

NCEP Quarterly Newsletter - March 2013

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Weather and Climate Operational Supercomputing Transition

NCEP is currently transitioning operations from the **CCS** to the **WCOSS** with a planned operational date of mid-August 2013. The **WCOSS** will be one of the **NWS**'s four National Critical Systems and will affect the entire operational **NOAA** model suite for Atmospheric, Marine and Climate modeling. We are moving from a system that could perform 73.9 trillion calculations per second with 800 Terabytes of storage to a system that can perform 208 trillion calculations per second with 2590 Terabytes of storage. The increase in capability will enable modelers to improve both the science and resolution of most of our major scientific models resulting in improved guidance for our forecasters.

This is an especially difficult transition because we are moving to a new operating system and architecture at two new locations. We must maintain the current system, transition with no lapse in service and the move should be essentially transparent to our customers/partners. The transition is currently ahead of schedule as we continue to move forward at a rapid pace and hope to beat the planned implementation date by as much as two months. During this period, all of our operational models and data acquisition systems were installed in the new environment and a preliminary evaluation of the output was performed. There are still some unresolved failures, the output needs to be further evaluated and tuning to meet specific timing requirements still needs to be performed. However, the time period remaining should be more than enough to complete these tasks and implement the **WCOSS** sooner than originally planned.



The Weather and Climate Operational Supercomputing System

IDP Infrastructure Project

NCEP Central Operations (NCO) is currently leading the **NOAA** Integrated Dissemination Program's (IDP) Infrastructure Project. To implement **NOAA**'s enterprise dissemination services, **NOAA** and specifically **NWS** established IDP. This program will follow a phased approach, initially focusing on three National Weather Service (**NWS**) dissemination projects, then incorporating other **NWS** and **NOAA** dissemination programs/projects and eventually broadening its scope to future **NOAA**'s dissemination requirements. IDP will aggregate and consolidate dissemination application on common standard dissemination infrastructure.

NCO's IDP Infrastructure Project will implement a robust, secure, and commonly shared dissemination infrastructure, building both a primary and backup dissemination infrastructure at geographically diverse locations. The following data centers will be leveraged: **NOAA** Center for Weather and Climate Prediction, College Park, MD (Primary IDP site), and David Skaggs Research Center (DSRC), Boulder, CO (Backup IDP

site). This infrastructure will provide for aggregation and consolidation of dissemination functions to enable common shared services and gain cost-efficiencies. The following will be consolidated in the short-term on this infrastructure: NextGen Prototype, National Weather Service Telecommunication Gateway applications, [NCEP Model Analysis and Guidance \(MAG\)](#) output, Unidata's CONDUIT project, the [NOAA National Operational Model Archive & Distribution System \(NOMADS\)](#), and FTPPRD.



Current NCEP Compute Farm



Proposed NOAA IDP location, College Park

Service Center Activities

AWC Conducts First Winter Weather Experiment

For two weeks in February, the Aviation Weather Center ([AWC](#)) hosted the first ever Aviation Winter Weather Experiment in the [NOAA Aviation Weather Testbed \(AWT\)](#) in Kansas City, MO. The culmination of four months of work, the primary goals of the experiment were to enhance [AWC](#) winter hazard forecasting operations, expose forecasters to new tools, provide valuable operations to research (O2R) feedback, and evaluate new products, displays, and tools for operational readiness. Other goals included strengthening partnerships, gaining valuable stakeholder feedback, and sharing best practices.

The February 11-22, 2013 experiment took place in a simulated forecast environment in which forecasters were asked to produce forecasts with the aid of several new products. Their feedback was then gathered via in-person discussions and post-experiment online surveys. Other activities included joint weather briefings with the [NCEP Weather Prediction Center](#) and brown-bag lunch presentations on a variety of topics including accident investigations, use of [AWC](#) products in flight briefings, new research, and technology transfer.



AWC Testbed with Winter Experiment participants at work.

Internal participants included fifteen full-time operational [AWC](#) forecasters, six fill-in forecasters from the [AWC](#)'s Aviation Support Branch, and five managers. External guest participants included scientists and engineers from the National Transportation Safety Board, Lockheed Martin Flight Services, the Air Force Weather Agency, [NASA](#) Langley Research Center, the National Center for Atmospheric Research, the [NOAA](#) NextGen Weather Program, the [NOAA](#) Earth Systems Research Laboratory, the [GOES-R](#) Program Office, and the National Weather Service Central Region Headquarters.

While the results are still being assessed, preliminary feedback suggests the [AWT](#) Winter Experiment was a tremendous success and will undoubtedly lead to improved products and services.

For more information on the [AWT](#) Winter Experiment please visit https://testbed.aviationweather.gov/page/public?name=2013_Winter_Experiment.

AWC at Women in Aviation Conference

[NCEP](#) Aviation Weather Center, Memphis CWSU, and Nashville WFO partnered at the International [Women in Aviation Conference](#) Exhibition held March 14-16, 2013 in Nashville, Tennessee.



Pictured from L-R: Ingrid Greenwall, AWC; Joann Becker, AWC; Mark Rose, Forecaster Nashville WFO. Not included in photo: Stephen Kearney, Forecaster Memphis CWSU.

The theme for the 24th Annual International [Women in Aviation Conference](#) was "Setting the Stage for Your Success". The conference was attended by 3,375 registered people representing 14 countries. Nigeria, Canada and Ghana had the largest number of international participants at the event.

Eighty scholarships totaling \$497,575 were awarded to student and professional members seeking aviation training and certifications. A FedEx 727 aircraft was donated to California Baptist University, Riverside, CA in support of their aviation program. Aviation Weather Center Director, Bob Maxson said, "There's such a sense of optimism and teamwork made by all the participants. We appreciate the ability to involve the Local Weather Forecast Office and associated Center Weather Service Unit to showcase the contribution the National Weather Service makes in promoting flight safety and efficiency throughout the United States and the world."

Unique to this year's conference was the interview activity for commercial pilots in hope of landing an airline job with an exhibiting airline. Most major carriers have pilots reaching mandatory retirement age soon, creating significant job opportunity in the industry.

Exhibitors at the conference represented 114 different groups including the military, educational institutions, commercial aviation industries, aviation organizations, and public and federal agencies. Attendees shared their appreciation for the service and the mission of the [NWS](#). There were many questions about [NWS](#) products and services answered. During Saturday's "Bring your Daughter to Conference" day one visitor shared how she would like to be a meteorologist someday and she was encouraged to meet female meteorologists.

Drought Outlook Modifications

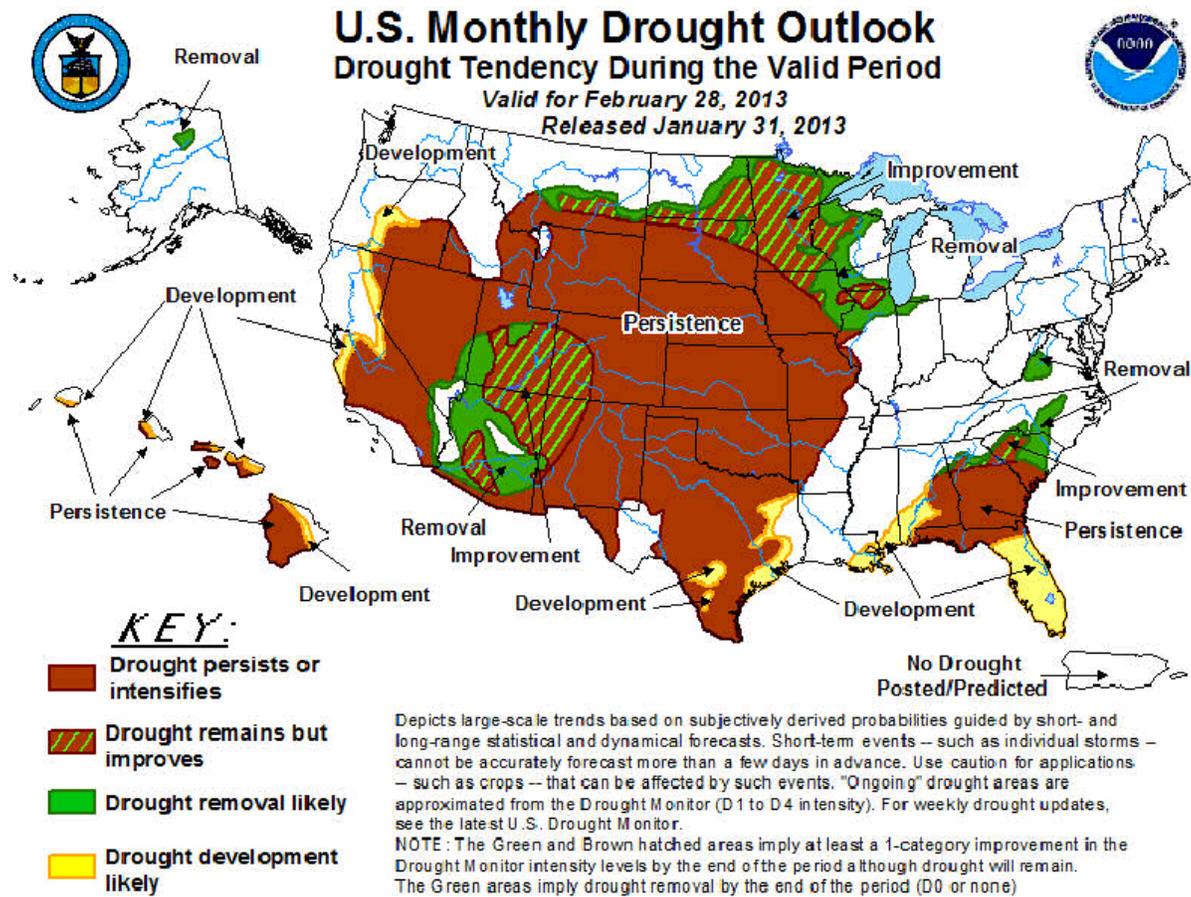
The [Climate Prediction Center \(CPC\)](#) has submitted modifications for the U.S. Drought Outlooks (DOs) to

NWS Headquarters that are expected to become operational after a 75-day review process. The major changes involve the replacement of the updated Seasonal Drought Outlook (SDO) currently issued on the first Thursday of the month, with a new Monthly Drought Outlook (MDO) issued on the last day of the month, and the clarification of the drought outlook categories (e.g. Some Improvement and Improvement). These modifications are expected to become operational in mid-June, starting with the July-September'13 SDO (released June 20) and the July'13 MDO (released June 30).

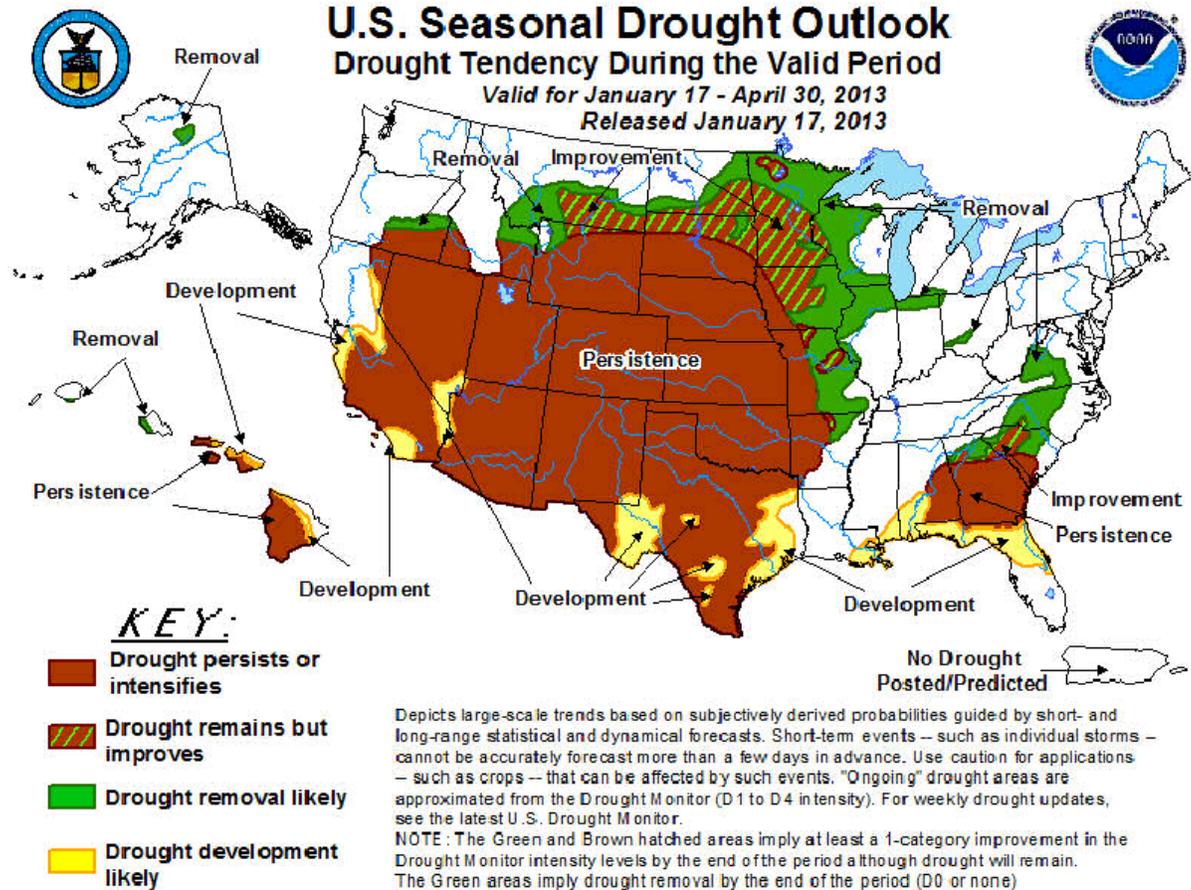
The modifications to the DOs, particularly the MDO, were possible due to the improved skills of short- to medium-term forecasts (e.g. 6-10 day, 8-14 day, week 3) and dynamical models (e.g. NMME, CFSv2, etc.), and also to be more responsive to user needs, given the knowledge that droughts can develop and intensify on time scales shorter than 3-months, such as the 2012 Midwest Flash Drought. By producing a MDO at the end of each month instead of an updated SDO, benefits will be realized for short-term agricultural purposes, especially during the growing season. Lastly, this new DO schedule mirrors the release of CPC's 1- and 3-month Temperature and Precipitation Outlooks.

Changes were also made to the drought outlook categories. For the DOs, drought is defined as D1 or worse (based upon the U.S. Drought Monitor (USDM) categories of D0 - abnormally dry, to D4 - exceptional drought). Since the category of *Some Improvement* could be interpreted as either improvement or persistence (or a buffer zone between *Persistence* and *Improvement*) and therefore not scored in the verification of the SDO, it was replaced with either *Persistence*, *Improvement*, or *Removal*. The new *Removal* category implies that drought (D1 or worse) will end (D0 or none) by the last day of the outlook period. The modified *Improvement* category implies at least a one category improvement in the USDM levels by the end of the period although drought still remains. The *Persistence* and *Development* categories remain unchanged.

Verification and skill scores of the DOs will be made available on the CPC web page in the near future. The old initial and updated SDOs have been verified using objective GIS techniques since late 2009. The current SDO (either initial or updated) and additional SDO information are available on the CPC web page to: http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html



New Monthly Drought Outlook produced on January 31, 2013 for February 2013.



Modified Seasonal Drought Outlook produced on January 17, 2013, for the January 17-April 30, 2013 period.

CPCer Wins Science Idol Contest

NOAA's [Climate Prediction Center \(CPC\)](#) and Wyle federal contractor meteorologist Tom Di Liberto won the first America's Science Idol competition held at the Annual Meeting of the American Association for the Advancement of Science (AAAS) in Boston, 14-18 February 2013. The event was hosted by the National Science Foundation, Discover Magazine, Popular Science and the Point of Inquiry podcast. The competition involved describing, in three minutes, a complex scientific topic to an audience who has little prior knowledge of the field of interest. The contest featured six finalists, including Mr. Di Liberto. Tom works in the [CPC International Desks](#), which provides the government and other agencies with international weather and climate information to enable decision making for the Famine Early Warning System (FEWS) and for advanced disaster risk reduction planning. During the contest, topics ranged from black holes to the health impacts of dust to the reproductive habits of insects. There was even a rap about lasers. Di Liberto's presentation, entitled "Weather Forecasting: How Hard Can That Be?" focused on the usually-overlooked complexity of a weather forecast and the difficulties a meteorologist has to overcome to produce that forecast. From errors in weather models to an incomplete weather observing system, many factors make accurate forecasting difficult. Even so, weather forecasts have improved vastly over the last 30 years. For Mr. Di Liberto, the overall experience was almost as valuable as winning the competition itself. In a field like meteorology, public communication of risk is a necessary and vital component. "A meteorologist must be adept at translating intricate forecasts in terms that the lay public can understand and utilize." The task of creating a three-minute talk helped Mr. Di Liberto focus and simplify his message, leading to a much more concise and memorable conclusion - "something that all scientists should strive for in their day-to-day communications." As a prize for winning the competition, the National Academy of Sciences will fly Mr. Di Liberto out to Hollywood later this summer to give a similar presentation to the film and television industry.



(From left to right) Corey Powell (Discover magazine), Indre Viskontas (Point of Inquiry podcast), host Chris Mooney (from Point of Inquiry podcast) and Tom Di Liberto (NOAA's Climate Prediction Center).

Hurricane Webinars

NOAA's National Hurricane Center "Hurricane Webinars for 5th Graders" program is underway and it's already a big success. More than 15,000 students participated in the sessions along the Gulf Coast in March. The Southeast and Northeast are coming up in May. These one hour webinars are presented by the "Hurricanes: Science and Society" team at the University of Rhode Island's Graduate School of Oceanography in partnership with the National Hurricane Center and NOAA's Aircraft Operations Center (AOC). It's all to raise awareness of the approaching 2013 hurricane season. The 5th grade level typically gets the weather unit in science class and they'll take the hurricane message home to their parents. Students hear from [NHC](#) forecasters, and AOC personnel that fly into hurricanes. Questions collected in advance of the webinar are answered by the hurricane scientists. There are videos, visualizations, graphics, and even a virtual tour of the National Hurricane Center.



NHC Hurricane Specialist John Cangialosi (right) leads the webinar for Gulf Coast students as Hurricane Specialists Dan Brown and Todd Kimberlain listen in.

National Hurricane Conference

NOAA's National Hurricane Center Director Dr. Rick Knabb and several [NHC](#) hurricane specialists were in attendance at the 35th annual National Hurricane Conference held in March in New Orleans, La. They were joined throughout the four-day program by experts from other federal agencies, academia and the emergency management community, conducting and participating in workshops and panel discussions on tropical cyclones. More than two dozen media interviews were provided, too. The takeaway message - Don't focus on the skinny black (track) line, don't focus on the category. Focus on the impacts. Each storm is unique.



FEMA Administrator Craig Fugate and NHC Director Dr. Rick Knabb address the media during the 2013 National Hurricane Conference in New Orleans, La.

OPC at US Sail Annual Meeting

Each winter the U.S. traditional sail training organization, Tall Ships America, holds its annual meeting. Captains, mates, crew, owners, foundations, and port representatives gather to discuss a variety of issues facing the sail training community. In 2012 the meeting was held in Erie, PA from February 4-7 at Harbors Edge with a beautiful backdrop of ice and snow. Erie was chosen because this year marks the bicentennial of the Battle of Lake Erie that took place in 1813. This coming summer, a fleet of tall ships will visit the Great Lakes and reenact the battle between British and U.S. warships.

Weather safety is always a prime focus and was again at this year's conference. Traditional sailing vessels or tall ships are very weather sensitive and have relatively slow transit speeds. They take time to prepare for threatening conditions by reducing sail, changing heading, or running for safe harbor. Without advanced warning and proper preparation and action, these vessels can become dangerous and vulnerable in rapidly increasing winds and seas. As education is their principal mission, typically, their precious cargoes are students of high school through college age.

Unfortunately on Oct 29, 2012, this community lost one of their own, the tall ship *Bounty*, when it capsized and sank while heading south from Connecticut to Florida in Hurricane Sandy. The Captain and one crew member were lost and 14 others were rescued by the U.S. Coast Guard (USCG).



Figure 1. Four crew members of the *Bounty* along with USCG Search and Rescue team members who recovered the surviving crew. Courtesy Tall Ships America.

Joe Sienkiewicz of the [Ocean Prediction Center](#) was invited by Tall Ships America to give two presentations. The first was an introductory lesson to marine weather and designed to be a tutorial and refresher for junior officers. Joe's second talk was entitled "Dissecting Super Storm Sandy" and discussed the forecasts, evolution, [NWS](#) warning decisions, and impacts of Sandy. This session was presented to the full conference with approximately 150 experienced sailors in attendance. Joe used a framework of slides presented by [NWS](#) Director Dr. Louis Uccellini, [Weather Prediction Center \(WPC\)](#) Branch Chief, Dr. David Novak, and National Hurricane Center ([NHC](#)) Director Dr. Richard Knabb at a Town Hall Meeting at the 2013 AMS Annual Meeting. He also added loops and images to illustrate points and used them as an educational opportunity. Four survivors from the *Bounty* were present along with three USCG air crew members who participated in the rescue of the *Bounty* crew. Several captains and waterfront directors from facilities and vessels significantly impacted by Sandy such as the US Coast Guard Academy, Mystic Seaport, South Street Seaport in lower Manhattan, US Merchant Marine Academy at Kings Point, NY, and the sailing vessels *Lynx* and *Pioneer* were in attendance.

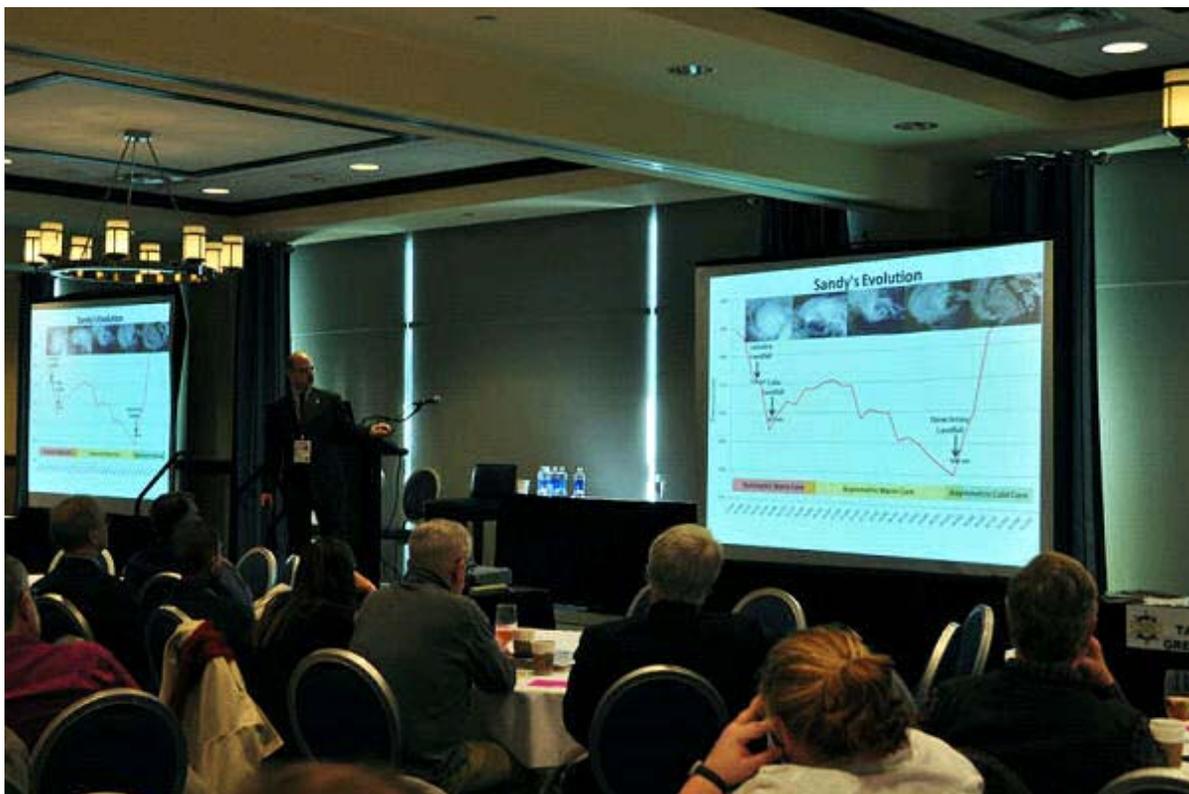


Figure 2. Joe Sienkiewicz of OPC addressing the 2013 Tall Ships America Annual Conference. Joe is showing a graphic of the evolution of Sandy. Courtesy Tall Ships America.

The complex evolution of Sandy and large scale flow features were illustrated and explained using a 500 mb height and vorticity time series. Key features that helped to determine the track of Sandy were highlighted and tracked as they interacted and phased together. As Sandy tracked northward it began to acquire non-tropical characteristics and developed front-like features. Sandy grew in diameter while maintaining a hurricane inner core. Joe highlighted this by discussing the differences and similarities between mature extra-tropical (non-tropical) and tropical cyclones to illustrate the hybrid nature of Sandy. Joe used satellite scatterometer wind fields to emphasize those points. He also walked through the [WPC](#) medium range series of forecasts valid 1200 UTC 29 Oct, [NHC](#) track and wind field probability graphics, and [OPC](#) graphical forecasts. These products highlighted the forecast process, the high level of [NWS](#) internal collaboration, and successful communication of a unified message of a very dangerous threat to the western Atlantic and East Coast of the United States.

This was a great opportunity to represent [NOAA/NWS](#) and to engage a very knowledgeable and appreciative group of users of [NOAA](#) products. Tall Ships America realizes how important weather information is to its members and was very kind to provide support for [NWS/OPC](#) participation.

OPC Hosts Wx-Ready Chesapeake Workshop

This winter the [Ocean Prediction Center \(OPC\)](#) collaborated with the [NOAA](#) Environmental Science Training Center (ESTC) and other National Weather Service personnel to host the Weather-Ready Chesapeake Workshop. The workshop, geared toward non-traditional and environmental educators, spanned two days, January 24 and February 14, 2013, and covered a wide variety of weather topics related to the Chesapeake Bay. Bart Merrick and Donna Stotts of ESTC orchestrated almost twelve hours of classroom and hands-on learning and content for thirty-five enthusiastic educators spanning the two sessions. Ron Gird and Mary Fairbanks from the [NWS](#) Awareness Branch helped to organize and support the workshop.

Workshop participants had a very full schedule that took full advantage of the new [NOAA](#) Center for Weather and Climate Prediction conference center, facilities, and [NOAA](#) expertise at the National Centers for Environmental Prediction ([NCEP](#)). The first workshop began with a short "Meteorology 101" course to set the stage for the events to follow. [OPC](#)'s Ocean Forecast Branch Chief, Anthony Siebers, presented an overview of [NCEP](#) as an organization and prepped the group to participate in the [Weather Prediction Center](#)'s ([WPC](#)) map discussion; they learned about atmospheric forecast models, the fundamentals of ensembles, and other key concepts to be discussed by [WPC](#) forecasters. After receiving a warm welcome from [NCEP](#) Director Dr. Louis Uccellini and attending the [WPC](#) map discussion in the building's media center, the group toured the 4th floor operations area, interacting with the [NESDIS](#) Satellite Applications Branch, [WPC](#), and [OPC](#) forecasters. The afternoon continued with hands-on activities that made the educators think like weather observers and operational meteorologists by conducting outdoor measurements and running through [NWS Southern Region](#)'s "Hot Seat" simulations.

The second session switched its focus from meteorology and weather prediction to community and Chesapeake Bay weather and climate impacts. Chris Strager had the opportunity to brief the group about the Weather Ready Nation initiative and discussed how the plan is being implemented in the Chesapeake region. Derek Arndt of the National Climatic Data Center was able to join remotely via the conference center's VTC capabilities to speak to the educators about the connection between climate and weather extremes. Rounding out the discussion on climate and weather preparedness, Chris Brown from [NESDIS](#) spoke about efforts to expand ecological forecasting.

In addition to learning about [NCEP](#) operations, Weather-Ready Nation, and meteorology in general, an emphasis was placed on using the tools already in place and publicly-available to obtain weather information

and decision-making products. The ESTC leaders also introduced techniques and ideas for integrating weather and climatology into educational programming, which included a group discussion and brainstorming session. The Weather-Ready Chesapeake workshop series was an excellent example of intra-agency cooperation between local offices and an effective outreach opportunity for [NCEP](#).

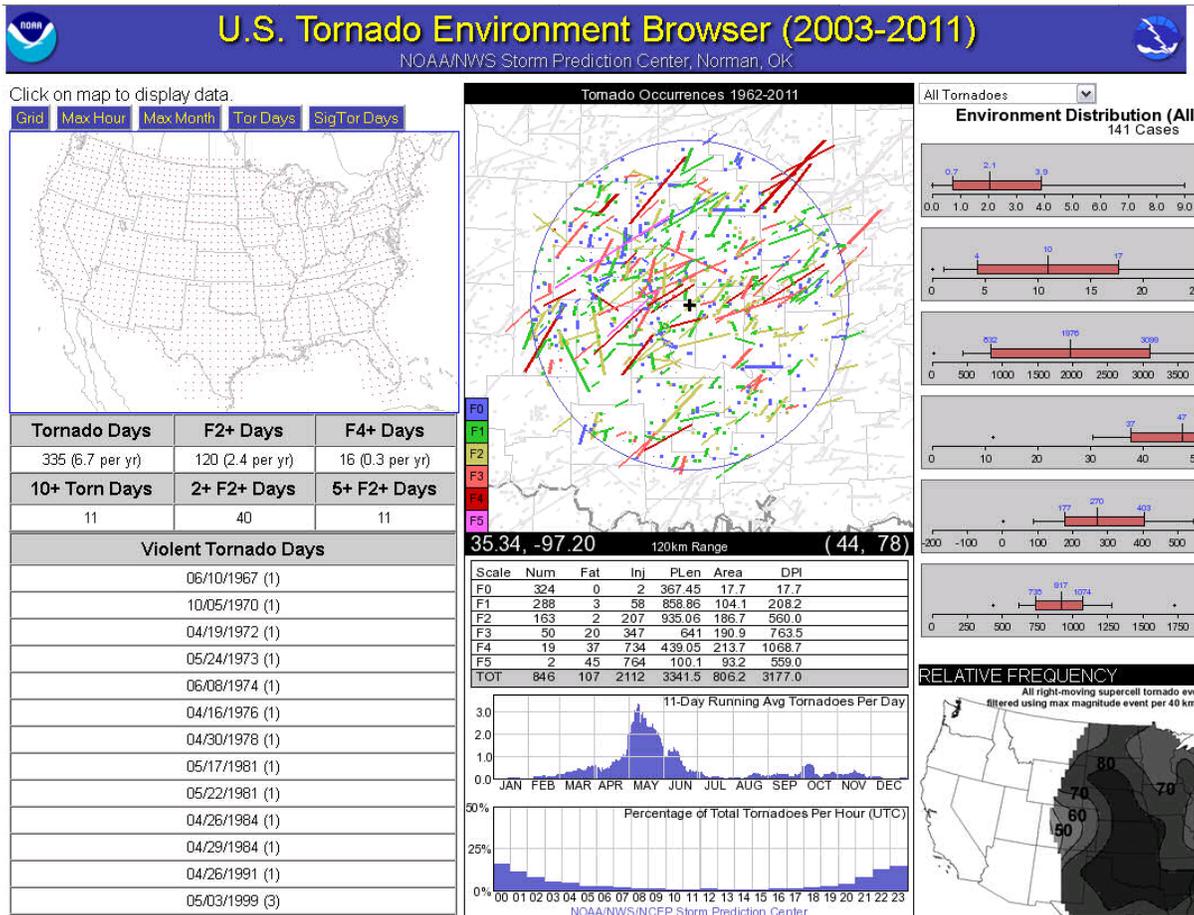


Ocean Forecast Branch Chief Tony Siebers answers questions during the Weather Ready Chesapeake tours.

SPC Web Page

The redesigned [SPC](#) Web Page was instituted on March 28, and incorporates a number of key features designed to improve access to critical information. The new page makes more effective use of screen space, and places critical outlook, watch, and mesoscale discussion information prominently on the page. In addition, all severe and fire weather outlooks contain demographic information regarding the total population and major cities within the threat areas. Drop-down menus and front-page thumbnail graphics provide easy access to new and existing forecast tools, past event archives, and public safety information. The new page is the result of the efforts of several [SPC](#) staff and incorporates feedback from [SPC](#) web page customers. (<http://www.spc.noaa.gov/>)

The [SPC](#) has also unveiled a tornado environment dynamic webpage browser for the contiguous United States (CONUS). The new browser is available on the [SPC's](#) website, <http://www.spc.noaa.gov/exper/envbrowser/>. A tornado environment.convective mode sample spanning the 2003-2011 period displays statistical information of supercell-related convective parameters accompanied by smoothed tornadic convective mode climatology images. Through a collaborative effort between [SPC](#) forecasters, [SPC](#) techniques development meteorologists, a [NSSL](#) scientist, and a graduate student with the University of Oklahoma, this specific work is an example of a Research-to-Operations (R2O) web-based tool. This tool has multiple applications that can serve to enhance severe storm training material, provide a climatological reference to forecasters in a real-time situational awareness warning situation (via decision support) and in a post-mortem setting, and act as a mechanism to further outreach to the severe storms community.



Screen capture of the tornado environment dynamic webpage for the contiguous United States (CONUS).

National Severe Storms Workshop

The [NWS](#) and the [SPC](#) collaborated with the Oklahoma Emergency Managers Association and the [NWS](#) Regions to hold a [National Severe Weather Workshop](#) geared towards learning the specific forecast and warning needs of emergency managers and weathercasters nationwide. A key focus remains the application of uncertainty information and the social sciences to improve hazard communication. This year's event was restructured due to budget constraints and held as part of the National Tornado Summit on 10-12 March 2013. The National Tornado Summit was attended by over 900 members of the insurance industry, emergency management, media, and other key [NWS](#) partners and stakeholders. Presentations and discussions focused on severe weather information, communication strategies, and emergency management response. The [SPC](#) Director, on behalf of the [NWS](#) Director, provided a keynote address to a general session of the Summit focused on [NWS](#) Weather Ready Nation goals and activities. The [SPC](#) developed content for seven breakout sessions at the Summit as part of the annual [National Severe Weather Workshop](#).



Owlie makes an appearance at the National Tornado Summit during the Public Session via Patrick Marsh, new SPC employee.

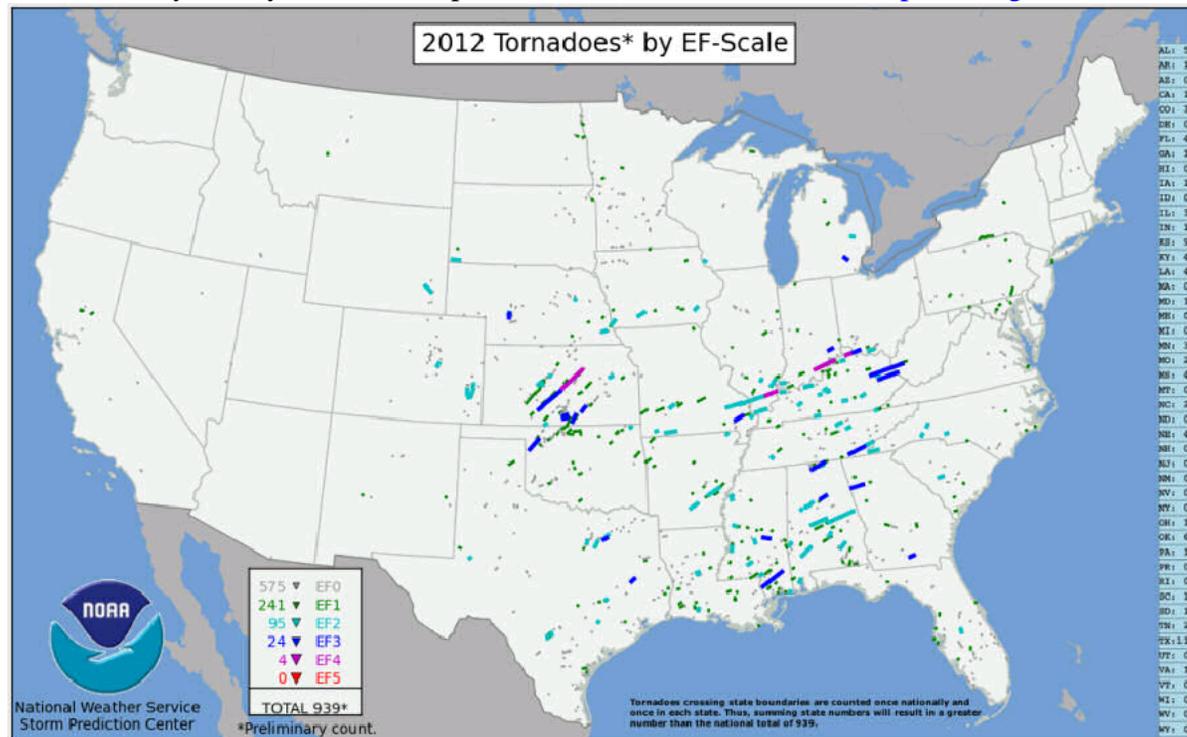
United States Tornadoes of 2012

Comparisons are made for the 62-year period 1950-2011 unless otherwise noted. The official [NOAA/NWS](#) period of record for tornadoes in the United States extends back to 1950. Fatality records for significant tornado events prior to 1950 are used for historical comparison. Tornado numbers from January through October, 2012 are derived from Storm Data while numbers for November through December are preliminary estimates based on [NWS Public Statements](#) and Local Storm Reports.

First Tornado	8:45 AM CST, 9-Jan (EF0-TX)
Last Tornado	5:00 PM EST, 26-Dec (EF1-NC)
2012 Total Tornadoes	936 (Ranked 25th since 1950)
Record Annual Total.....	1817 in 2004
Greatest 2012 Monthly Total	206 in April
Greatest Monthly Total on Record.....	759 in April 2011
2012 Tornado Days	170
Annual Average.....	178 (50-years, 1962-2011)
Record Tornado Days in Any Year.....	211 in 2000
Greatest 2012 Daily Total (Mid-Mid CST)	86 on 14-Apr
Greatest Daily Total on Record.....	200 on 27-Apr-2011
States Reporting Tornadoes in 2012	46
Annual Average Number of States.....	43 (50-years, 1962-2011)
Most States Reporting Tornadoes in Any Year.....	48 (2011 and 1989)
2012 Tornado Deaths	68 (Ranked 25th since 1950)
Annual Average Tornado Deaths.....	91 (62-years, 1950-2011)
2011 Tornado Deaths.....	553 (Ranked 2nd in History)
Greatest Annual Number of Tornado Deaths.....	794 (1925)
2012 Tornado Injuries	829 (Ranked 43rd since 1950)
Greatest Annual Number of Injuries.....	6824 in 1974
2012 Deadliest Single Tornado	Henryville, IN (11, 2-Mar)
Record Deadliest Single Tornado (modern era).....	Joplin, MO, 158, 22-May-2011
2012 Longest Track	85 miles (KY-WV, 2-Mar)
Record Longest Track.....	235 miles (LA-MS, 22-Mar-1953)
2012 Tornadoes Rated EF4	4 (Fewest since 2 in 2009)
Record Annual Number.....	36 in 1974
2012 Tornadoes Rated EF5 (200+mph)	0 (Fewest since 0 in 2010)
Record Annual Number of EF5 Tornadoes.....	7 in 1974

2012 Estimated Property and Crop Losses.....~1.6 billion USD
 2011 Estimated Property and Crop Losses.....~10.0 billion USD (Ranked 1st)
 Greatest Losses from Single Tornado.....~2.8 billion USD (Joplin, MO)

The 2012 year end review of U.S. Tornadoes was compiled by SPC WCM Greg Carbin. For additional information, you may find the complete statistical document at www.spc.noaa.gov/wcm.



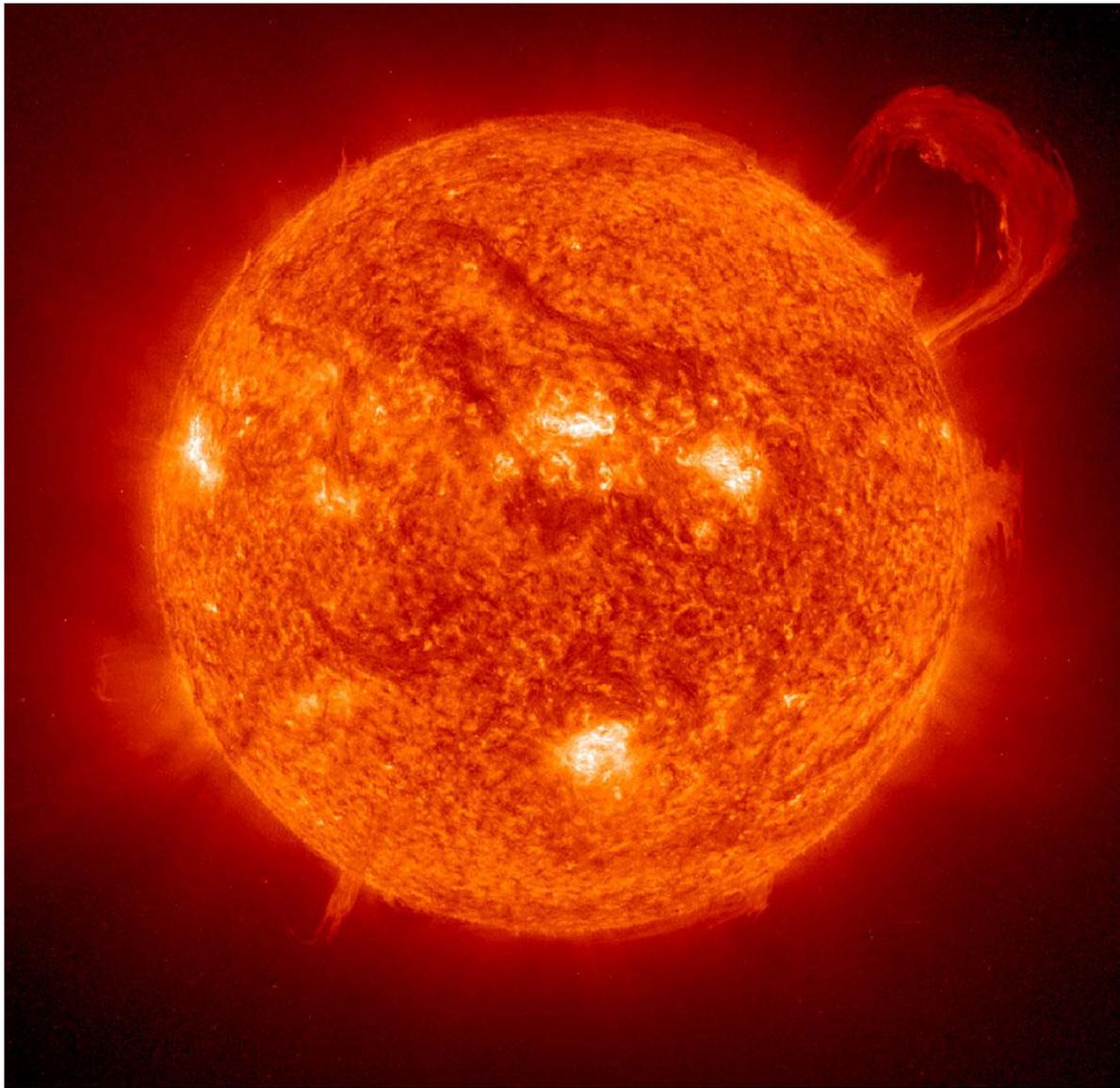
2012 Tornadoes by EF-Scale

SWPC Releases Two New Products

The National Weather Service Space [Weather Prediction Center \(SWPC\)](#) recently released two new forecast products, a 3-Day Forecast and a corresponding Forecast Discussion. Both are produced at 0030 and 1230 UTC with an option for out-of-cycle updates during significant space weather events. The goal of these new products is to communicate forecast information in a more frequent and more easily understood manner to [SWPC's](#) broadening customer base. These new products evolved from the traditional daily Report of Solar and Geophysical Activity (RSGA). The 3-Day Forecast is a concise, [NOAA](#)-Scale-centric product which provides a summary of conditions during the previous 24 hours and a 3-day outlook. This one-page composition includes three sections describing geomagnetic, solar radiation storm, and radio blackout observations and predictions.



NOAA's Space Weather Prediction Center Forecast Office



Solar image from NASA's Solar and Heliospheric Observatory (SOHO)

The Forecast Discussion product complements the 3-Day Forecast and describes the observations, model output, and scientific reasoning underpinning the forecasts. This provides our customers with the background reasoning that helped to formulate the forecast and also provides insight to our forecast process. Additionally, the Forecast Discussion provides forecasters an opportunity to express their confidence in the forecasts and to describe potential alternate outcomes.

These two new products represent a progression towards improved space weather products and services, delivering information at the appropriate level to meet the sophistication of the respective users. The products also reflect a move towards consistency with the terrestrial meteorological products available to the general public. Thus, while space weather remains an evolving and sometimes difficult to translate field, incremental steps are being taken to make space weather more tangible and easier to understand.

These two new products are available in the Data and Products section of the [SWPC](http://www.swpc.noaa.gov) website at http://www.swpc.noaa.gov/ftplib/latest/three_day_forecast.txt and http://www.swpc.noaa.gov/ftplib/latest/forecast_discussion.txt. Users can also subscribe to these products in the Product Subscription Service under the Forecasts and Summaries product category (<https://pss.swpc.noaa.gov>).

These two products will supplement the existing product suite and no current products will be discontinued at this time.

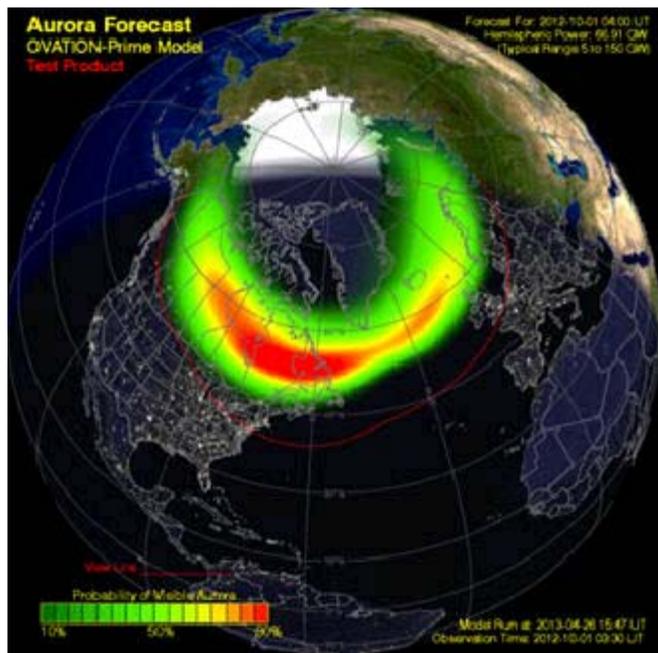
Geomagnetic Storm Protection

NOAA's Space [Weather Prediction Center \(SWPC\)](#) is working with the North American Electric Reliability Corporation (NERC) on efforts to protect the Nation's bulk power system from the effect of geomagnetic disturbances (GMD). NERC is an international regulatory authority established to evaluate reliability of the bulk power system in North America, and develop and enforce Reliability Standards. In February 2013, [SWPC](#) participated in a NERC GMD Task Force (GMDTF) meeting in Atlanta, joining representatives from DOE, the Federal Energy Regulatory Commission, Natural Resources Canada, United States Geological Survey (USGS), [NASA](#), the Electric Power Research Institute, multiple electric utility companies, and others in the NERC GMD Task Force Phase 2 efforts. The GMDTF is focused on two key areas: (1) assessing the vulnerability of the North American transformer fleet, by incorporating power system modeling with space weather simulation and transformer thermal characteristics, and (2) surveying the industry for best practices in operations to respond to GMD and updating the NERC Industry Alert (provides concise, actionable information to the electricity industry).

It was recognized by NERC that severe GMD events present risks and vulnerabilities that are not fully addressed in conventional bulk power system planning, design, and operating processes. The Geomagnetic Disturbance Task Force (GMDTF) is investigating bulk power system reliability implications of these risks and developing solutions to help mitigate this risk.

Many of the GMDTF engineers are focusing on engineering solutions and system vulnerability modeling assessments. Others work closely with the space weather community in understanding the geomagnetic storm threat and appropriate response procedures. [SWPC](#) staff is coordinating new GMD warning dissemination procedures. [SWPC](#) is also working closely with USGS and [NASA](#) on an electric field product, specifying regionally where the greatest threat for GMD induced currents (GIC) may occur. To fully understand the flow of GIC in the bulk power system, we must understand how the geoelectric field responds to a GMD. This geophysical response depends largely on the conductivity structure of Earth. Consequently, [SWPC](#) has partnered with USGS who are working on ground conductivity models. Electric-field model output is critical input for power system vulnerability models.

[SWPC](#) is also working with industry and partner agencies to understand the appropriate quantity, spatial distribution, and location of magnetometers necessary to support E-field calculations. And to support validation of models, the group is addressing what measurements and data are openly available to the space weather community for geomagnetic storm analysis and operational assessment. This critical public-private collaborative effort is an important step in building our Nation's readiness, responsiveness, and resilience to severe geomagnetic storms.

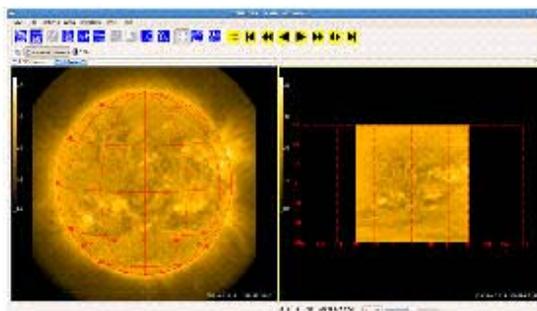
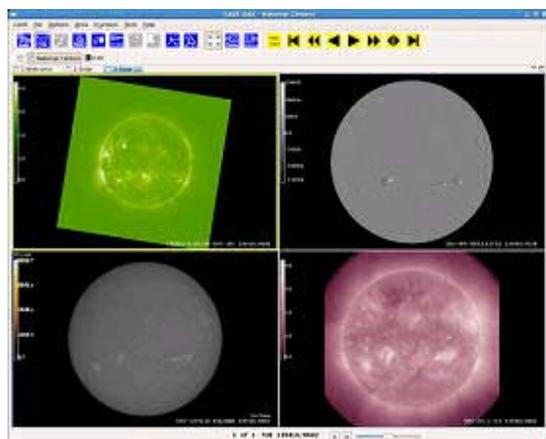


The aurora can provide local information on where geomagnetic storms may be more severe.

AWIPS II Software Update for SWPC

NCEP Central Operations (NCO) is currently in the midst of transitioning legacy NAWIPS software into the NWS AWIPS II system. As part of our migration efforts, NCO Systems Integration Branch (SIB) has the opportunity to integrate the data ingest/display and forecast tools currently used at Space Weather Prediction Center's (SWPC) into the AWIPS II baseline software. Following several months of design and development, SIB delivered new operational capabilities for the SWPC forecasters in the current AWIPS2 Operational Build (OB) 13.3 Release. This will enable SWPC to take their first step toward integrating their operational activities onto a single IT system. SWPC will now establish an operational data stream of solar imagery (satellite images of the sun taken at various wavelengths), and decode and persist the imagery in the AWIPS2 datastores. Forecasters using CAVE (Common AWIPS Visualization Environment, the primary user interface to the data and forecast production) may now select, display and manipulate the imagery, including being able to interactively sample the data and overlay the solar equivalent of latitude-longitude lines. The images shown here provide an Initial Operating Capability (IOC) of image display with refined capabilities being provided in OB13.4 scheduled for July. Further enhancements will follow as forecasters use the new software and provide feedback to SIB.

SIB continues to evaluate and implement additional SWPC data decoding and display requirements for re-implementation onto AWIPS2. In the coming months we will be delivering decoders for high-cadence observed data such as magnetometer, as well as various specialized display techniques.



Solar images as displayed by AWIPS II software

Winter Weather Experiment 2013

The Hydrometeorological Testbed at the [Weather Prediction Center](#) (HMT-WPC) hosted its third annual Winter Weather Experiment from January 15 - February 15, 2013. This year's experiment focused on exploring improved methods to quantify and communicate uncertainty in winter weather forecasts while also investigating a new method for deriving snowfall accumulations from numerical models. Twenty-three forecasters, researchers, and model developers participated in the five week experiment.

During the experiment, participants issued short-term 24-hour probabilistic snowfall forecasts using a combination of experimental and operational model guidance. The experimental guidance included two 10-member ensembles provided by the Air Force Weather Agency ([AFWA](#)) and a weighted mean from the operational Short-Range Ensemble Forecast system ([SREF](#)). In addition to these experimental ensembles, the experiment featured a new snowfall accumulation technique that uses information from the North American Model's (NAM) microphysics scheme to refine the model snowfall forecast. Participants found the parameters used in this calculation provided valuable forecast information. As a result, HMT-WPC is working with the [Environmental Modeling Center](#) (EMC) to expand this methodology to other models.

In addition to the short-term probabilistic snowfall forecasts, participants also issued experimental Day 4-5 winter weather outlook forecasts. Despite the challenges associated with forecasting winter weather at these longer time ranges, participants were generally able to provide valuable forecast guidance. As a result, [WPC](#) is investigating expanding its operational winter weather product suite to include such outlooks.

Another important aspect of this year's Winter Weather Experiment was exploring how to communicate uncertainty in winter weather forecasts more effectively. Participants prepared a public forecast graphic highlighting the anticipated winter weather hazards, and then used this graphic to conduct a mock decision support briefing for a regional emergency management group. Feedback from the Weather for Emergency Management Decision Support (WxEM) team participating in this mock briefing emphasized the importance of organizing the briefing so that the most important forecast information appears first.

The HMT-WPC Winter Weather Experiment provided a valuable opportunity to foster collaboration between the forecast, research, and model development communities. A number of the experiment's results continue to be explored through collaboration with [EMC](#) and other partners. A complete report summarizing the experiment activities and results is available [here](#).



HMT-WPC Winter Weather Experiment participants examine model differences for the early February Nor'easter. From left to right: Paul Stokols (NWS HQ), Rich Otto (WPC), Paul Frisbie (WFO GJT), Gary Lackmann (NCSU), and Matt Pyle (EMC). (photo credit: David Novak)

Congressional Visitors to WPC

Since opening its doors in August 2012, the [NOAA Center for Weather and Climate Prediction \(NCWCP\)](#) in College Park, Maryland, has become a destination for national decision makers. On February 11, U.S. Senator Ben Cardin of Maryland and Acting [NOAA Administrator Kathryn Sullivan](#) visited the [NCWCP](#). Guided by [NCEP](#) management, they toured the new facility and visited each operational unit on the 4th floor, where the ongoing life-saving activities were highlighted. [Weather Prediction Center \(WPC\) Director, Jim Hoke](#), and Development and Training Branch Chief, David Novak, led the visitors on an interactive tour with the staff of the various [WPC](#) forecast and analysis desks and emphasized the importance of collaboration in executing the [NWS](#) mission to protect life and property and enhance economic opportunity.

On March 5, [WPC Director Jim Hoke](#) hosted U.S. Congressman Chaka Fattah of Pennsylvania to [WPC](#) operations in the [NCWCP](#). In meeting with the congressman, Hoke and John Sokich of the [NWS Strategic Planning and Policy Office](#) focused on the importance of [NWS](#) forecasts to people's safety and well-being. The [NWS](#) is the primary source of weather information for the public, private, and academic sectors across the country and works around the clock every day of the year to serve in this role. Hoke and Sokich emphasized the importance of satellite, radar, surface-based, and other types of observations to accurate weather forecasting.

The day after Rep. Fattah visited [NCWCP](#), the *Philadelphia Inquirer* reported Rep. Fattah stated the [NWS](#) has a key ally in Congress - namely, him. In fact, Rep. Fattah returned to [NCWCP](#) just three weeks later on March 27 to gain more understanding about the details of [NWS](#) activities. During this second visit, [NWS Director Louis Uccellini](#) briefed Rep. Fattah on some of these operational details prior to an in-depth tour of the [WPC](#) operations area.

On March 25, staff of the U.S. House of Representatives Committee on Science, Space, and Technology visited the [NCWCP](#). During the [WPC](#) portion of the tour, the staffers engaged [WPC](#) staff with many questions about the details of the [WPC](#) role in support of the [NOAA](#) and [NWS](#) missions. Direct interaction with national decision makers, such as that which occurred during the recent visits, is critical in providing awareness for the broad and life-saving [NWS](#) mission.



Figure 1: (left to right) Drs. David Novak and Jim Hoke (WPC) welcome Acting NOAA Administrator Kathryn Sullivan and U.S. Senator (MD) Ben Cardin to the WPC operations area at the NCWCP. Photo courtesy Frank Pereira (WPC).



Figure 2: WPC forecasters Brian Korty (seated), Bruce Sullivan (center-left), Andrew Orrison (right), and WPC Director Jim Hoke (center-right) discuss the WPC rainfall forecast methodology with U.S. Representative (PA) Chaka Fattah (center). Photo courtesy Crystal Rickett (WPC).

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