# NCEP Quarterly Newsletter - October 2011

Print

## NCEP High Performance Computing

In August, NCEP Central Operations (NCO), NOAA's Office of the Chief Information Officer (NOAA OCIO) and NOAA Acquisition and Grants Office (NOAA AGO)reached a major milestone with the award of a new contract to maintain current operational High Performance Computing (HPC) capability for up to two years. The current contract expires at the end of fiscal year (FY) 2011 and contract award for NCEP's next generation supercomputer, the Weather and Climate Operational Supercomputing System (WCOSS) is expected in early FY2012. The just-awarded "bridge contract" provides supercomputing capability until the WCOSS is built and NCEP operations are transitioned to the new system.

Award of the bridge contract is a major accomplishment in a multi-year effort that will significantly change the way NCEP utilizes high performance computing for research, development, and operations. Over the last decade, NCEP has developed, upgraded, and operated Numerical Weather Prediction, Climate Prediction, Ocean Forecasting, and other models on IBM Power systems. The current development system, Vapor, has a capacity of approximately 20 teraflops (TF). The teraflop, one trillion floating point operations per second, is a common measure of supercomputer processing speed. At this time, the world's fastest supercomputers operate in the range of 1000 to 8000 TF. Final development work is conducted on the backup NCEP operational supercomputer, Cirrus, and deployed into operations on the primary NCEP operational supercomputer, Stratus. Both Cirrus and Stratus have a capacity of 72 TF.

In 2008, NOAA published the High Performance Computing (HPC) Strategic Plan, outlining NOAA's plan to consolidate high performance computing requirements into an Environmental Security Architecture. In this architecture, NCEP development will be distributed across multiple NOAA HPC systems, including Gaea, a Cray system at the Oak Ridge National Laboratory with over 700 TF capacity, growing beyond a petaflop in early 2012 and Zeus, an SGI system with over 350 TF capacity that will be operating in the NOAA Environmental Security Computing Center (NESCC) in Fairmont, WV at the start of 2012. NCEP research and development work will be conducted alongside other NOAA R&D efforts, allowing more collaboration among NOAA line offices. At the same time, NOAA line offices will consolidate their HPC management efforts to increase the efficiency of HPC capability delivery to all NOAA. The integrated management approach will also allow NOAA to centralize HPC services and practices resulting in the ability of developers to move work to different HPC platforms with less effort.

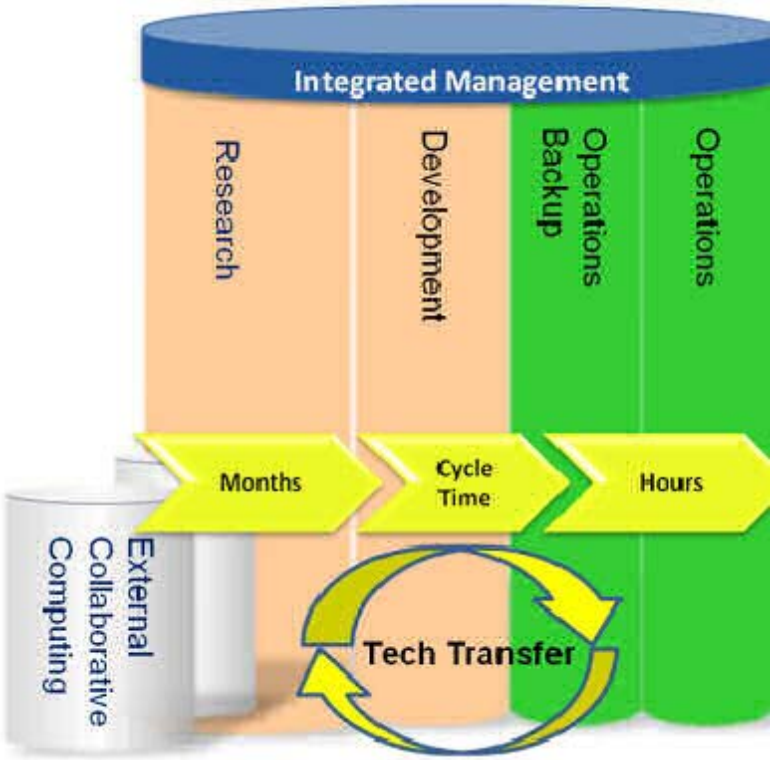

Diagram showing the Environmental Security Architecture.

Another major NCEP HPC milestone was reached in September with the transition of the NCEP High Performance Storage System (HPSS) from Gaithersburg, MD to NESCC. The transition, overseen by the NOAA Office of the Chief Informantion Officer (OCIO) High Performance Computing and Communications

Picture of the HPSS Tape Silo at NESCC.

group and the NOAA integrated management team, included transition of NCEP operational archiving functions to the new HPSS system and the disassembly and move of the legacy NCEP archive system to the new facility. During the transition, 12 petabytes (PB) of data was transferred by truck from Gaithersburg to Fairmont. The new archive has a current capacity of over 30 petabytes and can grow to more than 50 PB. The archive will be utilized by NCEP and NOAA's Earth System Research Lab in Boulder, CO.

## NWP Workshop on Model Physics with an Emphasis on Short-Range Weather Prediction

A workshop organized by the Development Testbed Center (DTC) and NCEP's Environmental Modeling Center (EMC) was held at the World Weather Building in Camp Springs, Maryland on 26-28 July 2011. The goals of the two and a half day meeting were to find short-term opportunities for improving numerical weather prediction (NWP) models, and to establish a longer-term framework for closer collaboration between research and operations (R&O). Thirty-four invited participants from academia and various government agencies attended the meeting. The first day of the workshop focused on issues related to representing physics processes in NWP models, including atmospheric radiation, land surface modeling, cloud microphysical processes, the surface and planetary boundary layer (PBL), air-sea interactions, and parameterized subgrid-scale convection. The second day included talks from representatives from NCEP centers, universities, and private industry, providing their perspectives as key users of model guidance. Presentations were also given by representatives from several NOAA labs and from the Naval Research Laboratory (NRL), describing their operational numerical weather prediction development. The final portion of the meeting focused on identifying a path forward for promoting greater coordination of physics development between the R&O modeling communities.

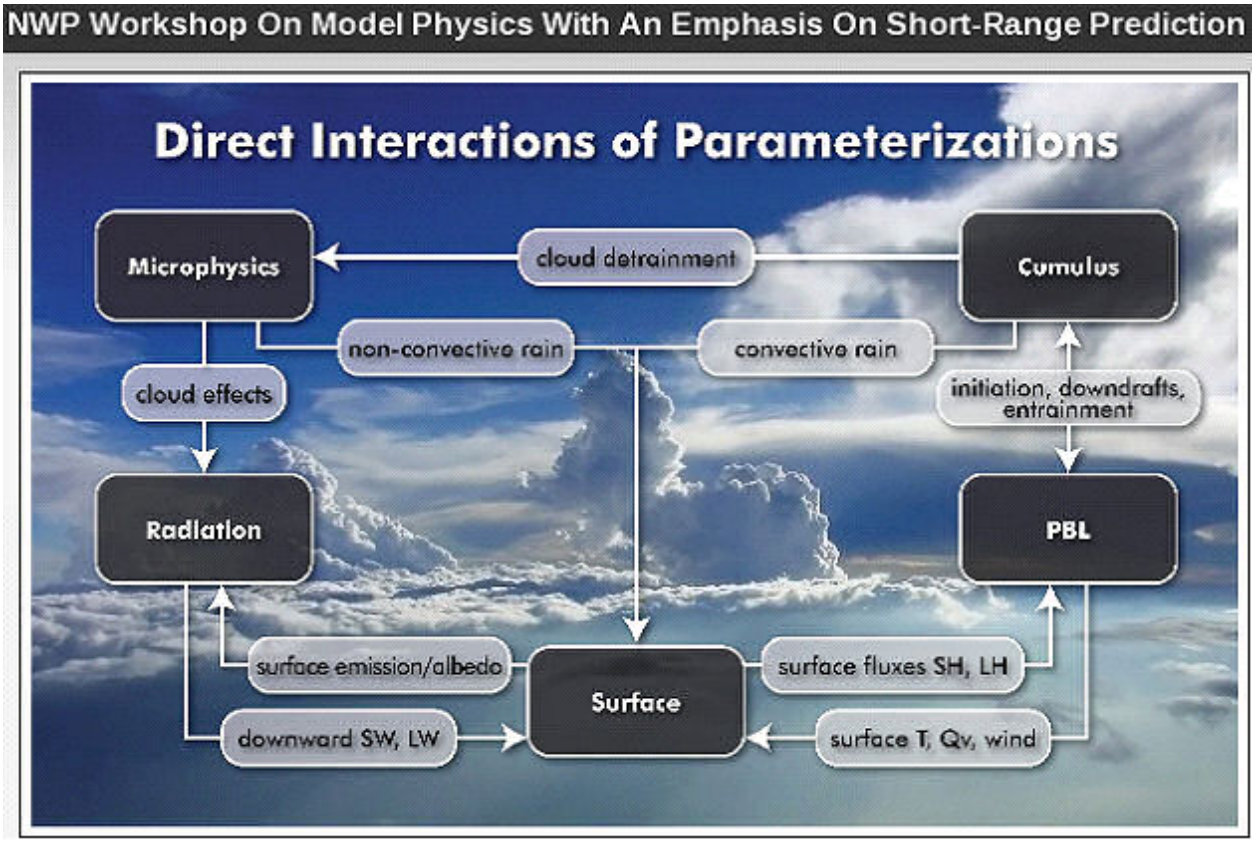

Diagram showing direct interactions of parameterizations.

In summary, the workshop participants recommended the following action items as a follow up to the meeting.

- EMC should establish a science advisory board to provide guidance on scientific priorities, with a particular emphasis on physics development.
- EMC and the DTC should work closely to promote R&O collaboration through working group meetings and workshops.
- NOAA/NWS should fund a substantial grants program for NWP weather research, including a visiting scientist program that encourages R&O collaboration.
- DTC should establish a model evaluation testbed with a variety of datasets that can be used by a wide range of community users.
- The community developing NWP physics should make greater use of direct physical validation, special observation networks, and simplified modeling frameworks.
- NOAA/NWS should acquire increased computing resources for developing the next generation high-resolution modeling systems.

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## MAG User Interface Redesign

Based on customer feedback, a new Model Analysis and Guidance (MAG) web site user interface was deployed on June 27th 2011. The new user interface features a choice of image size, and the ability to choose individual forecast hour images through a clean, row and column style interface (see Figure 1.). Controls on the product presentation page allow selection of previous or next images in the time series without having to navigate away from the product image (see Figure 2.). Product animations are also available in multiple day increments.

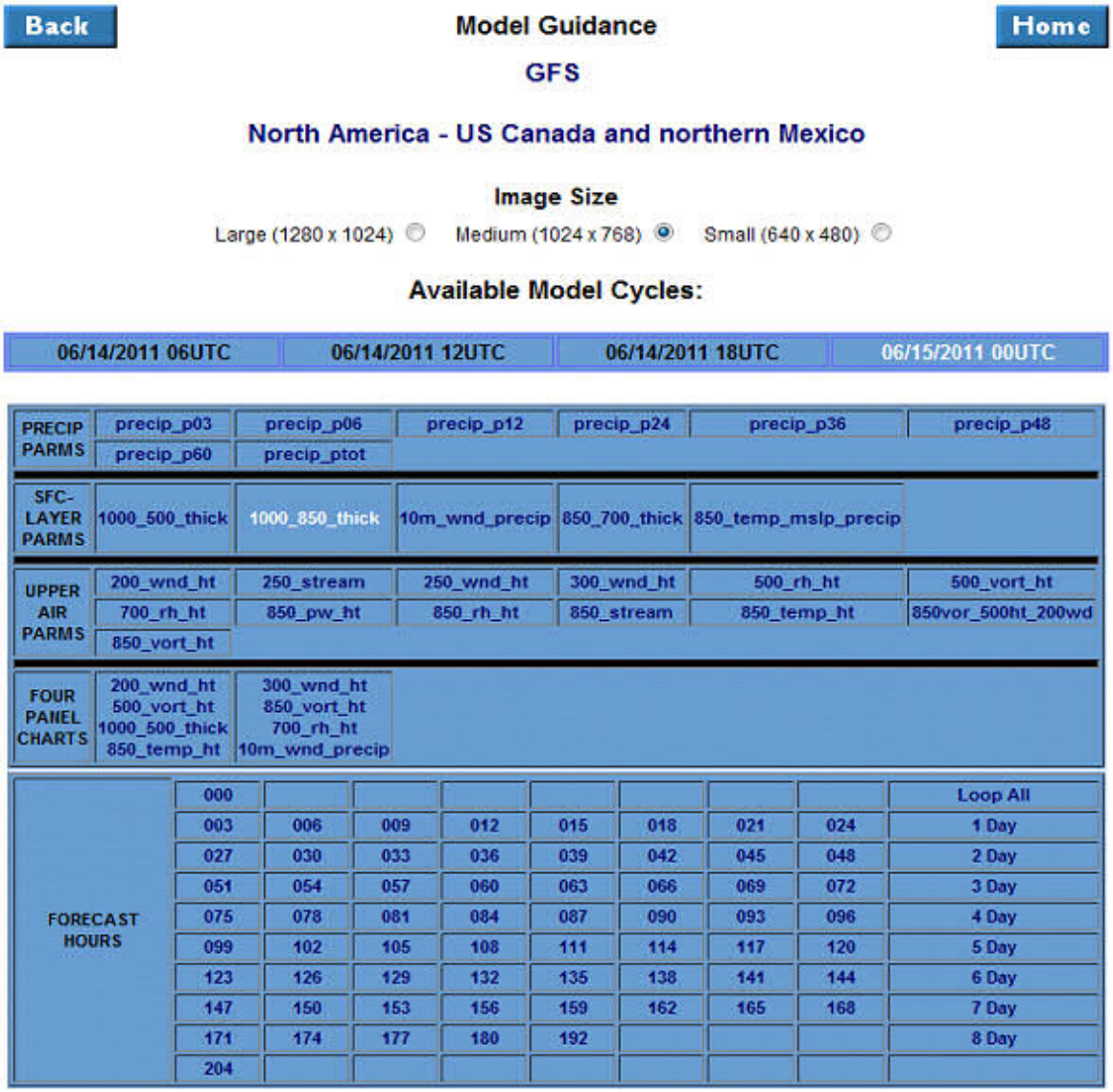


Figure 1: Forecast hour selection matrix replaces dropdown list control. Large, Medium, and Small image sizes are available.

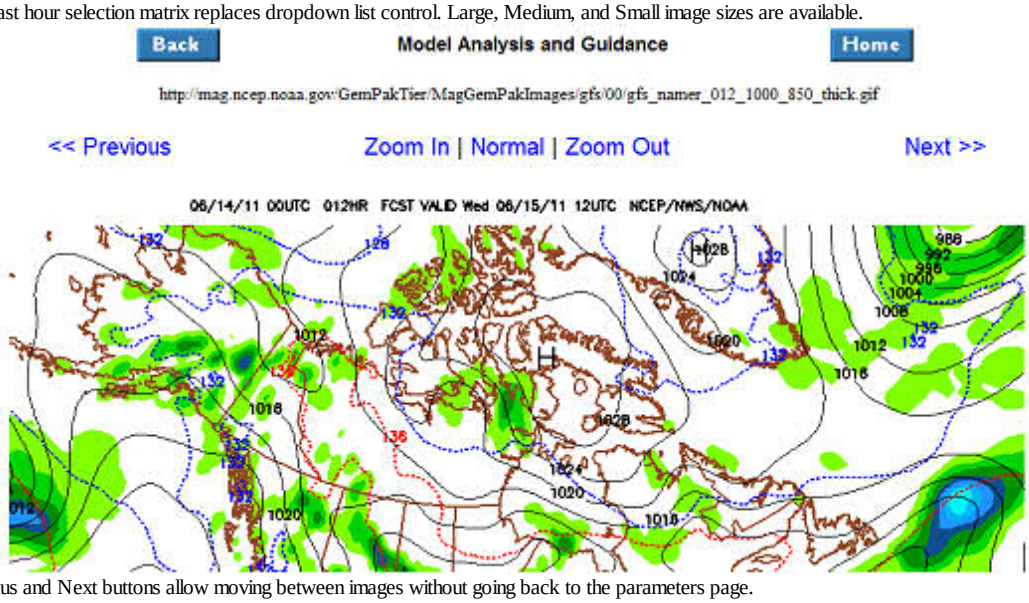


Figure 2: Previous and Next buttons allow moving between images without going back to the parameters page.

The MAG's predecessor, the Model Analysis and Forecast (MAF) site was removed from service on August 29th, 2011. Computer resources from its retirement are being reclaimed and used in furthering the capabilities of the production and evaluation of new numerical weather prediction models.

The re-design of the user interface is the beginning of several site upgrades to add new model output choices; create new visualizations of existing model data; make image backgrounds, maps, titles, and unit measures more consistent; and improve overall usability. Common choices are pre-selected to reduce the number of mouse clicks needed to display products. Users are kept informed of planned upgrades and changes through several documents available on the web siteâ€™s main page.

The main page of the site is found at: http://mag.ncep.noaa.gov/
Customer comments are always welcome at: http://mag.ncep.noaa.gov/NCOMAGWEB/mail_webmaster/index.shtml.

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## Work Continues at NCWCP

Work continues on the NCWCP, a four story, 268,762 sq ft building designed to house approximately 800 employees of five centers of the National Centers for Environmental Prediction (NCEP), two groups from the National Environmental Satellite, Data, and Information Service (NESDIS)and NOAA's Air Resources Laboratory (ARL), located in Riverdale, MD. Skanska, the construction company selected to complete the NCWCP, has made considerable progress and the completion schedule remains on target. The schedule has non-operational occupants beginning to move in June, 2012. Dual operations for NCEP and NESDIS's operational sections will commence in August, 2012 with move-in complete for all groups by the end of September, 2012. Meanwhile, much work is being accomplished inside the building including carpeting (see Figure 1), the atrium ceiling (see Figure 2) and the auditorium (see Figure 3).

Figure 1 â€“ Second floor carpet, paint, and ceiling tiles are complete.

Figure 2 â€“ Atrium ceiling.

Figure 3 â€“ Entrance to NCWCP, auditorium is grey section on right.

# Service Center Activities

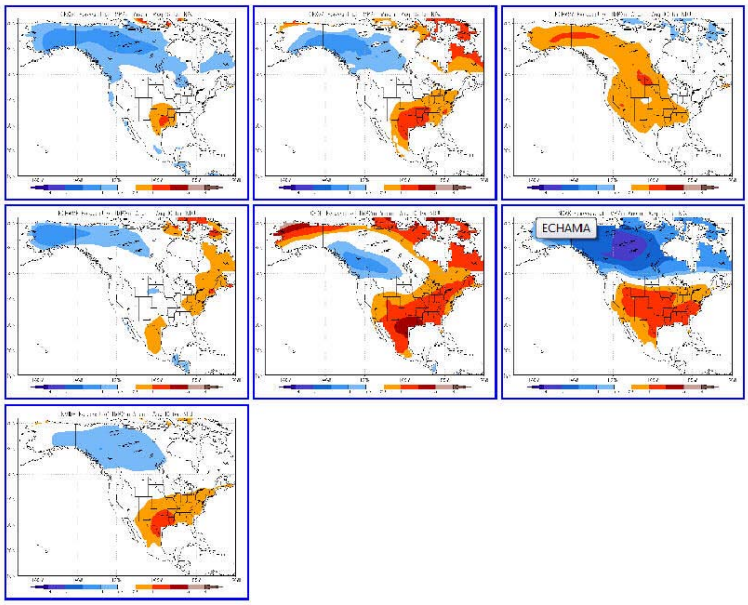
## National Multi-Model Ensemble Initiative

The idea that an ensemble of models may be better for prediction than a single model has been around for a while. One formidable challenge for the originators of these predictions, in the context of seasonal prediction, is the requirement that about 30 years of hindcasts are needed to correct the model systematic error, a big burden in terms of computer resources. At a meeting in February 2011, it became apparent that four US modeling groups involved in coupled ocean-atmosphere models outside NCEP were up to the task of seasonal prediction and very willing to participate. These groups are NOAA's Geophysical Fluid Dynamics Laboratory (GFDL), the National Center for Atmospheric Research (NCAR) (in collaboration with University of Miami/Center for Ocean-Land-Atmosphere Studies (COLA)), the International Research Institute(IRI) /

Columbia University (2 versions of one model), and NASA's Global Modeling and Assimilation Office (GMAO) and when combined with NCEP's Climate Forecast System (CFS) form the basis a national multi-model ensemble (NMME).

The outlying centers completed their hindcasts during June and July and EMC/Climate Prediction Center (CPC) collected them via ftp for processing at NCEP. An agreement on a common grid (1X1 degree global grid) and three variables (monthly Temperature at 2 meters, Precipitation and Sea Surface Temperature (SST)) was reached, and NCEP converted all files to a common format (GRIB). It was also agreed that the real time forecasts would need to be ready by the end of the day on the 8th of each month in order to be considered as a tool for CPC's operational seasonal forecasts. Scripts were written to handle a flexible number of available models and any number of ensemble members in order to improve its reliability to withstand partial failures on the part of one or more of the producers to deliver these products on time.

With the help of many at GFDL, IRI, EMC, CPC, NCAR (University of Miami/COLA), the Climate Program Office (CPO) and NASA, an equally weighted mean of the ensemble mean anomalies by each model was produced and ready by August 12th, in time for CPC's briefings and for use in the formulation of the official seasonal outlooks. An example of the output available to the forecasters is shown below.




Winter 2011-12 2-meter temperature anomalies from 6 different models and the multi-model mean (lower left corner) for North America. Red (blue) indicates above (below) average temperatures.

For more details see: http://www.cpc.ncep.noaa.gov/products/people/wd51yf/NMME/

## Aviation Weather Testbed Summer Experiment

The Aviation Weather Testbed, located at the Aviation Weather Center(AWC) in Kansas City, MO conducted a real-time forecast experiment from July 11th - 22nd, 2011 that created experimental forecasts and evaluated new and emerging weather data sets for forecasting convection impacts in the National Airspace System. Over 40 participants from 15 organizations consisting of the AWC and other NCEP Centers, the National Center for Atmospheric Research (NCAR), NOAA/Global Systems Division (GSD), Federal Aviation Administration (FAA), Massachusetts Institute of Technology (MIT)/Lincoln Labs, MITRE Corporation, NWS's Meteorological Development Laboratory (MDL), Cooperative Institute for Meteorological Satellite Studies (CIMSS), the Air Force Weather Agency (AFWA), Purdue University, and the Universities of Missouri and Kansas attended the experiment, working together in small teams to assess the new data sets and test enhanced decision support services through a suite of next-generation aviation weather forecasts.

During the two week operational period, the teams generated two graphical forecasts each day, valid from 18Z-00Z over the Chicago-Atlanta-New York "Golden Triangle" area, using data sets generated by research partners. The first forecast depicted areas of convection impacts to high altitude jet routes, and the second areas of 30% and 60% exceedance probability of radar echo top and reflectivity. The data sets evaluated included a 12 member 4km WRF ensemble generated by the Air Force Weather Agency, Air Capacity Reduction Potential (NCAR), the Short-Range Ensemble Forecast system (EMC), the Nearcast convective initiation model (GOES-R/CIMSS), the High Resolution Rapid Refresh (GSD), the Localized Aviation MOS Product (NOAA MDL), and CoSPA (MIT/LL). Additionally, the teams produced a Day 2-7 categorical forecast of convection impacts using the North American Ensemble Forecast System. Early results indicate that the guidance, particularly when used in combination with aircraft position data, will help the meteorologist convey weather impact and decision support information to air traffic planners in the National Airspace system.

Director of FAA Systems Operations, Ellen King and the FAA Air Traffic Control System Command Center (ATCSCC) Chief Meteorologist, Kevin Johnston participated in the AWC Summer Experiment in the Aviation Weather Testbed (see picture below). Kevin Johnston participated in the Summer Experiment for two full days during which he provided a valuable perspective of the ATCSCCâ€™s operational needs. Ellen King sat in on the experiment for a half day, and was actively involved with meeting with AWC management and forecasters. Mr. Johnston later said the visit was very successful from his and Ms. Kingâ€™s perspective and thought it very beneficial to the continued improvement of the AWCâ€™s support to the ATCSCC.

Participants engaged in Aviation Weather Testbed Summer Experiment. In the foreground on the right is Ellen King, Director of FAA Systems Operations. To her right is Kevin Johnston, the FAA Air Traffic Control System Command Center (ATCSCC) Chief Meteorologist.

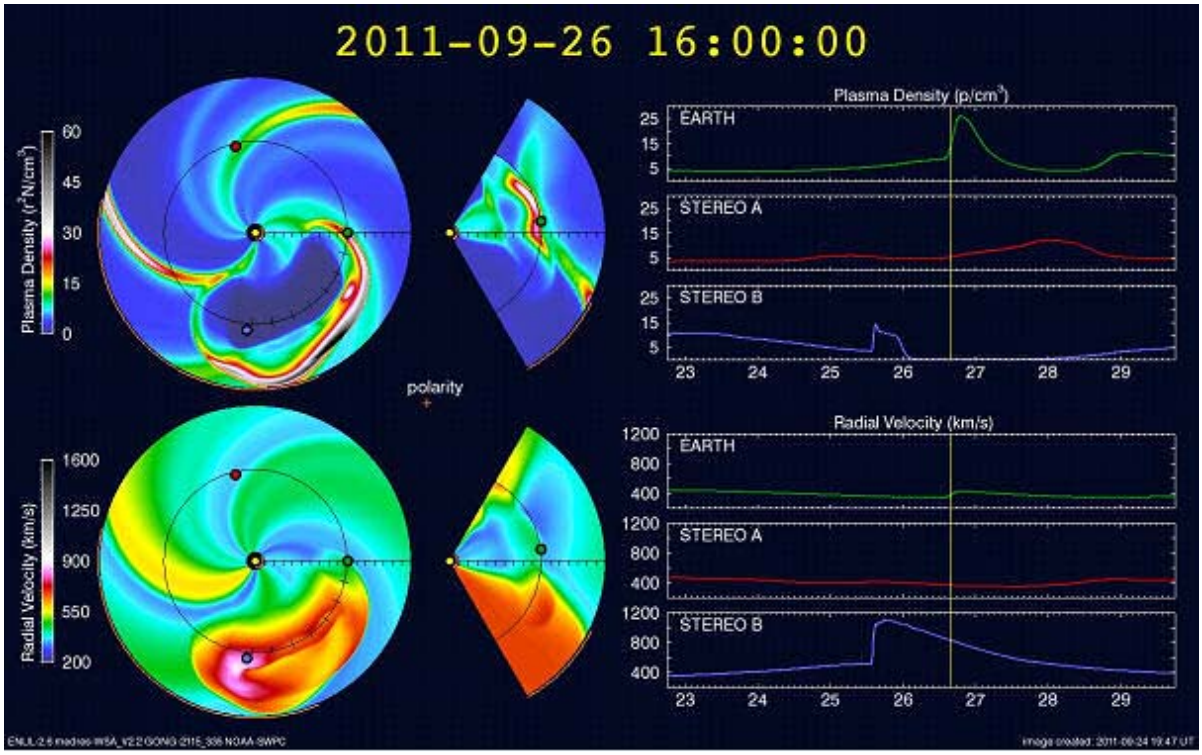
## WSA-Enlil Space Weather Model Implementation

The Space Weather Prediction Center (SWPC) and the NCEP Central Operations (NCO) have achieved an important milestone as of September 30, 2011 when Initial Operating Capability (IOC) was accomplished for the WSA-Enlil model and was placed into the NWS Central Computing System parallel production environment for evaluation. WSA-Enlil will be the first large-scale, physics-based space weather prediction model to be put into operations on the NWS National Centers for Environmental Prediction (NCEP) supercomputing system. The model was jointly developed by scientists with NOAA, NASA, the Air Force Research Laboratory, the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado at Boulder, Boston University, the National Center for Atmospheric Research (NCAR),

and George Mason University.

WSA-Enlil is intended to provide 1-4 day advance warning of geomagnetic storms from quasi-recurrent solar wind structures and Earth-directed coronal mass ejections (CMEs). Such storms disrupt communications, wreak havoc upon sensitive electrical systems, and pose dangers for satellite operations.

The model has been used by SWPC research and forecast staff in experimental mode for several months where it has accurately forecast the timing of geomagnetic space weather storms. The most recent event was the September 26, 2011 geomagnetic storm (see image), where SWPC was able to successfully predict the onset of this event with 40 hours advance notice. This storm was a result of a Coronal Mass Ejection (CME) that erupted from the Sun two days earlier on Saturday morning, September 24 and was partially directed at Earth.




WSA-Enlil Output for the 26 Sept 2011 geomagnetic storm event. The first row of images above show the plasma density and the Radial Velocity of the solar wind is given in the bottom row. The images in the first column provide a 2-D representation of the density and velocity features in a sun-earth plane as viewed from above. The second column of images is a vertical slice (south-north) of the sun-earth plane. In these images, the sun is represented by the yellow dot, the earth is green, and the NASA Stereo Ahead and Behind spacecraft are red and blue respectively.

This geomagnetic storm reached a G2 (Moderate) level on the NOAA Space Weather Scale. Impacts from this event in the US were generally limited to communications and GPS systems. The FAA Wide Area Augmentation System (WAAS), a system of satellites and ground stations that provide GPS signal corrections for aircraft navigation, was severely degraded due to this event over the northern and western sections of the contiguous US as well as all of Alaska. The primary impacts of this degradation were felt at airports with terrain avoidance issues, closely-spaced runways, and/or congested airspace. Outside of the US, international partners have reported reliability issues with GPS and a suspension of cross polar airline flights due to communication reliability concerns.

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## World Meteorological Organization Space Weather Product Portal

Global coordination of space weather data and services has been enhanced significantly through partnership with the World Meteorological Organization (WMO). Together with the WMO Space Programme and the WMO Inter-Programme Coordination Team on Space Weather, NOAA's Space Weather Prediction Center (SWPC) began the implementation of the WMO Space Weather Product Portal. The purpose of the Space

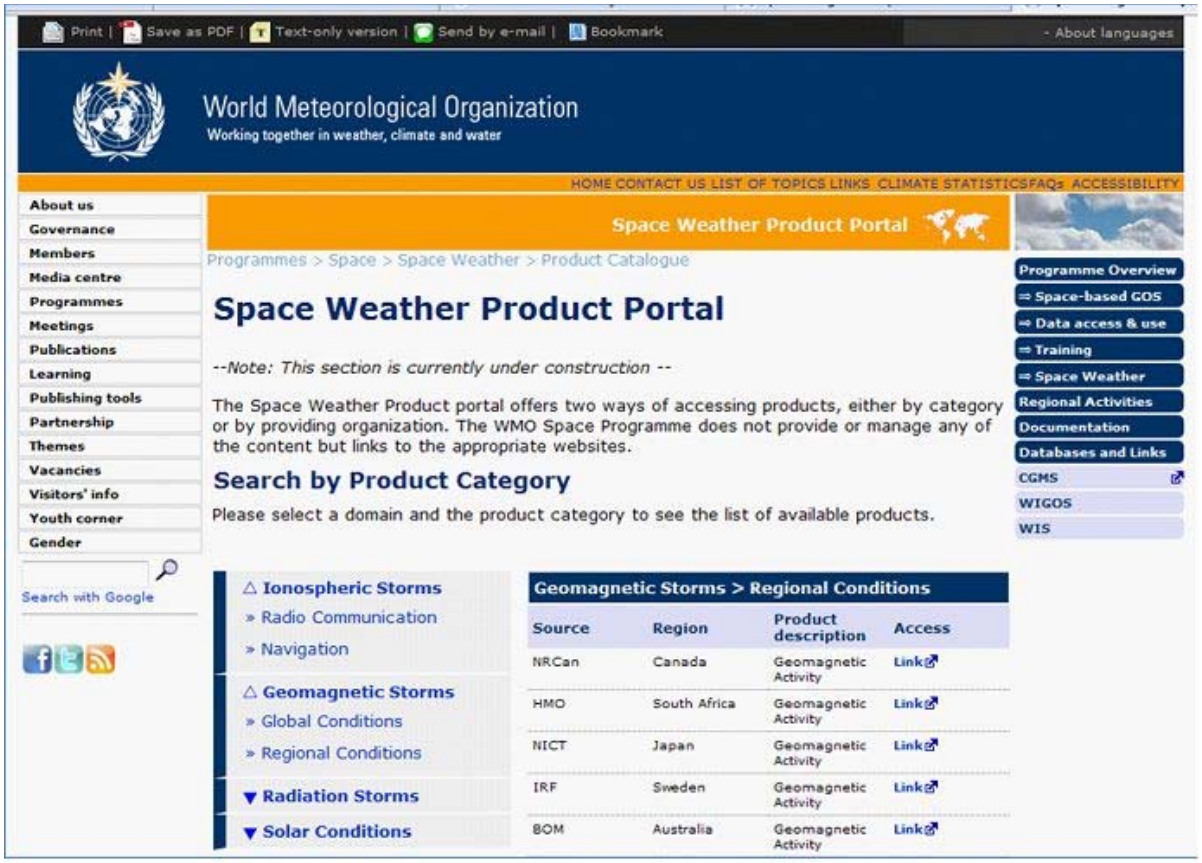
Weather Portal is to make available space weather products that are being provided by WMO Members. This will enable a broader community of users that can benefit from existing services and contribute to improvements.

The WMO Space Weather Portal concept was introduced by Dr. Jack Hayes, U.S. Permanent Representative to the WMO and Director, NWS, at the recent XVI WMO Congress. During a Side Meeting on the Global Preparedness for Space Weather Hazards, Dr. Hayes presented the case for global space weather cooperation (see Figure 1). The participants acknowledged the increasing risks of space weather and the need for coordinated near-term and far-term action plans to implement capabilities that will meet regional and global space weather requirements.

Dr Jack Hayes addresses WMO Meeting on Global Preparedness for Space Weather Hazards

The WMO-hosted portal was proposed by Dr. Hayes as a way to coordinate activities already underway and to encourage increased effort to improve space weather services. The portal will contain metadata and links to space weather products that are being made available by service providers around the world. The portal will also highlight a few products with global value and include training material in multiple languages. This training material will enable Members who currently do not use space weather services to benefit from products available today.

The initial operating capability for the portal is targeted for the end of calendar year 2011. Figure 2 shows the home page of the portal, currently under construction, that is located at the following link: http://www.wmo.int/pages/prog/sat/spaceweather-productportal_en.php. This link, http://www.wmo.int/pages/prog/sat/spaceweather-pilotproducts_en.php , is to the page, also under construction, where products will be available.




Home page of WMO Space Weather Product Portal

This Space Weather Portal effort is closely aligned with the goals of the WMO to facilitate coordination and to enhance usage of space weather data, products, and services. Organizing global products in this way will lead to a harmonized definition of end products and services and the standardization and enhancement of space weather data and product exchange through the WMO Information System. By improving the value of current products, we will encourage a stronger global participation in space weather services, thereby raising the level of our capabilities.

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## Ocean Prediction Center: Toward Enabling NOAA Ecological Forecasting Services

Building off the success of the implementation of National Ocean Service (NOS) models for the Chesapeake, Delaware and Tampa Bays, several Ocean Prediction Center (OPC) senior staff participated in a NOAA-sponsored Ecological Forecasting Workshop July 5-6, 2011. Numerous NOAA Line Offices, as well as state and academic partners were represented. The group examined the development of future ecological forecasts, and recommended that the concentration of dissolved oxygen (DO) be the next parameter to predict. DO was chosen because it is an important water quality variable for many purposes, and is the underpinning to many other ecological forecasts. When DO occurs at low hypoxic and anoxic levels, it creates "dead zones" where insufficient oxygen is available to support marine life. Low concentration of DO values are typically a problem in the central and northern Chesapeake Bay in the summer. DO values can also be used to determine where the fish are, because they avoid areas of low DO.

Main findings from the workshop include:

- Ecological forecasting needs support from upper management to be successful,
- It takes time to transition from research to operations, but is valuable in the long run,
- NOAA needs to better capture user requirements for ecological forecasts,

- We already have a set of ecological forecasts that could move from research to operations,
- NWS infrastructure is valuable to help support ecological forecasts,
- There is a clear difference between guidance and forecasts that is important in the process.

The Ecological Forecasting Workshop preceded a NCEP hosted visit and meeting by Deputy Assistant Administrators for the National Ocean Service (NOS) and NWS on July 11, 2011. The participants of the NWS-NOS meeting reviewed the ecological forecasting workshop findings and recent model implementations, developed priorities for ecological forecasts, and discussed other areas where collaborations between NWS and NOS will lead to better services for the public. This meeting also served as a forum to discuss the development of an Integrated Ocean Observing System (IOOS) sponsored Ocean Coastal Modeling Test Bed at OPC as an essential component for transitioning ecological forecasting capability into operational services. The meeting was widely attended with over 40 participants, including directors of NCEP, IOOS, and representatives from the National Marine Fisheries Service (NMFS). NCEP and NOS offices have operated together under a formal agreement over the last few years to collaborate and produce coastal models which run operationally on the NCEP managed high performance computing system along with other weather, ocean, and climate models. A number of models developed by NOS are now operational on the NCEP system and there are significant prospects for ecological forecasting systems development. OPC plans to host the Chesapeake Bay sea nettle operational web site with its graphical output and to support the generation of the operational model guidance for sea nettle probability (Figure 1).

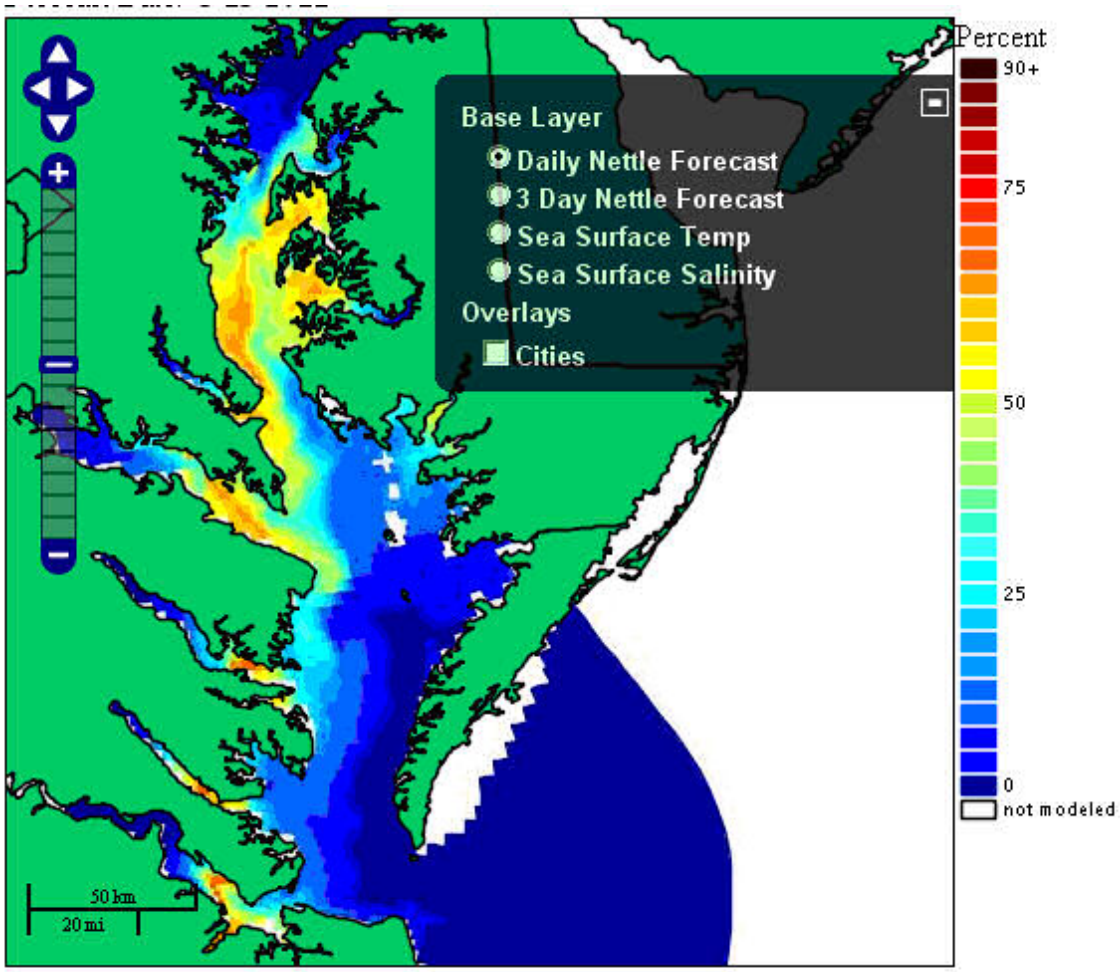


Figure 1. Probability of sea nettle presence for August 15, 2011.

## Hazardous Weather Testbed Fire Weather Experiment

In cooperation with NCEP's Storm Prediction Center (SPC) and the National Severe Storms Laboratory

(NSSL), the GOES-R Proving Ground organized a short fire weather forecast experiment from August 22 through September 2, 2011. This year's experiment was intended as a starting point for more in-depth experiments in the future, which will include inviting outside visiting scientists and forecasters. A mix of SPC and Norman Weather Forecast Office (WFO) operational forecasters, as well as SPC and NSSL scientists participated in generating experimental short-term fire weather outlooks during a 3-hour period each day, with a primary focus on dry lightning and fuel availability over much of the western US (see Fig. 1). Forecast discussions and associated experimental product feedback were captured via online survey during the forecast period (see Fig. 2). The experiment included testing the SPC and NSSL Hazardous Weather Testbed (HWT) facilities and developing an effective demonstration technique, using only a few experimental GOES-R and numerical weather prediction (NWP) products towards a fire weather focus. Satellite-derived Normalized Difference Vegetation Index (NDVI) and NDVI change composites, in addition to GOES observed surface dryness and associated dryness anomalies were demonstrated in combination with operationally available products to determine dry fuel availability (see Fig. 3). Experimental NWP output such as simulated GOES-R Advanced Baseline Imager (ABI) satellite imagery and total lightning threat from the NSSL-WRF (Weather Research Forecasting) model, as well as SPCâ€™s Storm Scale Ensemble of Opportunity (SSEO) were also demonstrated to assist in the forecast of dry lightning. When available, the North American Mesoscale (NAM) model 1.3 km fire weather nest was examined to help develop the fields and associated display techniques that may be utilized in future experiments.

Much like the annual HWT Spring Experiment, the goal of the fire weather experiment in the coming years will be to build foundational relationships within the fire weather community and to help accelerate the transfer of research to operations for experimental products that are directly applicable to the fire weather forecast community. In addition, the interactions between researchers and the operational fire weather community are crucial in the development of future fire weather forecast decision aids.

For more information, please visit the GOES-R Proving Ground at NOAA's Hazardous Weather Testbed blog at: http://goesrhwt.blogspot.com/

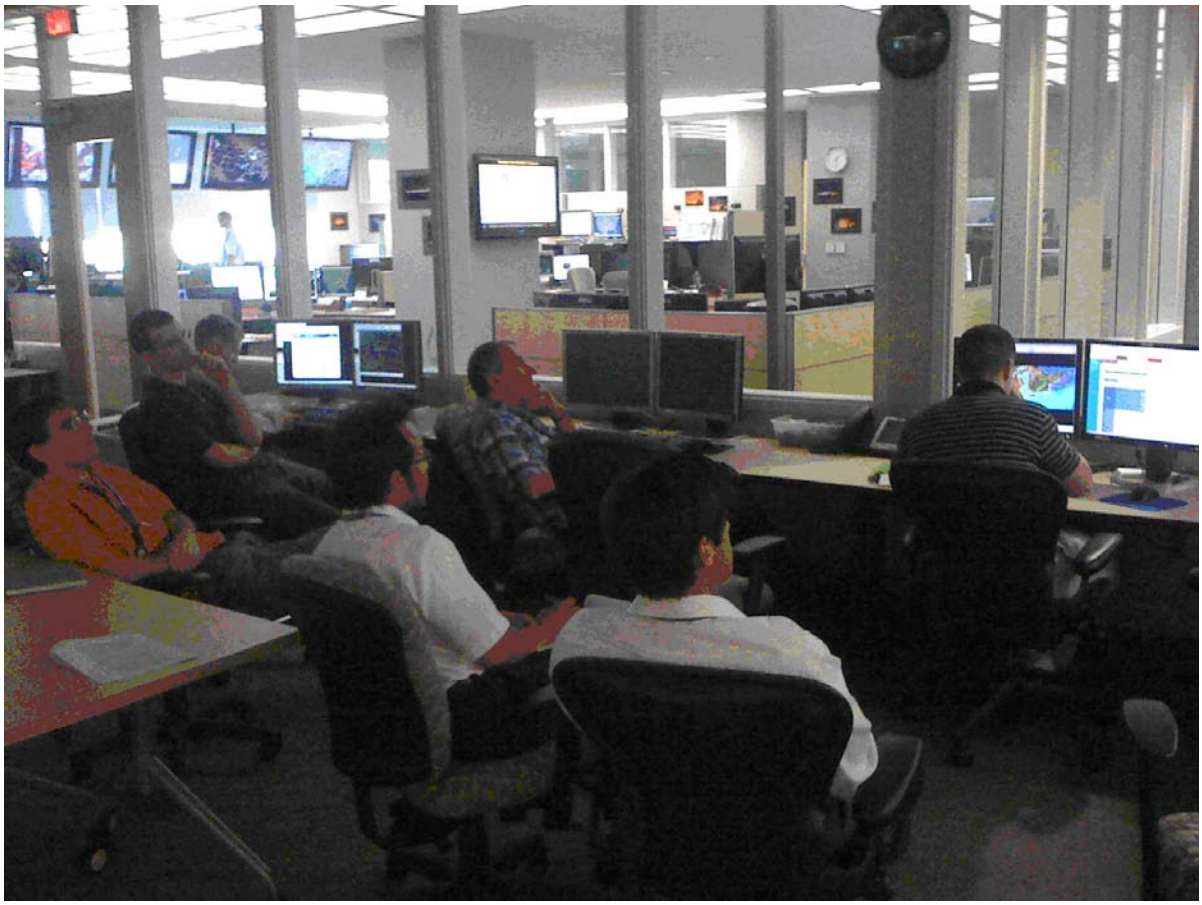

Fig. 1 â€“ SPC, NSSL and NWS Norman forecasters and scientist participating in the 2011 fire weather experiment within the HWT.

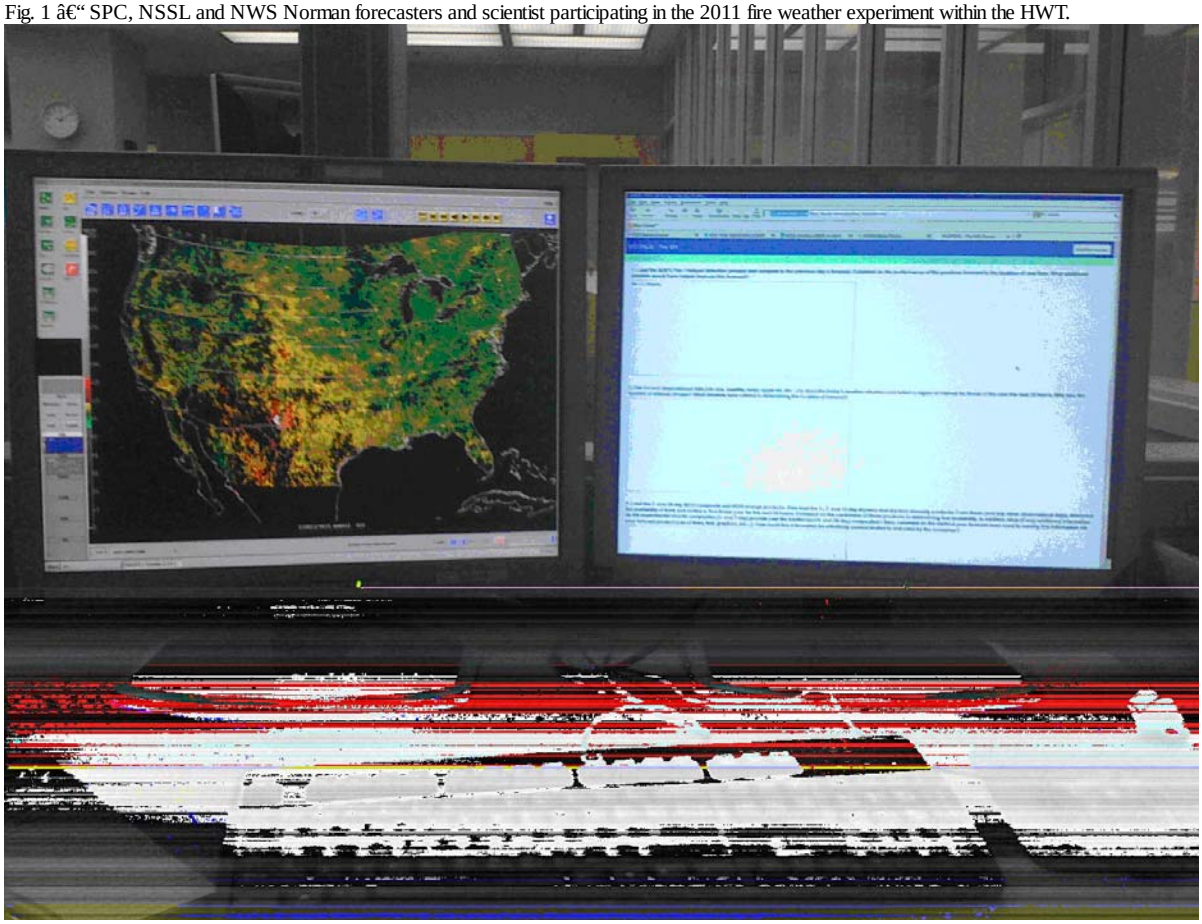

Fig. 2 â€“ HWT N-AWIPS workstation with experimental GOES surface dryness (left panel) and online forecast discussion / feedback form (right panel) used during the 2011 fire weather experiment.

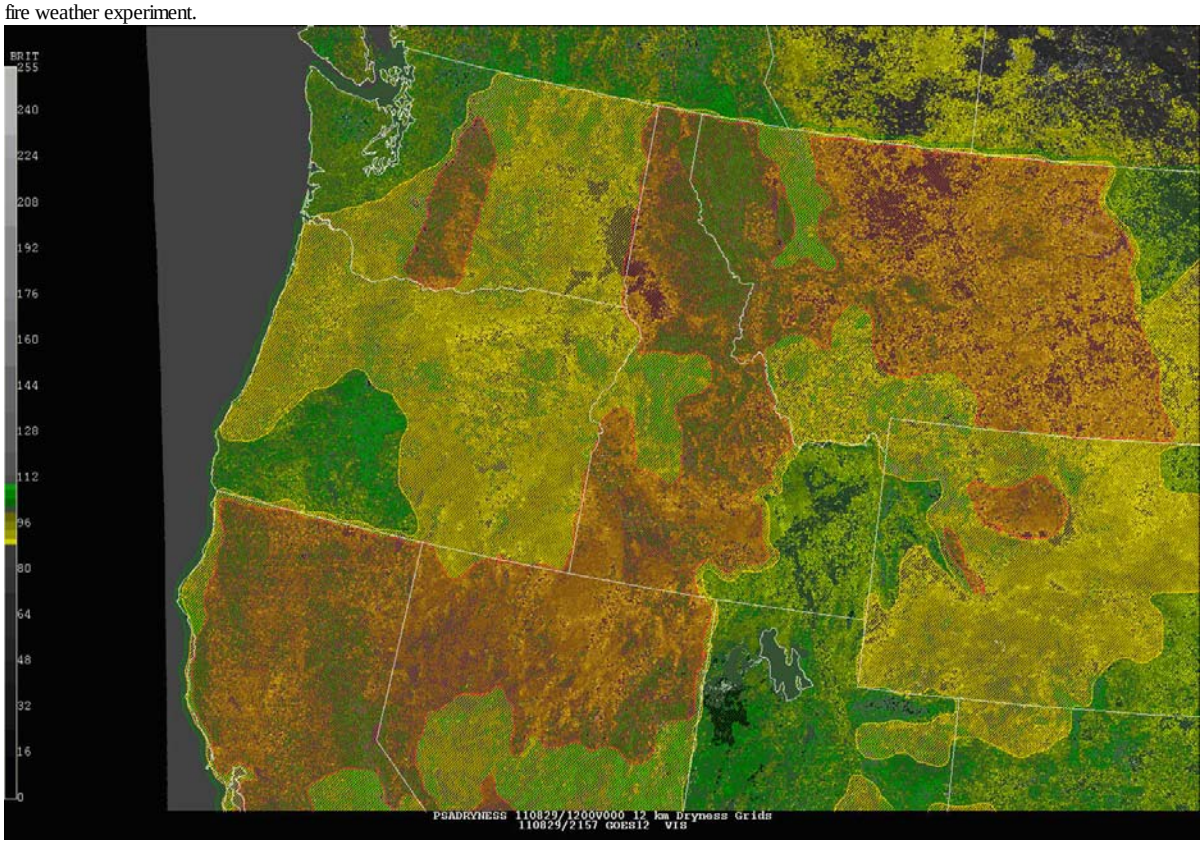


Fig. 3 â€“ Experimental 14-day NDVI change composite with operational Predictive Service Area (PSA) dryness product overlaid. Areas of yellow and red indicate availability of dry fuels.

## NCEP/NWSEO Synergy Team Expanded

The Ocean Prediction Center (OPC) and the Tropical Analysis and Forecast Branch (TAFB) of the National Hurricane Center (NHC) have a Synergy Team that was established in 2003. The team includes both management and National Weather Service Employees Organization (NWSEO) representatives. The goal of the team was to improve ocean forecasts through collaboration and increased operational effectiveness of the two NCEP offices responsible for ocean forecasts (OPC, NHC). The team focused on improving product quality and consistency across boundaries and coordinating product and procedure improvements.

In August, 2011 the Synergy Team was formally expanded to include the Honolulu Weather Forecast Office (HFO). Expansion of the Synergy Team to HFO is natural fit since HFO and NHC share a common border along 140W for over 3000nm, and HFO and OPC share a common boarder along 30N for over 5000nm (Figure 1). All three offices produce both Offshore and High Seas marine forecasts. The team will develop at least one feasible scenario that will result in enhanced operational effectiveness of OPC, NHC and HFO. The first meeting of the expanded team is scheduled for November, 2011.

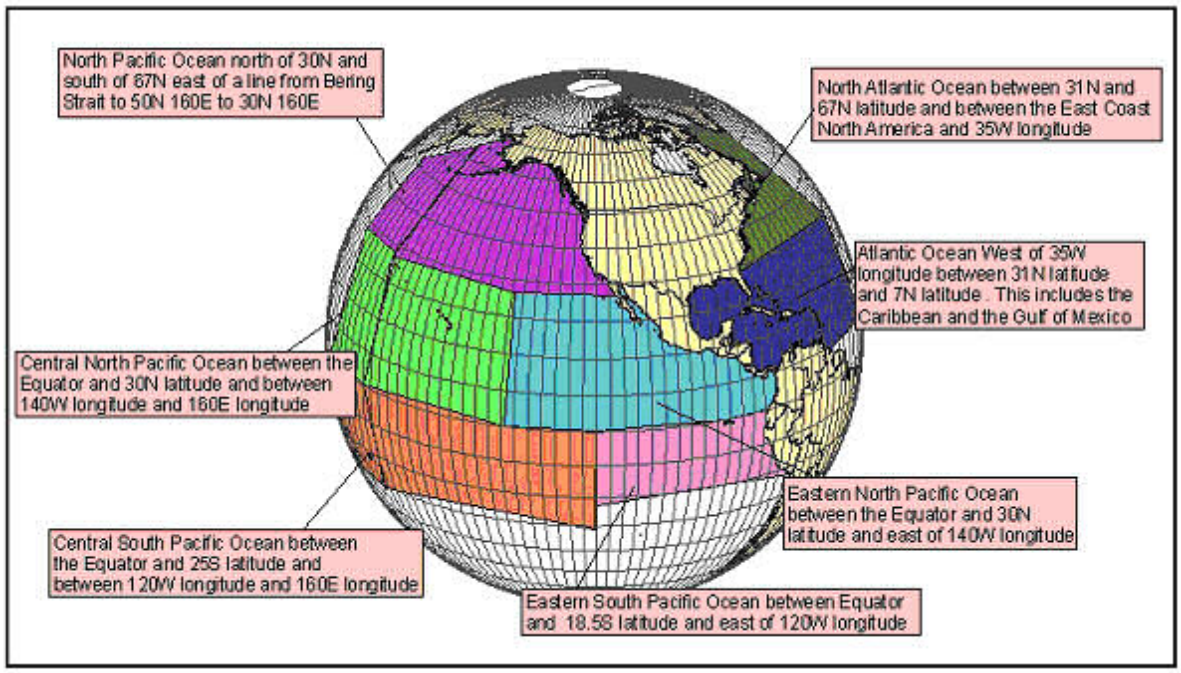


Figure 1. High Seas forecast areas of responsibility.

A few of the major successes of the Synergy Team so far are:

- Formal cross-training established between offices.
- Cross-trained staff submitted nearly 100 recommendations that were implemented.
- Improved management/NWSEO relations.
- Increased Consistency of Products and Forecast Processes.
- Synchronized workflow established between OPC and NHC (seamless graphical products).
- Consistent text forecasts were established.
- Enhanced suite of numerical guidance and data sources at both centers.
- Enhanced technical developments, including utilization of the Graphical Forecast Editor (GFE).

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## Aviation Weather Center Data Services Grow Exponentially

The integration of the Aviation Digital Data Service (ADDS) and www.AviationWeather.gov, collectively referred to as "AviationWeather.gov Web Services" has created a powerful tool for users of National Weather Service's Aviation Weather services. Aviation weather decision makers, from pilots, to airline dispatchers and briefers are accessing the site and using data in new and innovative ways, which is leading to a safer and more

efficient National Airspace System. Traffic across AviationWeather.gov Web Services has nearly doubled the information transferred over the past ten months from 120 to nearly 220 Gigabytes a day. There are several reasons for this dramatic increase.

Just recently the Aviation Weather Center (AWC) aligned the AviationWeather.gov Web with NOAA's Web Operations Center (WOC). The WOC is comprised of multiple independent and geographically diverse server farms. Three farms are individually able to host the entire AviationWeather.gov Web Services. By mirroring the AviationWeather.gov Web Services across these farms, additional security, reliability, and accessibility capabilities can be realized. Additionally, the WOC alignment allowed AWC Information Technology (IT) staff to convert the AviationWeather.gov Web Services to a state of the art object-oriented code which will support additional growth of services. This room for growth has already seen a realization of improved products and data services, and puts the NWS one step closer to a "four-dimensional weather cube" which will drive the weather needs of aviation and the Federal Aviation Administration (FAA) into the future.

AviationWeather.gov Web Services earned "Qualified Internet Communications Provider" (QICP) certification from the FAA in February of 2010. QICP certification means the website meets certain reliability and security standards for the exchange of meteorological data across the Internet. While this certification helps all AviationWeather.gov Web Services users, the airlines are initially benefiting the most. With QICP, they can now use these aviation web services for operational decision making.

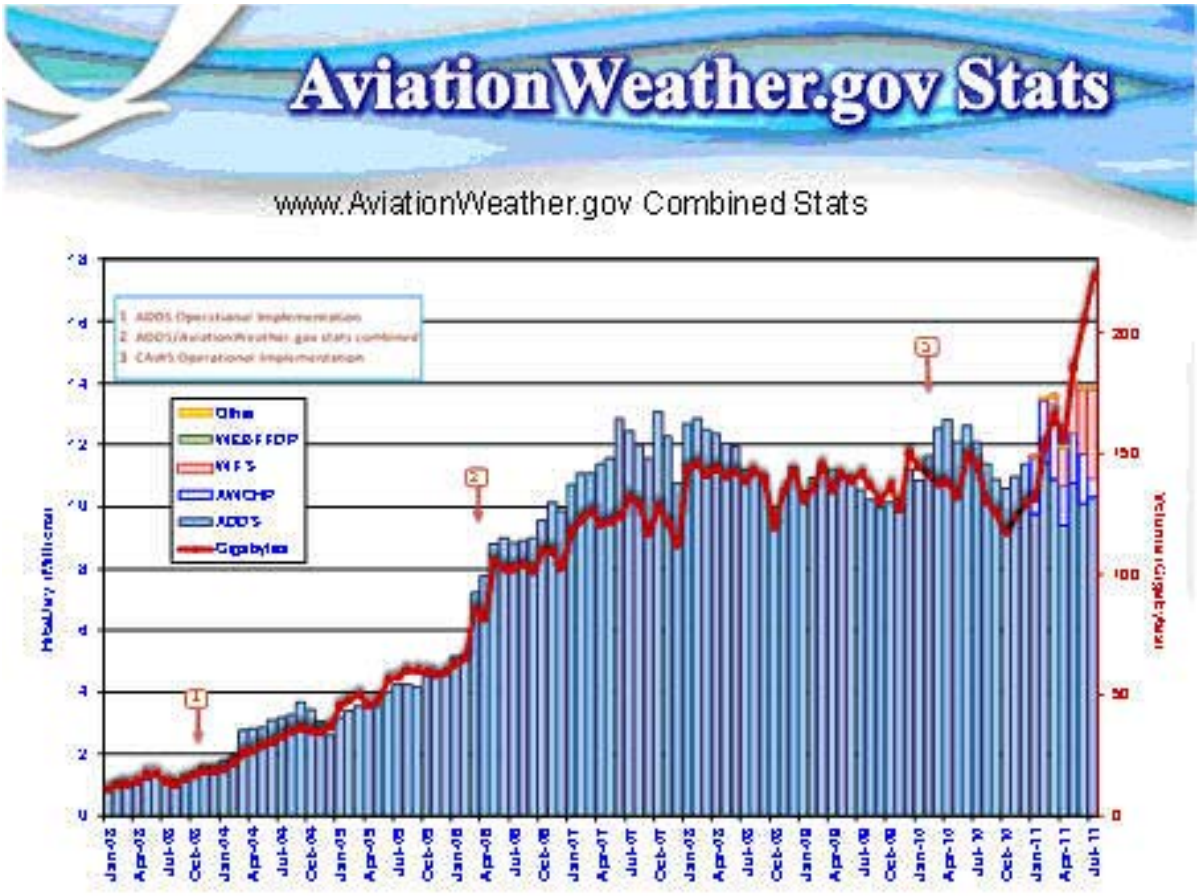
Building on the QICP certification, the Aviation Weather Center has initiated two ambitious customer support campaigns. The WAFS Internet File System, (WIFS) has come on line this past year. WAFS stands for World Area Forecast System. WAFS comprises two World Area Forecast Centers (WAFC). One is WAFC Washington run by the National Weather Service. The other is WAFC London run by the United Kingdom Meteorological Office. WAFCs produce global Significant Weather (SIGWX) charts covering most of the oceanic air space used by international carriers. They also produce a high resolution digitally gridded data set of weather information for the entire world. This data consists of vertical and horizontal grids, points across the globe and up through 60,000 feet.

The plethora of weather information available to other countries and airlines from the WAFC has been made available via an expensive Satellite Broadcast System. This system required expensive dedicated workstations which are becoming obsolete. WIFS provides this data service at no cost to the user, and over the Internet without dedicated hardware systems; and much faster too.

Another international data service managed by the Aviation Weather Center is the International Flight Folder Documentation Program (IFFDP). IFFDP is a facsimile based dissemination system for airlines to receive weather hazards and warnings when flying into or out of the United States. This system, like the satellite WAFC satellite system is very old and becoming obsolete. IFFDP has dramatically improved by moving to the AviationWeather.gov Web Services. By transitioning both the satellite and fax systems which are limited-use data â€œpullingâ€ systems to the Internet, not only can users access data easier, more cheaply and faster, but new capabilities can be provided.

For example, color graphics can be downloaded. Electronic versions can be loaded on laptops or notepads for pilots to use rather than printing out numerous paper copies. Individual users can directly manage the aviation weather information they receive and customize outputs to meet their specific needs.

The Aviation Weather Center continues to add capabilities and features to the entire aviation weather Internet experience which is contributing to better operational flight decisions and safer and more efficient aviation traveling. AviationWeather.gov is now truly a â€œone-stop shopâ€ for all NWS aviation weather information.

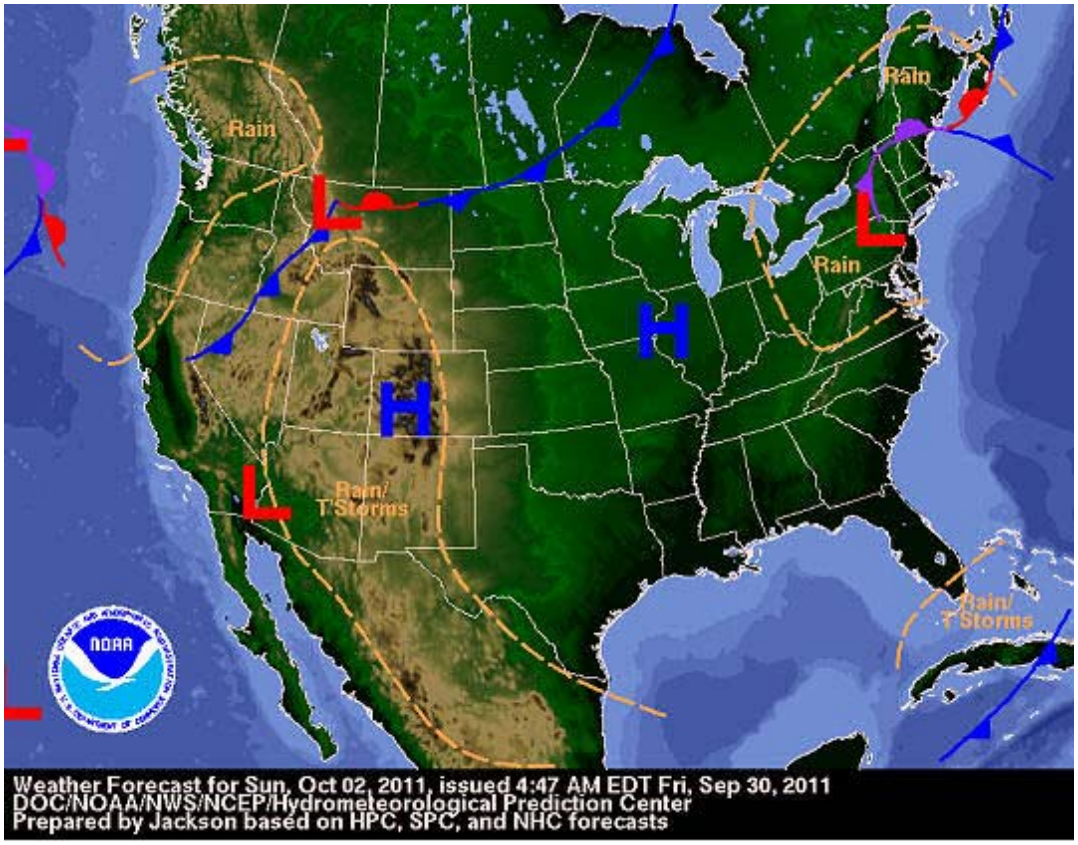



Access statistics for the www.AviationWeather.gov website including hits/day (colored bars) and the volume in gigabytes (red line).

## Day 3 National Forecast Chart

On Monday, September 12, the Hydrometeorological Prediction Center (HPC) implemented the day 3 version of the National Forecast Chart. The new chart was requested by Department of Homeland Security (DHS) management. The new chart is available at http://www.hpc.ncep.noaa.gov/national_forecast/natfcst.php?day=3 along with the charts for days 1 and 2.

The new product was the result of much effort by many HPC people. Forecast Operations Branch Chief Bob Kelly headed the overall project. Extensive programming was accomplished by Alan Robson and Mark Klein of the Development and Training Branch, who developed the scripts, used by the staff to facilitate production of the new product and created the new web interface. Forecaster Tony Fracasso continues to serve as the focal point for establishing the operational procedures and for training the staff in preparing the new product. Negotiations were conducted with the National Weather Service Employees Organization (NWSEO), as implementing the new product involved a significant change in the working conditions for our meteorological technicians (met techs). Because the deadline for producing the new chart is 5 a.m., the daily operational met tech shift was changed from a day shift to a night shift.



Day 3 National Forecast Chart for Sunday, October 2, 2011

## National Hurricane Center Visiting Scientist Program Underway

During the peak of each hurricane season, the National Hurricane Center (NHC) hosts a number of researchers and outside forecasters as part of its Visiting Scientist Program. These scientists get a unique opportunity to spend a few days in the hurricane operations areas with one of the Hurricane Specialists, particularly when there are tropical cyclones to be analyzed and forecast. Time is also spent in NHC's Tropical Analysis and Forecast Branch, which issues more than 100 marine products every day covering several million square miles of ocean.

The class of 2011 is an excellent mix of people, ranging from university professors, government lab researchers, WFO forecasters, national center forecasters, a social scientist, a private company forecaster, and for the first time the program's history, a television broadcast meteorologist. The program will wrap at the end of October as the hurricane season winds down.

KTBS-TV3 Meteorologist Jennifer Gray is briefed by senior hurricane specialist Stacy Stewart as part of the NHC Visiting Scientist Program.

## HPC International Desks

The Hydrometeorological Prediction Center (HPC) International Desks provide in-residence training to operational forecasters from the Caribbean Basin, Central and South America. The Desks consist of two sections, the Tropical Desk and the South American Desk. Two visiting forecasters are in training at each desk at any given time. The students stay for four months, with 16 students trained per year.

Michel Davison, HPC International Desk Coordinator, provides the day to day training as well as curriculum development. The training tools are independent of working platforms so the forecasters can use the same freely available software and data sets when they return to their countries.

The training is focused on the operational use and application of numerical model output. During the training, the visiting forecasters are exposed to a broad spectrum of meteorological products and analysis and forecasting techniques. The training simulates the work in an operational environment, with students preparing forecast charts using current data. These charts are made available on the HPC website. The instructor prepares narratives for each desk discussing the reasoning behind the forecasts. The HPC International Desks also provide visiting fellows training in climate prediction and seasonal and inter-annual forecasts

In addition to the residence training, the HPC International Desk conducts one or two distance training sessions each month using the Internet. These sessions focus on current weather and serve as a refresher for former students and as additional training for their colleagues. Mike also conducts one or two on-site workshops each year in the participating countries. These workshops cover much of the same material that is taught in the residence training, but in a compressed format. These workshops normally last five days and involve 20 - 30 participants. In 2011, Mike led workshops in Mexico and El Salvador.

The Desk, formed in 1988, has trained over 250 meteorologists from Central and South America and the Caribbean Basin.

HPC International Desk Coordinator Michel Davison leads a discussion with visiting forecasters.

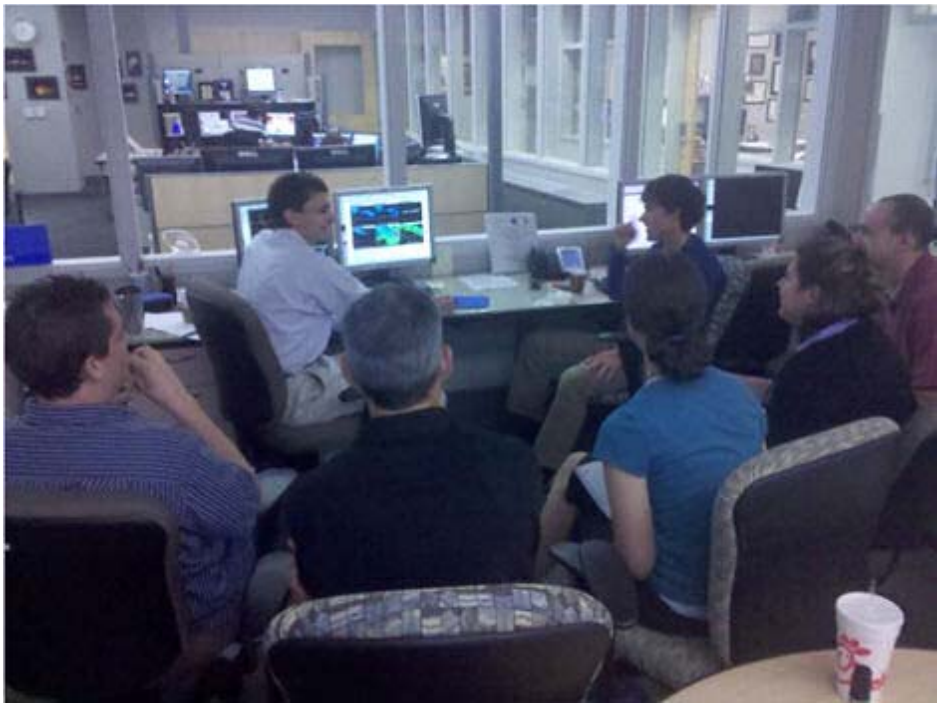
## NCEP Centers Participate in Hazardous Weather Testbed Spring Experiment

NCEP's Hydrometeorological Prediction Center (HPC) joined the Storm Prediction Center (SPC) and National Severe Storms Laboratory (NSSL) in conducting the 2011 Spring Experiment at the Hazardous Weather Testbed in Norman, Oklahoma. The experiment brings researchers, operational forecasters, and members of academia together to evaluate new tools for improving forecasts of hazardous weather events. This year's experiment was composed of severe, convective initiation, and quantitative precipitation forecast (QPF) components. The NOAA Hydrometeorological Testbed at the HPC (HMT-HPC) led the QPF component of the annual experiment for the second consecutive year.

From May 9-June 10, 2011, over 80 forecasters, researchers, and academics used experimental high resolution numerical weather prediction models to produce probabilistic QPFs indicating the potential for rainfall to exceed one half and one inch thresholds. The forecasts were made for three 6-hour periods including the overnight period when initiation and nocturnal movement of MCSs is a major forecast problem. This year, the models being investigated included two 4 km resolution ensembles with convection-allowing physics. As a result of the experiment, it was determined that these models provided substantially improved forecasts compared to the current operational Short Range Ensemble Forecast System (SREF).

Participating in the Spring Experiment has been a valuable experience for HPC forecasters and has allowed them to gain important experience using high resolution model output. A full report describing the results of the QPF component of the 2011 Spring Experiment is available on the HMT-HPC website at http://www.hpc.ncep.noaa.gov/hmt/2011_SpringExperiment_summary.pdf.

NCEPâ€™s Aviation Weather Center (AWC) also participated in the Spring Experiment. A forecaster in the Domestic Operations Branch helped evaluate the high-resolution models for future use at the AWC, particularly for the Convective Sigmet and Collaborative Convective Forecast Product (CCFP) desks. A weekâ€™s participation resulted in the determination that substantial potential exists, but more testing and refinement will be necessary before using this information in routine operations.



David Novak, HPC Science and Operations Officer, leading a discussion at the 2011 Spring Experiment at the Hazardous Weather Testbed in Norman, OK

## Crew of Three Little Birds Visits National Hurricane Center

Ever dreamed of sailing around the world? The Leonard Family - Scott, Mandi, Griffin, Jake and Luke - are doing just that, spending three years traveling around the world on their 50 foot sailboat called the "Three Little Birds".

Of course, tropical cyclones are a big concern for any mariner. That's why the family made a special trip to the National Hurricane Center (NHC) in early July just before taking off on their adventure. NHC Science and Operations Officer Chris Landsea, Ph.D., explained how forecasts are made and what products these adventurers should be watching for on their voyage.

Scott Leonard says he will continue to run his businesses remotely from the boat and make quarterly trips back to California. It's proof that you can run a business from virtually anywhere. For the boys, it's a rare opportunity to be exposed to other cultures. And yes, they will be keeping up with their schoolwork.

NHC SOO Chris Landsea, Ph.D., shows off the ship light to the Leonard family during a tour of the NHC facility. One light is for an active tropical storm, two lights for a hurricane.