Cray System - Surge

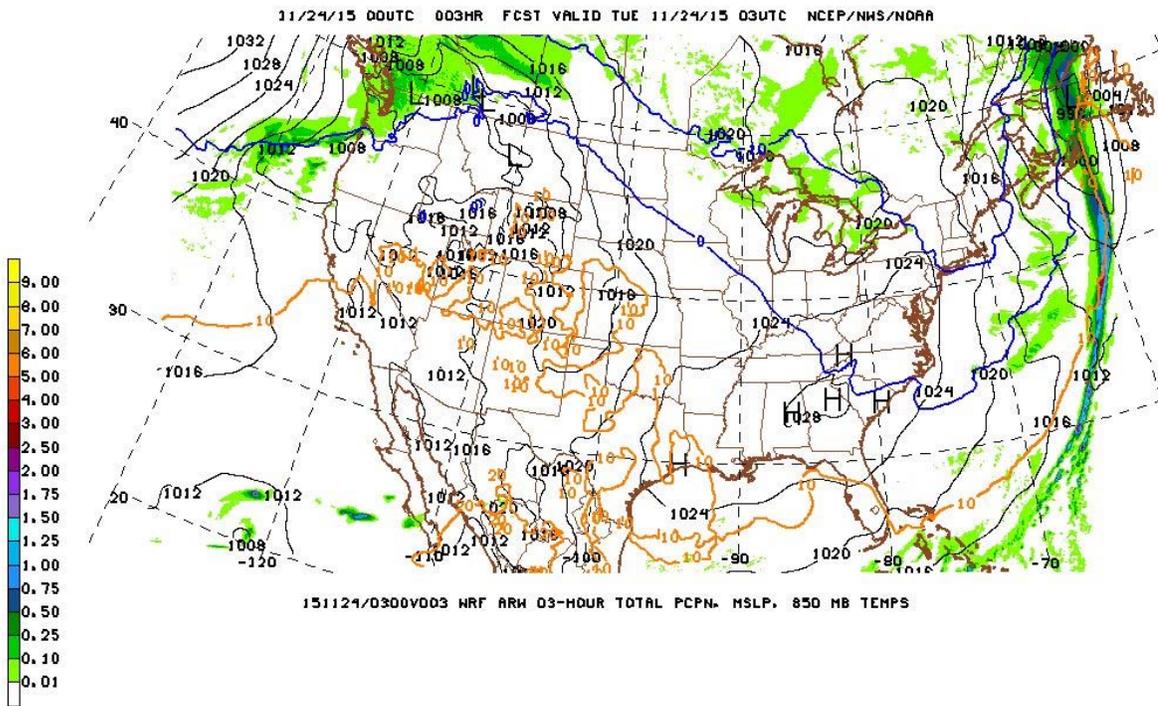


The Cray Systems will include graphics on the front panels of the systems as shown in these two images.

Image of the graphical front panels on the Cray systems

High-Resolution Window Forecast System (HIRESW) Model Upgrade

On Tuesday, September 8, 2015, 1200 UTC, [NCEP](#) upgraded the High-Resolution Window (HIRESW) Forecast System. The HIRESW is a regional, high-resolution forecast system that makes forecasts over the U.S. (including Alaska, Hawaii, Puerto Rico, and Guam) out to 48 hours, with a focus on severe weather forecasting. It has two model components, the Nonhydrostatic Multiscale Model on B-grid (NMMB) and the Advanced Research Weather Research and Forecasting (ARW) model. In this upgrade, both model components were upgraded to newer computer codes, the number of vertical levels in both components was increased from 40 to 50, and changes were made to the ARW model to improve model-simulated radar echo top height used in aviation forecasting. A new High-Resolution Ensemble Forecast (HREF) set of products also were introduced with the HIRESW upgrade. The HREF uses the three most recent HIRESW model runs and the five most recent North American Mesoscale model nest runs to create an 11 member time-lagged ensemble. This initial HREF configuration covers the CONUS, and products are generated every 6 hours (00, 06, 12, 18Z). Mean, spread, and probability products are produced at a 3 hour forecast interval out to 36 hours.



Graphic of ARW HIRESW for 11/24/2015 00UTC 03-Hour Total PCPN

CPC Begins Issuing Experimental Week 3-4 Temperature and Precipitation Outlooks

During September 2015, the [Climate Prediction Center \(CPC\)](#) began issuing experimental temperature and precipitation outlooks for the Week 3-4 time period. The experimental product are two categories outlooks (above- or below-average) where shading depicts the favored category, either above-average (A) or below-average (B) for 2-week mean temperature or 2-week total accumulated precipitation along with a text prognostic map discussion explaining the rationale behind the outlook. The product is released once per week currently on Friday's at approximately 3 PM. The solid contour lines show the probability (>50%) of this more likely category (above or below). In areas where the likelihoods of 2-week mean temperature or 2-week total accumulated precipitation amounts are similar to climatological probabilities and a category cannot be favored, equal chances (EC; 50% probability for each category) is indicated.

This experimental product seeks to close the gap in the [NWS](#) seamless suite of outlooks between [CPC's](#) Week-2 and 1-month outlook periods. The objective of the outlook is to provide advance notice of potential temperature and precipitation pattern changes to further assist decision makers in weather and climate sensitive activities in their decisions. The audience for this experimental product includes (1) the [NWS](#) local and regional field structure, (2) local, state, regional and national government entities (emergency management and planning), (3) the private sector (energy, water resource management, financial, etc. industries) and (4) the general public, among others.

The product is available at the following web site:
<http://www.cpc.ncep.noaa.gov/products/predictions/WK34/>

The figure below illustrates the first experimental outlook released on September 18, 2015.

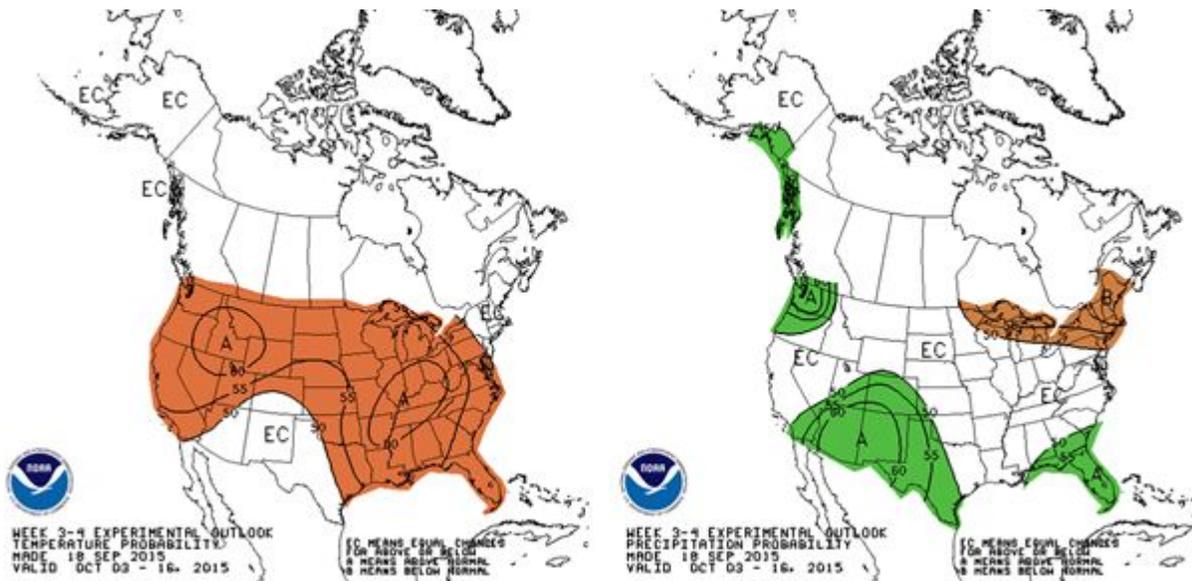


Image of the first experimental outlook released on September 18, 2015

Service Center Activities

Some Assembly Required as GOES-R Dishes Arrive at NHC

Crews at the [National Hurricane Center](#) were busy in the hot and humid days of early August assembling three large satellite dishes as [NHC](#) gets ready for the [GOES-R](#) (Geostationary Operational Environmental Satellites – R Series). [NHC](#) is one of a handful of receiving sites across the country preparing to receive the data from the [GOES-R](#) satellites, the first of which is scheduled for launch in late 2016.

[GOES-R](#) will make available 34 meteorological, solar and space weather products, providing significant improvements in the detection and observations of environmental phenomena that directly affect public safety, protection of property and our nation's economic health and prosperity.



Photo of the GOES-R dish assemblies

WPC Hosts the Flash Flood and Intense Rainfall Experiment

During the three weeks from July 6 to July 24, 2015, the Hydrometeorological Testbed at the [Weather Prediction](#)

Center (WPC-HMT) hosted the third annual Flash Flood and Intense Rainfall (FFaIR) Experiment. In an effort to support improvements to WPC's operational Excessive Rainfall Outlook (ERO) and explore the utility and accuracy of shorter, 6-hourly probability of flash flood forecasts, the FFaIR Experiment brought together 24 participants from the forecast, research, and modeling communities to investigate methods for improving flash flood forecasting in both the near term (0-6 hour) and short range (Day 1) forecast periods. The WPC-HMT collaborated in tandem with the Norman Hydrometeorology Testbed (HMT-Hydro) with the common goal of improving the forecasting of flash floods.

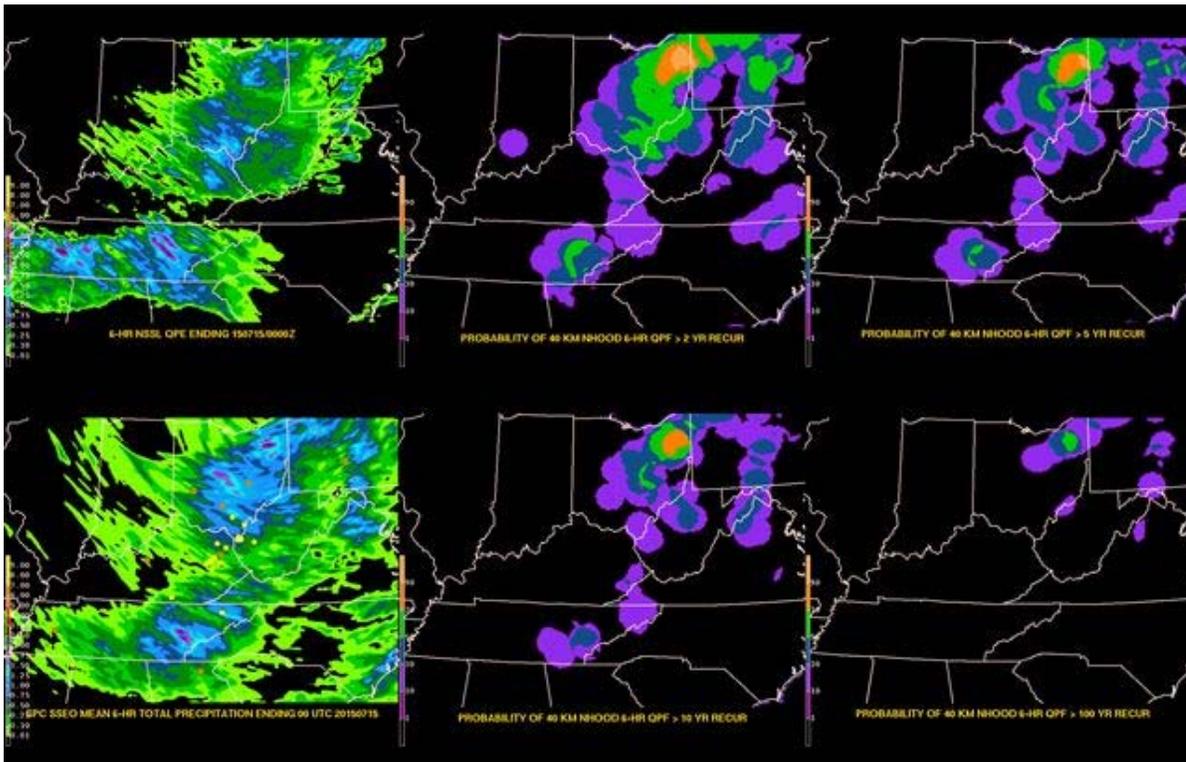
The goals of the 2015 Flash Flood and Intense Rainfall Experiment were to:

- Evaluate ways to maximize the utility of high resolution convection-allowing models and ensembles for short-term flash flood forecasts.
- Identify the most effective forms and proper usage of available hydrologic and climatological guidance for the prediction of flash floods.
- Explore proposed changes to WPC's operational Excessive Rainfall Outlook by evaluating the utility of probabilistic flash flood forecasts for Day 1.
- Explore ways to improve WPC's Mesoscale Precipitation Discussion (MPD) by evaluating the utility of 6-hourly forecasts.
- Enhance cross-testbed collaboration as well as collaboration between the operational forecasting, research, and academic communities on the forecast challenges associated with short-term flash flood forecasting.

This year's experiment focused on the use of convection-allowing models and ensembles in the flash flood forecast process. For example, the neighborhood probability of QPF exceeding Flash Flood Guidance again proved to be a useful forecast tool. This year the neighborhood probability of QPF > Recurrence Intervals also gained high praise for its contribution to the flash flood forecast process. Such examples are shown below from one of the experimental high resolution ensembles. The probabilistic fields of QPF greater than pre-determined rainfall thresholds from high resolution ensembles gave forecasters to more confidence when building a probabilistic excessive rainfall forecast.

These tools are helping inform a redefinition of WPC's Excessive Rainfall Outlook. The experiment tested used a definition of the product as the probability of a flash flood within 40 km of a point. This aligns the product with the analogous SPC Severe Weather Convective Outlook. The redefined product was shown to be well calibrated and has sufficient skill to be tested experimentally in a parallel operational environment over the 2016 warm season.

These results among many others show how the community is attacking the difficult flash flood problem. A final experiment report is provided at: http://www.wpc.ncep.noaa.gov/hmt/2015_FFaIR_Final_Report.pdf



Participants used this display to subjectively rank the value of the Recurrence Intervals. On this particular day, 3 flood related fatalities were reported in eastern Kentucky. (a) Observed rainfall, (b) Ensemble 6-hr mean rainfall forecast and flash flooding reports, (c) ensemble probability of exceeding 2-year Recurrence Intervals, (d) 5-year Recurrence Interval, (e) 10-year Recurrence Interval, and (f) 100-year Recurrence Interval

NOAA and AWC Fly High at EAA Airventure

The annual [EAA](#) AirVenture - colloquially known as "[EAA](#) Oshkosh" or simply "Oshkosh" - is the largest air show in North America, and also happens to be the largest outreach event for [NOAA](#). This year's attendance topped 550,000, a two percent increase over 2014! The fly-in ran from July 20-26.

[AWC](#) and [NOAA](#) presence at Oshkosh was markedly improved this year, with a fresh new look and open exhibit area, better graphics and more hands-on displays that received raves from both visitors and other members of the International Federal Partnership, or IFP, which runs AirVenture's Federal Pavilion, one of the highest attended venues at the event. Ed Holicky, a Senior Aviation Meteorologist at [AWC](#), led the effort, bringing in specialists from [AWC](#), the Aviation and Space Weather Services Branch at [NWS](#) headquarters, the Center Weather Service Unit in Chicago, and WFOs Green Bay and Milwaukee. [AWC](#) showcased the continued advancements being made in aviation weather forecasting, while Greg Romano from the [NWS](#) Office of Communications and others explained what becoming a Weather-Ready Nation is all about to non-aviation audiences.

A key highlight of the week was a visit by [NOAA](#) Administrator Dr. Kathryn Sullivan. Sullivan, a private pilot, flew her plane to the event. While there, she participated in a number of events to highlight the work the [NWS](#) is doing to evolve its operations to build a Weather-Ready Nation. In addition, she spoke at a luncheon forum for more than 650 female aviation enthusiasts about pursuing their dreams in the air and in space. [EAA](#) noted that Sullivan is the very first Federal agency head to fly her own airplane to Oshkosh...and the event has been held there for 45 years!

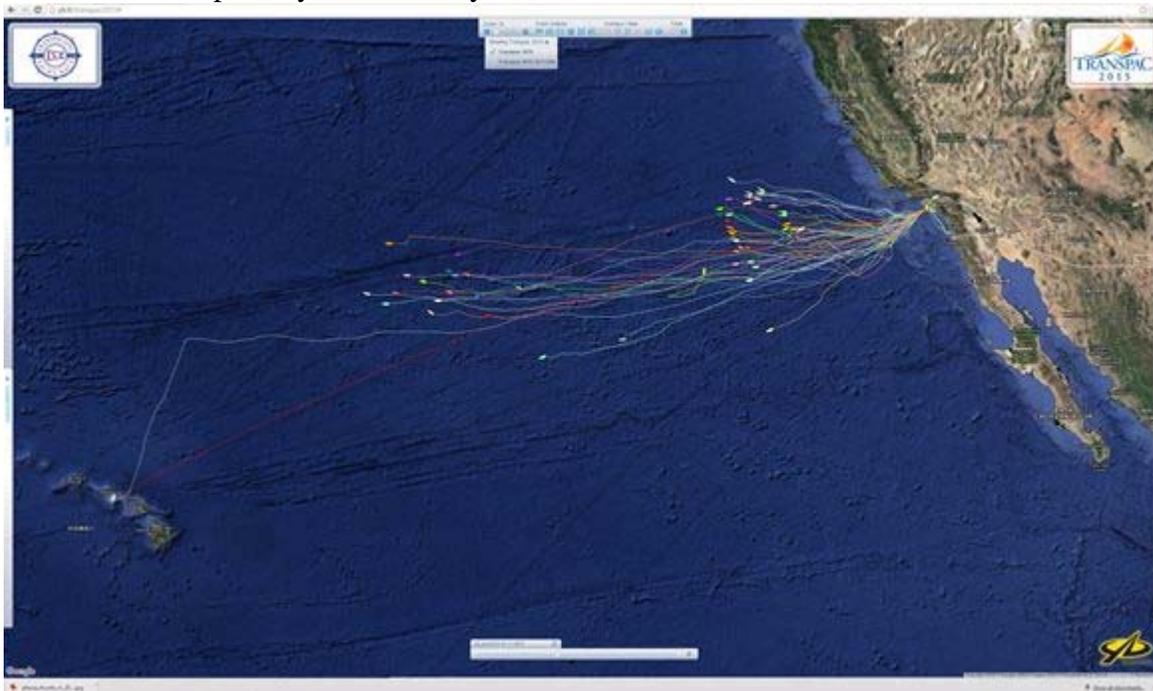
Another big Oshkosh draw was [NOAA](#)'s Beechcraft King Air 350 coastal mapping and emergency response aircraft on static display in one of the most centrally-located area of the show grounds. Parked alongside historic and world-renowned aircraft such as the iconic B-17 and B-29 World War II bombers, modern F-22 and F35 fighters, and Airbus's brand new A250 airliner, the King Air attracted thousands of visitors interested in learning more about how this aircraft -- and Unmanned Aircraft Systems showcased in the Pavilion -- support [NOAA](#)'s research and operational missions.



NOAA and other federal participants outside the EAA AirVenture Federal Pavilion

Transpac Race - Weather Safety Briefing

Acting Director Joseph Sienkiewicz represented [NOAA/NWS](#) at the Skipper's Meeting for the Transpac Race in Long Beach, CA over the July 11th weekend. The sailing race was from San Pedro, CA to Honolulu, HI and covered 2225 nautical miles over a period of one to two weeks. 61 boats and 520 people participated in the race. Joe shared information from the following [NWS](#) offices and centers: WFOs Oxnard and Honolulu, [OPC](#), [CPC](#), [NHC TAFB](#), [NHC](#), and [CPHC](#). The [Climate Prediction Center](#) provided information concerning the weakening of the trades in the strengthening El Niño and insight into the eastward migrating Madden Julian Oscillation and potential for increased tropical cyclone activity in the eastern Pacific.



Track of vessels engaged in Transpac race from San Pedro, CA to Honolulu



© Doug Gifford / Ultimate Sailing
Acting OPC Director Joe Sienkiewicz briefing the race participants concerning the conditions along the course from CA to Hawaii

OPC Provides Arctic Decision Support Services for High Visibility Shell - Chukchi Sea Exploration Plan

Shell Oil, embarked on its Chukchi Sea Exploration Plan, assessing opportunities to explore oil and gas resources. Shell's effort has high visibility in part due to the national debate over Arctic drilling and earlier efforts in 2012 that resulted in the grounding and wreck of the Kulluk drilling platform on return transit. Alaska Region has been producing twice-weekly decision support briefings for the Bureau of Ocean Energy Management (BOEM) using OPC products and services, and to further aid decision support OPC began issuing a twice-weekly 72-hour Arctic forecast July 29. This 72-hour forecast will continue through November and will aid in providing a more complete picture of potential Arctic weather hazards for improved situational awareness. The Acting Chief of Alaska Region's Environmental and Scientific Services Division wrote to the OPC Acting Branch Chief, "Thanks again to...everyone at OPC who made this possible! This will be very helpful."



96 hour OPC forecast for Arctic areas valid 1200 UTC 27 August 2015 with GALE force winds predicted for the Chukchi Sea area

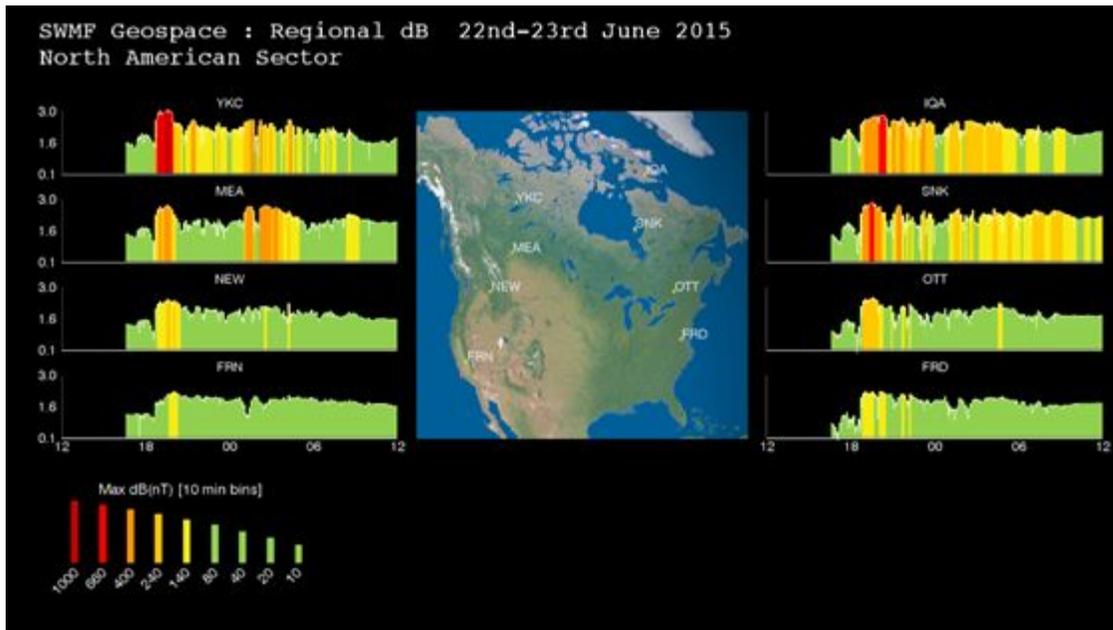
Hand-off of the Geospace Model to NCO

On 29 September, scientists and developers at the [NOAA Space Weather Prediction Center](#) completed initial development and testing of the Space Weather Modeling Framework Geospace model in preparation for transition to operations. The model was handed off to [NCEP Central Operations](#) who will take this model the final step to fully operational status. The current schedule has the model in operations by the end of 2015.

The introduction of the Geospace model into operations was instigated by the needs of the electric power industry who requesting regional specification and forecasts of the space weather conditions that affected their electric power transmission and distribution systems. Electric power lines and transformers are susceptible to unwanted electric currents that stem from the interaction between the auroral currents in the magnetosphere and ionosphere and currents induced in the ground near the power line. There is potential for severe impact on the electric power grid from these induced currents.

The Geospace model transition-to-operations culminates extensive work and development by a number of institutions and agencies. The model was developed for scientific research at the University of Michigan using funding from [NASA](#) and [NSF](#). The [NASA/Goddard Community Coordinated Modeling Center](#), in collaboration with [NOAA](#), compared the Michigan Geospace model, along with four other models, to identify which performed the best and was best suited for transition to operations. In December 2013, the Michigan Geospace model was selected and the computer code was provided to [NOAA/SWPC](#) for further development. Researchers and developers at the Space Weather Prediction Testbed (SWPT) worked with University of Michigan scientists to modify the Geospace model to run in real-time and accept real-time solar wind and space weather data. SWPT developers also began to develop output products to be used by customers such as those in the electric power industry. The figure below is an example of the products that can be generated from the Geospace model.

Figure 1. The Geospace model predictions of the induced magnetic fields, due to the space weather event of 22nd-23rd June 2015, calculated at 8 stations across North America. During this event the model was running in a real-time test mode and accurately predicted ahead of time the global G4 (severe storm) intensity.



The Geospace model predictions of the induced magnetic fields, due to the space weather event of 22nd-23rd June 2015, calculated at 8 stations across North America

AWC Aviation Weather Testbed Summer Experiment

The [Aviation Weather Center's \(AWC\)](#) Aviation Weather Testbed (AWT) hosted its annual Summer Experiment from August 10-21. The 2015 Aviation Weather Testbed (AWT) Summer Experiment was held at the Aviation Weather Center (AWC) in Kansas City cooperatively with the [FAA's William J. Hughes Technical Center](#) in Atlantic City from August 10-21. The major efforts of this experiment included cloud and visibility gridded forecast creation, improvements to the Collaborative Aviation Weather Statement (CAWS), new forecasting techniques over the Gulf of Mexico and Caribbean Sea, and verification techniques for aviation forecasts.

Cloud and visibility impacts flight operations throughout the year, with aviation impacts ranging from accidents to significant National Airspace System (NAS) delays. The cloud and visibility portion of the experiment focused on assessing the ability of creating gridded cloud and visibility products by using a variety of model data in the [AWIPS 2 Graphical Forecast Editor \(GFE\)](#). The grids created over the conterminous U.S. would potentially be used to drive local forecasts of cloud and visibility at National Weather Service Forecast Offices (WFOs). Use of these grids would improve results in consistency between locally produced products such as the TAF and larger scale forecasts such as the Area Forecast (FA) and graphical AIRMETs.

The convective portion of the experiment focused on improving the [CAWS](#) process incorporating findings from the [FAA Technical Center](#). The primary goal is producing [CAWS](#) that have focused impacts to a specific area instead of creating similar areas to the Experiment CDM Convective Forecast Planning (CCFP) guidance. This means leveraging the best forecasting practices using the highest resolution forecast models. The resultant experimental [CAWS](#) issued during [AWT](#) were compared against operational [CAWS](#) during this time. The end result is enhanced training surrounding the [CAWS](#) process.

Finally, graphical forecasts over the Gulf of Mexico and Caribbean Sea were tested as a potential way forward away from the text-based Area Forecast (FA). In addition, several verification studies, both quantitative and qualitative, were performed on the experimental guidance issued in all parts of the experiment.

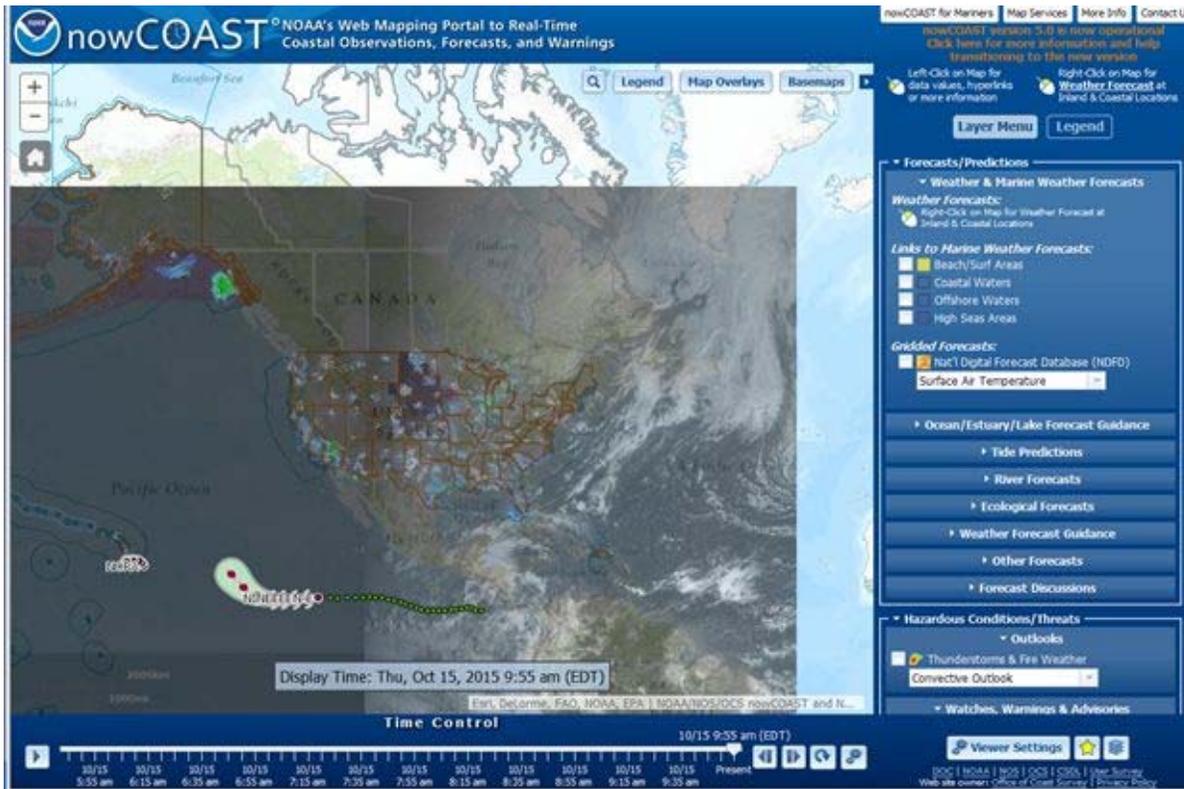


AWT participants attend the end-of-day briefing session

nowCOAST on NOAA's Integrated Dissemination Program (IDP) System

On September 21, [NCEP Central Operations](#) implemented the [National Ocean Service's](#) nowCOAST v5.0 onto IDP. nowCOAST is a GIS-based online web mapping portal displaying near real-time observations, analyses, tide predictions, model guidance, watches/warnings, and forecasts for the coastal United States. Visual point-and-click access to 60 [NOAA](#) data products and services are available to users to assist in areas such as marine transportation, emergency management, search and rescue coordination, HAZMAT response, risk management, and U.S. military planning and operations via <http://nowcoast.noaa.gov>.

The original version of nowCOAST, available since 2003, had provided the public with information on the latest observed and predicted coastal weather, marine weather, and oceanographic and river conditions. The updated operationally-supported map viewer now allows users to animate observations for the past four hours and forecasts for the next seven days and includes watches, warnings and advisories for hazardous marine weather conditions, even far offshore. It also provides near-real-time lightning strike density data for land and over water, and hydrologic conditions and predictions from ocean forecast models.



Screenshot of the new nowCOAST web site

National Hurricane Center Remembers the 2005 Hurricane Season

It was a hurricane season like no other on record – 28 named storms, including 15 hurricanes and seven major hurricanes with names such as Katrina, Rita and Wilma. Over the course of the 2005 season, nearly 4,000 people lost their lives and there was nearly \$160 billion in damage. Hurricane forecasting has come a long way in the ten years since that historic season.

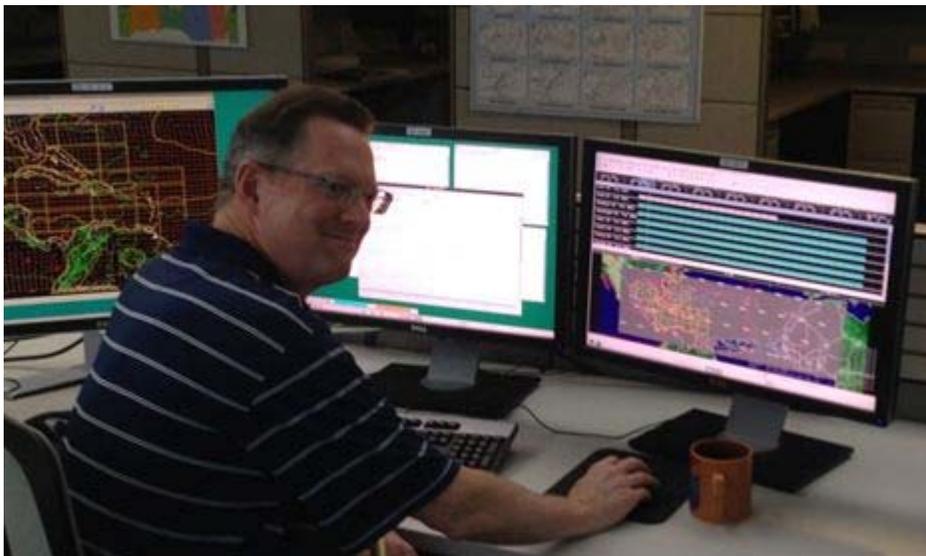
On July 28th, [NOAA's](#) Climate Program Office offered a two-hour webinar to discuss the progress in hurricane modeling, prediction, decision support, and coastal resilience. [NHC's](#) Director Dr. Rick Knabb participated, discussing the advances in hurricane forecasting with a focus on the specific hazards, especially storm surge.



NHC Director Dr. Rick Knabb participating in the discussion

GFE Service Backup

On August 18, 2015, OPC performed a scheduled backup for NHC/TAFB. For the first time, OPC's Douglas Scovil was able to use AWIPS II's GFE Service Backup to create the forecasts. This allowed OPC to produce NHC's forecasts over all 31 of their offshore zones, instead of condensing the forecast into 9 much larger areas. It was an important first step towards true gridded backup and making OPC and NHC's gridded forecasts operational in NDFD.



OPC lead forecaster Doug Scovil using the AWIPS 2 Graphical Forecast Editor to provide backup to the NHC TAFB

EMC's Wave Summer School

EMC's Wave Modeling Team conducted a 5-day course in phase averaged wave modeling and provided hands-on training on NOAA's WAVEWATCH III® model on July 13-17th at UMD College Park. The course was conducted in partnership with the University of Maryland and attended by 21 international researchers and students. One of

the main objectives of the workshop was to expand the global user base and strengthen ties with new and existing users of WAVEWATCH III. Having the research community work directly on the model accelerates the transition of new ideas from research to operations. Participants included a diverse mix of graduate students, research scientists and consultants. Organizations represented were Tel Aviv University (Israel), Delft University (Netherlands), U.S. Army Engineering Research and Development Center, National University of Mexico (Mexico), University of Hawaii, Texas A&M University, University of Michigan, University of North Florida, George Mason University, Taiwan Central Weather Bureau (Taiwan), Taiwan National University (Taiwan), P. P. Shirv Institute of Oceanology (Russia), Servivio Meteorologico Nacional (Argentina), National Institute of Geophysics and Vulcanology (Italy), [National Hurricane Center](#) and Naval Research Laboratory. Apart from the list of external participants, the wave modeling team also invited an internal participant from the [EMC](#) Hurricane Modeling Team who will be actively involved in developing a coupled hurricane – wave prediction system for the next hurricane season. Participants were unanimous in their feedback that the course was outstanding and that they would recommend it to others without hesitation.

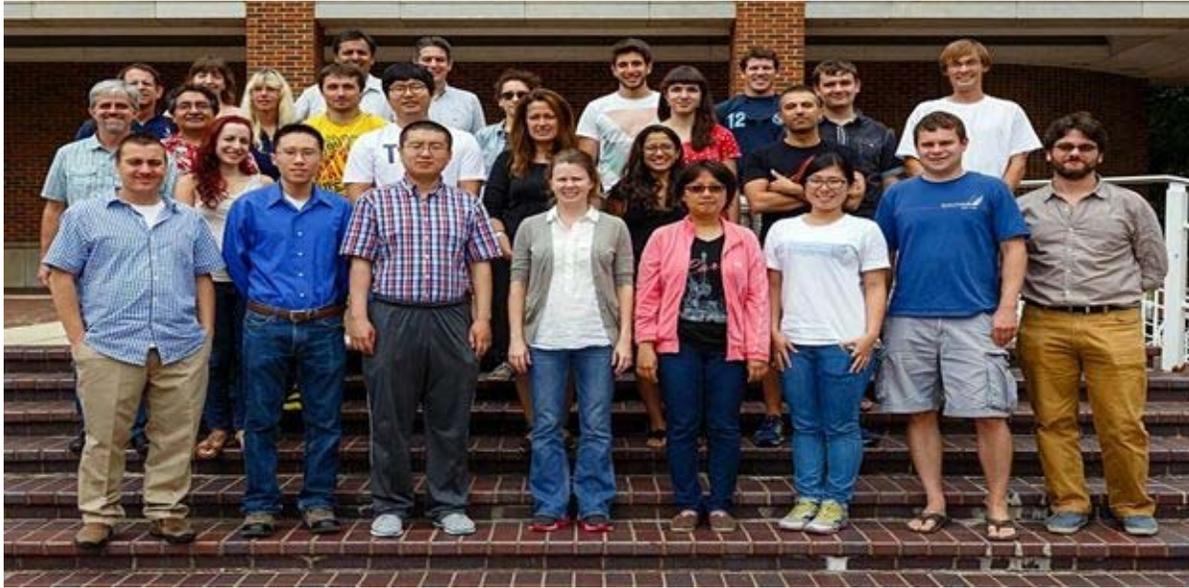


Photo of Wave Summer School participants

WPC Hosts Historic National Winter Weather Program Meeting

On August 12th and 13th, [WPC](#) hosted the largest ever Agency wide meeting specifically dedicated to Winter Weather. The meeting was kicked off by [NWS](#) Director Dr. Louis Uccellini. Approximately 40 attendees descended upon the National Center for Weather and Climate Prediction in College Park, MD, including representatives from 5 [NWS](#) Regions, many parts of the Analyze Forecast Support Office, the Office of Science Technology Integration, a multitude of [NCEP](#) and [WPC](#) personnel and a representative from the Department of Transportation. The overarching goal of the meeting was to identify ways to improve winter weather forecasting, dissemination and communication.

Both short term tactical goals as well as a long term strategic vision were discussed. Topics included:

- Improved [WFO/WPC](#) Collaboration and role of the National Center
- Expanding Probabilistic Forecasting at both the [WFO](#) and National Center
- Improving modeling and the 0-6 hour forecast during winter storms
- Prototyping a predictive Winter Weather Impacts Index
- Supporting a cohesive, national, graphical snowfall analysis
- Debuting a Winter Weather Professional Development Series

The group rallied around a 2020 vision, "one collaborated [NWS](#) forecast that is probabilistic, impact-based, accurate, and understandable," and aligned FY16 milestones towards this vision. Meeting participants provided

productive interactions and valuable contributions that will benefit the National Program.



Dr. Uccellini kicks off the workshop to a packed room at the Weather Prediction Center

Joe Phillips Honored for Photography Skills

LTJG Joe Phillips was recognized for his photos submitted to the [NOAA](#) Weather in Focus Photo Contest. Among more than 2000 submissions, Joe had two entries recognized for third place and honorable mention in the Science in Action category at the Gateway to [NOAA](#) exhibit in Silver Spring. You can see Joe's photos at http://www.weather.gov/photocontest/sa_winners



South Pole Atmospheric Research Observatory. Photograph: LTJG Joseph Phillips