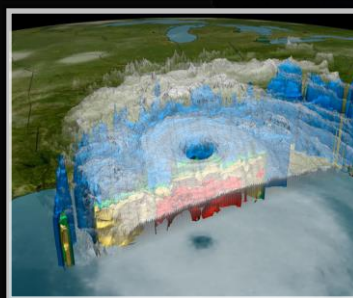
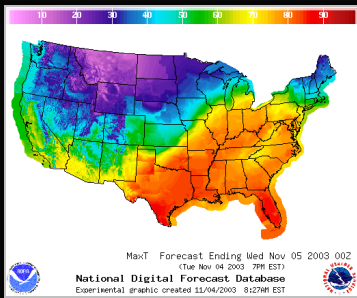
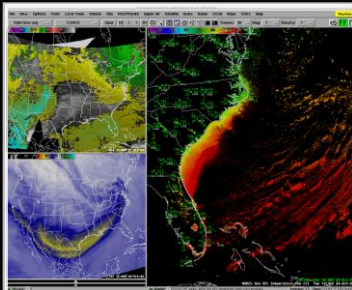


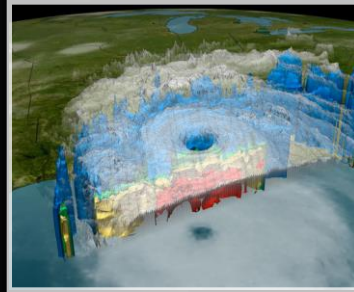
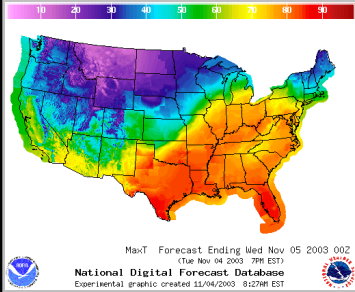
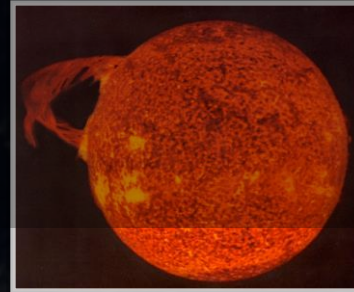
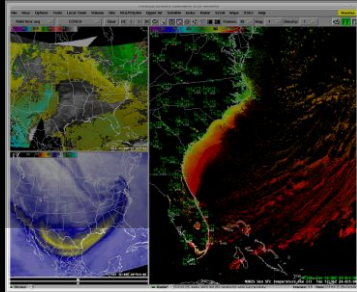
# National Weather Service Partners' Meeting

AMS Annual Conference  
Phoenix, AZ  
Thursday, January 8, 2015





# Building a Weather Ready Nation Strategic Goals – Status Report



**Dr. Louis W. Uccellini**  
Director, National Weather Service  
NOAA Assistant Administrator for Weather Services  
**January 8, 2014 – AMS Partners Meeting**



# Outline

- **Weather-Ready Nation**
- **Status: Budget & Organization**
- **Dissemination, Computing & Open Data**
- **Ongoing Activities**
- **Summary**



# NWS Strategic Outcome: A Weather-Ready Nation

Becoming a Weather-Ready Nation is about building **community resiliency** in the face of increasing vulnerability to extreme weather

***“Ready, Responsive, Resilient”***



## REQUIRES NWS TO:

- Fully Integrate our Field Structure:
  - Better Forecasts and Warnings
  - Ensure Consistent Products and Services
- Provide Impact-based Decision Support Services (IDSS)
- Deliver through Multiple and Reliable Dissemination Pathways
- Work with Partners to *gain needed response*; includes embedding NWS in Emergency Operations Centers

*Involves entire US Weather Enterprise WORKING TOGETHER  
to achieve far-reaching national preparedness for weather events*



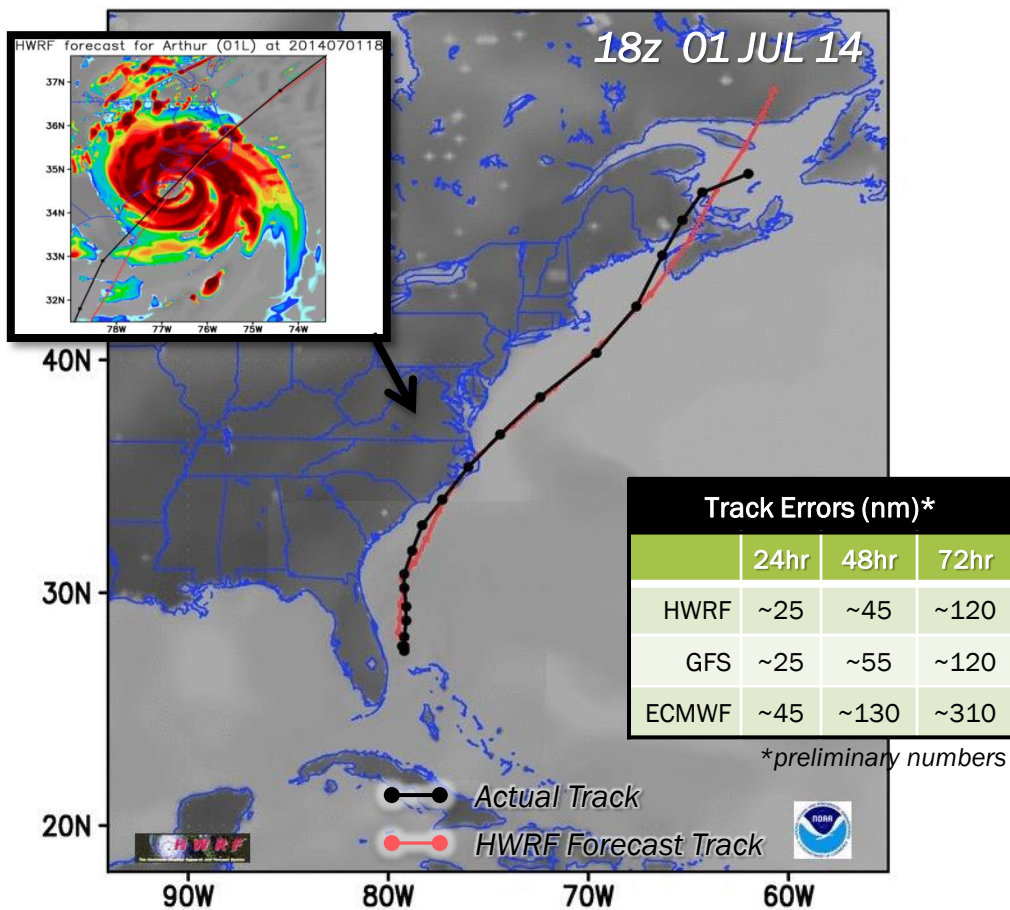


# 2014: Improved Forecasts & Products

## Hurricane WRF Model & New Storm Surge Graphics

### Hurricane Arthur: July 01-07, 2014

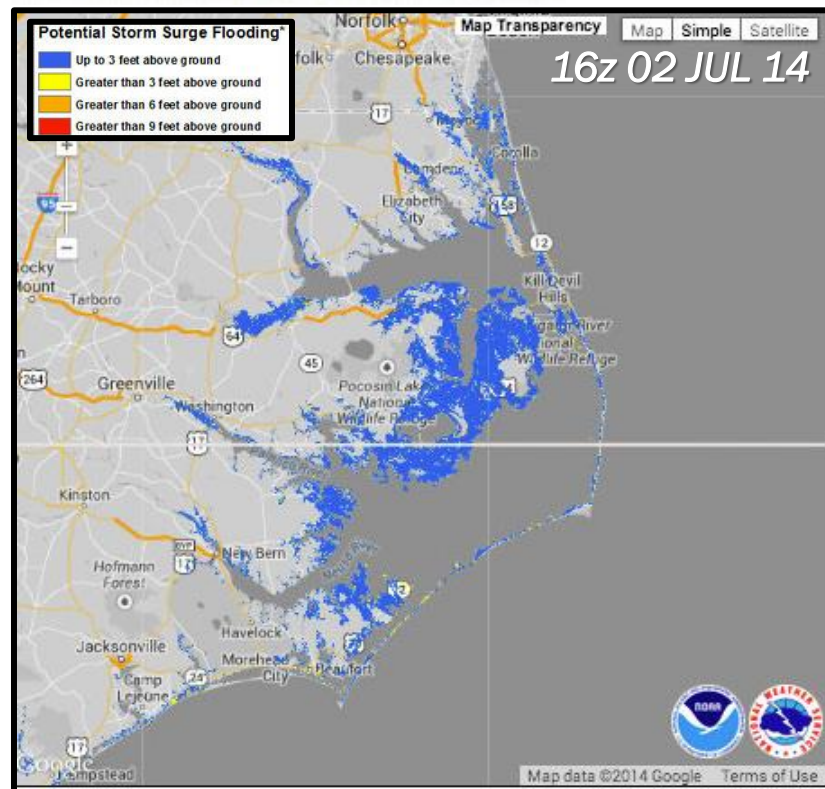
#### HWRf Forecast Track & Forecast Radar Reflectivity



#### Potential Storm Surge Mapping

'Best Guess, Worst Case Scenario'

NHC Experimental Potential Storm Surge Flooding Map  
Tropical Storm ARTHUR (2014) Advisory 7  
From 11 AM EDT Wednesday July 02 to 04 PM EDT Saturday July 05

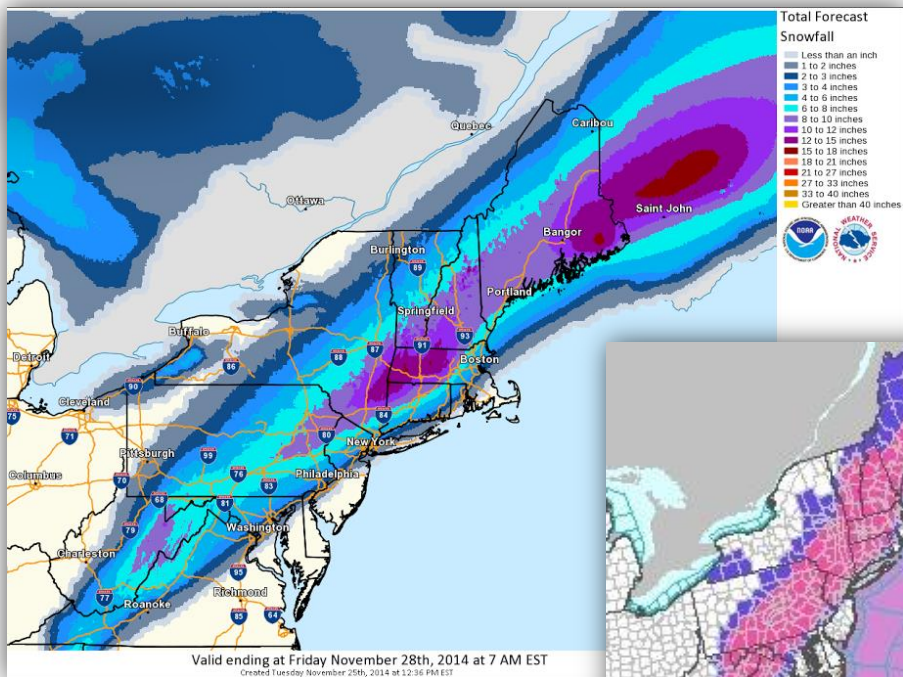




# Internal NWS Collaboration & Impacts to IDSS

## Pre-Thanksgiving Storm: Nov. 25-26, 2014

Predicted Consistently the Week Before



WPC Snowfall Map



Watch-Warning Map

*Delta was very impressed with the meteorology briefing that morning [from AWC/NAM] and liked the way the meteorologist briefed on the turbulence and the outlook for the day. It was so good in fact, that Delta would like to use it as a training tool for our meteorology group so we can show them how best to conduct a briefing with our dispatchers and ATC coordinators.*

*Dave Vogt  
Delta Airlines*





# IDSS & Communication

## Buffalo NY Lake Effect Snow: Nov 19-21, 2014



**OVERCAST DISCUSSION**  
**NATIONAL WEATHER SERVICE BUFFALO NY**  
 3:38 PM EST MON NOV 17 2014

**SYNOPSIS**  
 TWO STRONG LAKE EFFECT EVENTS WILL TAKE PLACE THIS WEEK AS AN ARCTIC BLAST OF COLD AIR MOVES INTO THE GREAT LAKES REGION. A 15 TO 20 MILE WIDE SWATH OF LAKE EFFECT SNOW WILL AFFECT AREAS NORTHEAST OF LAKE ERIE AND LAKE ONTARIO LATE TONIGHT THROUGH EARLY WEDNESDAY. A SYSTEM WILL DISRUPT THE BANDS WITH GENERALLY LIGHT SNOW FOR MUCH OF THE REGION WEDNESDAY. HOWEVER... THIS WILL BE FOLLOWED BY YET ANOTHER STRONG LAKE EFFECT EVENT THURSDAY.

**88**

**NEAR TERM (THROUGH TUESDAY)...**  
 HIGH CONFIDENCE LAKE EFFECT EVENT WITH TIGHT NORTHERN GRADIENT AND NEAR BLIZZARD CONDITIONS LATE TONIGHT THROUGH TUESDAY...

A TROUGH OVER THE ADIRONDACKS WILL CONTINUE TO MOVE NORTHEAST TONIGHT WITH AN AREA OF DEPARTING LIGHT RAIN AND TERRAIN DEPENDENT SNOW. THE FOCUS THEN TURNS TO A MAJOR LAKE EFFECT EVENT LATER TONIGHT... LASTING INTO LATE TUESDAY NIGHT OR EARLY WEDNESDAY.

FROM A LARGE SCALE PATTERN, THIS HAS ALL THE MAKINGS OF A HISTORIC OR AT LEAST WELL REMEMBERED LAKE EFFECT EVENT... WITH SNOW TOTALS EXCEEDING 3 FEET IN SOME AREAS BY WEDNESDAY. THE 24 HR/35+ INCH EVENT IN 12/1995 FOR KBUF IS HARD TO BEAT... BUT SOME LOCATIONS MAY REACH THIS VALUE TO THE SOUTH. SIMILAR AMOUNTS ARE EXPECTED EAST OF LAKE ONTARIO.

FOR LAKE ERIE... AS IS TYPICALLY THE CASE... EXPECT A VERY TIGHT NORTHERN GRADIENT WITH SNOW LIKELY REACHING BUFFALO/KBUF... BUT POSSIBLY BARELY GRAZING THE NORTHTOWNS. THIS IS NEARLY IMPOSSIBLE TO NAIL DOWN... AND WILL HAVE TO DEAL WITH THE NORTHTOWNS AS THE EVENT UNFOLDS. MEANWHILE... AREAS EAST OF BUFFALO... THE MAIN INTERCHANGES OF THE THRUWAY TO THE SOUTH... AND THE SOUTHTOWNS SHOULD TAKE A HARD HIT. CONFIDENCE IS HIGH FOR FEET OF SNOW... WITH MAJOR DISRUPTIONS TO TRAFFIC AS SNOW RATES FAR EXCEED THE ABILITY TO KEEP ROADS CLEAR. WILL NOT BE SURPRISED TO SEE SEVERAL HOURS OF LOCALIZED 3-5 INCH/HR SNOW RATES LATE TONIGHT THROUGH TUESDAY WITH THUNDERSNOW... AT LEAST THROUGH TUESDAY... THE SOUTHERN BOUNDARY SHOULD BE THE LAKE ERIE SHORELINE ALONG CHAUTAUQUA TO THE BOSTON HILLS... BUT AREAS TO THE SOUTH OF THIS WILL GET INTO THE SNOW BAND LATER TUESDAY NIGHT.

*NWS Buffalo*

**Cuomo blames forecasters over Buffalo-area snowstorms**  
 November 24, 2014 | 4:11pm  
 By Aaron Short

**Cuomo weathers storm, apologizes to forecasters**  
 November 25, 2014 | 4:02pm  
 By Cori Conande

NY Post

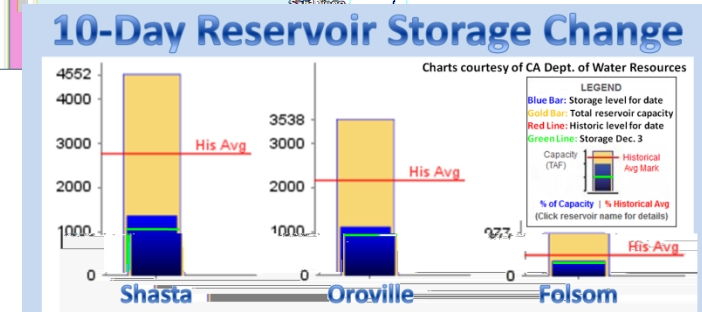
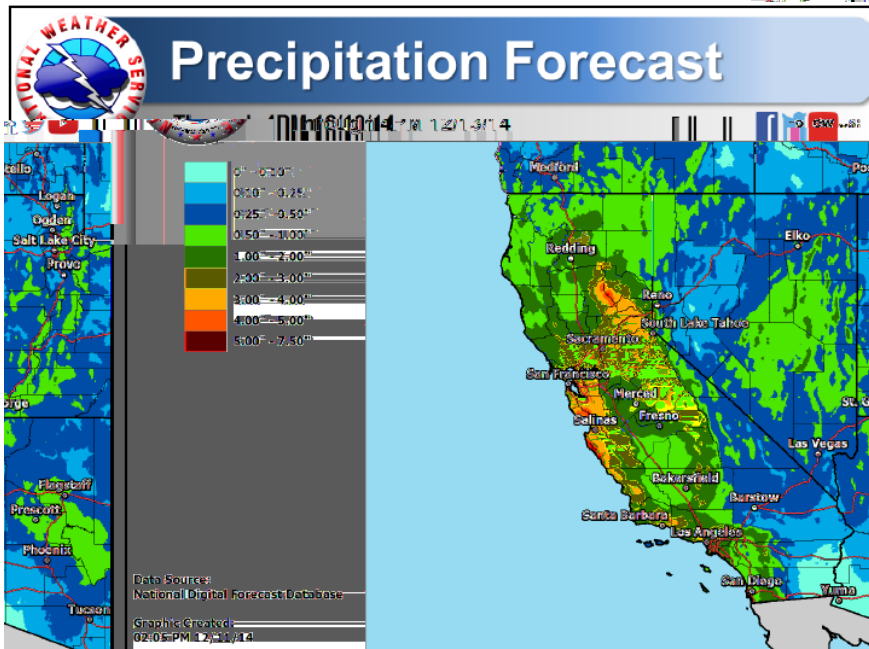
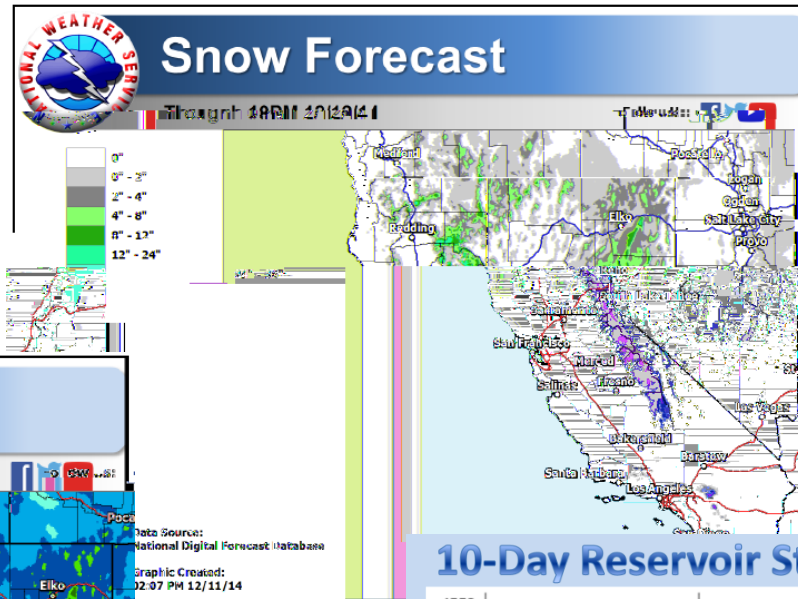




# West Coast Storm

## December 10-16

- Predicted 1-2 weeks before
- Consistency/collaboration across all NWS offices
- Proactive readiness for heavy rainfall that swamped central CA



Reservoir	Storage Gain (acre-feet)	Elevation Gain (feet)	% Capacity Change	% Average Change
Shasta	331,290	27	23% → 30%	38% → 50%
Oroville	196,780	30	26% → 32%	43% → 52%
Folsom	76,990	13	29% → 37%	60% → 76%



California Nevada River Forecast Center  
 Saturday, December 13, 2014 2:00 PM PST



# Status: Budget & Organization





# Approved NWS Programs, Projects, Activities (PPAs): Operations, Research, and Facilities (ORF)

A first step in creating an organization capable of change...

## Existing ORF Programs

## ORF PPAs

Surface, Ocean & Upper Air Observations, Aircraft Obs, Radiosondes, NEXRAD, ASOS, Buoys, Snow Surveys, Profilers, National Data Buoy Center, Observations Support



Observations

Data Collection/Display, AWIPS, Model Replication, Data Management, Supercomputing, Advanced Hydrologic Prediction Services



Central Processing

WFO Forecasts & Warnings, National Service Center, River Forecast Centers, CWSUs, Tsunami Services, Decision Support Services, WCM/SCH Program



Support

IT & Dissemination Systems; Telecommunications Gateway, NOAA Weather Radio; NEXTGEN IT, Ground Readiness, NOMADS



Dissemination

Research/Development/Assess, Environmental Modeling Center, Test and Demonstration, WRN Pilots, Operational Proving Ground, Testbeds, Training, CSTAR, NEXTGEN S&T, Education & Outreach, SOO/DOH Program



Science & Technology Integration

**APPROVED BY CONGRESS 12/13/14**

Forecast Process





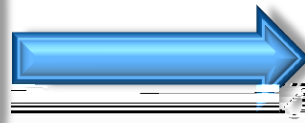


# Approved NWS Programs, Projects, Activities (PPAs): Procurement, Acquisition, and Construction (PAC)

## Existing PAC Programs

## PAC PPAs

NEXRAD SLEP, Radiosonde Network Replacement



Observations

AWIPS, Weather & Climate Supercomputing



Central Processing

WFO Construction



Facilities Construction & Major Repairs

NWS Telecommunications Gateway Re-architecture, Ground Readiness Project, Complete & Sustain NOAA Weather Radio



Dissemination

**APPROVED BY CONGRESS  
12/13/14**





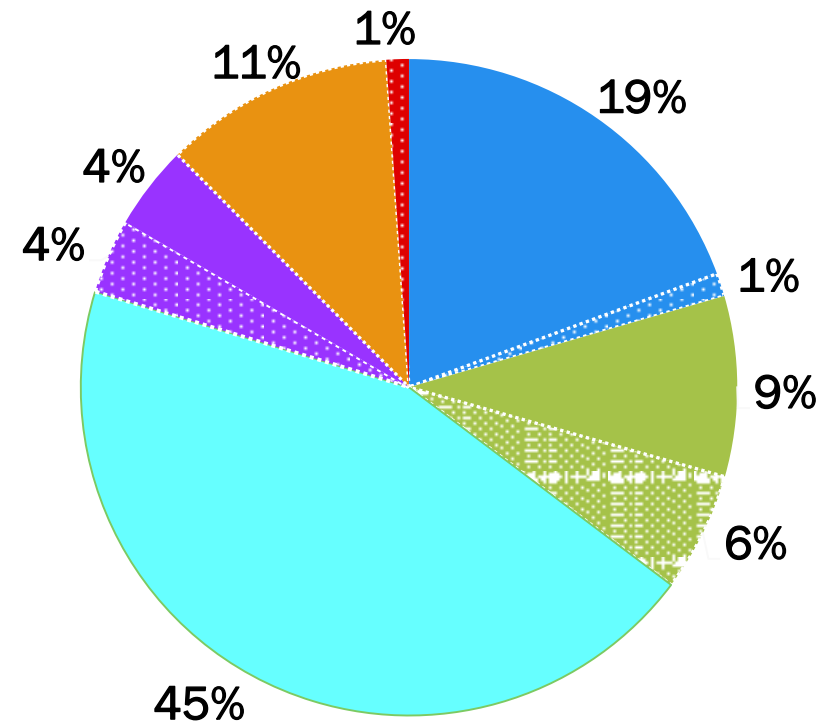
# NWS Budget Composition by Portfolio

## Consolidated and Further Continuing Appropriations Act, 2015

PPA	Funds*	Draft FTE
Observations ORF	210,777	804
Observations PAC	12,300	-
Central Processing ORF	96,617	232
Central Processing PAC	64,000	22
Analyze, Forecast and Support ORF	483,060	3,058
Dissemination ORF	40,099	82
Dissemination PAC	45,000	-
Science and Technology Integration ORF	123,600	517
Facilities PAC	12,000	-
<b>TOTAL</b>	<b>1,087,453</b>	<b>4,715</b>

\* In thousands of dollars

### Funds Breakdown



- Observations ORF
- Observations PAC
- Central Processing ORF
- Central Processing PAC
- Analyze, Forecast and Support ORF
- Dissemination PAC
- Dissemination ORF
- Science and Technology Integration ORF
- Facilities PAC



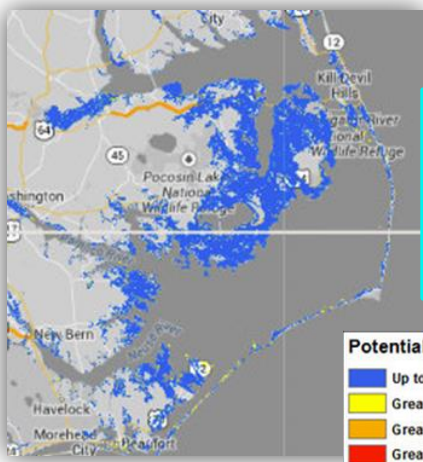
# FY15 Highlights from Each PPA



**Observations:** NEXRAD SLEP begins; TAO Array maintenance > 94%

**Central Processing:** AWIPS-2 Deployments (Group 5 complete)

- Central Computing upgrades (200 TF to 840 TF Jan 2015 and to 2.5 PF by September 2015)



**Analyze Forecast Support:** Focus on improving consistency in all services; Storm Surge Warnings and graphics with social science, National Water Center IOC; 3-4 Week forecasts of temp/precip



# FY15 Highlights from Each PPA



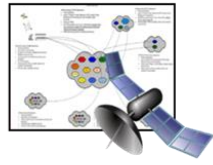
## NWS Dissemination Portfolio FY 2015 Services



**Service 1:**  
Dissemination IT Infrastructure Services



**Service 2:**  
Virtualized Application Services



**Service 3:**  
Terrestrial and Satellite Networking Services



**Service 4:**  
Weather Warning Services

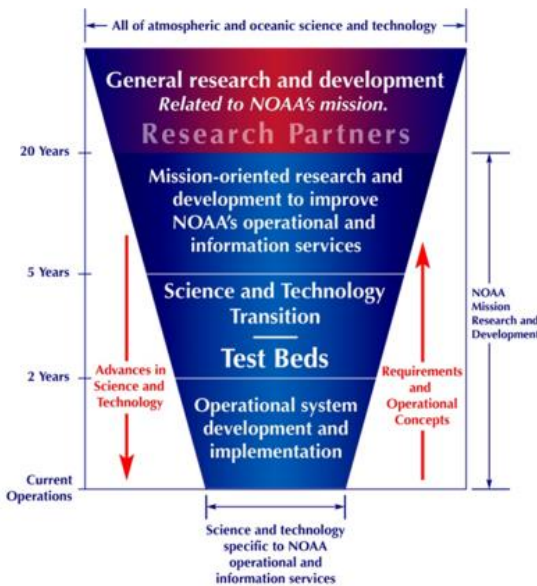


**Service 5:**  
Web and Geospatial Services

### Dissemination:

Fix, Sustain, Replace

- Ground Readiness Program
- Integrated Dissemination Program



### Science & Technology Integration:

- NGGPS FY14/15 \$14.3M mapped to the R20 Funnel
- National Blend of Models (*Blender*)
- *GDAS, GEFS, upgrades, Operationalize NMME*



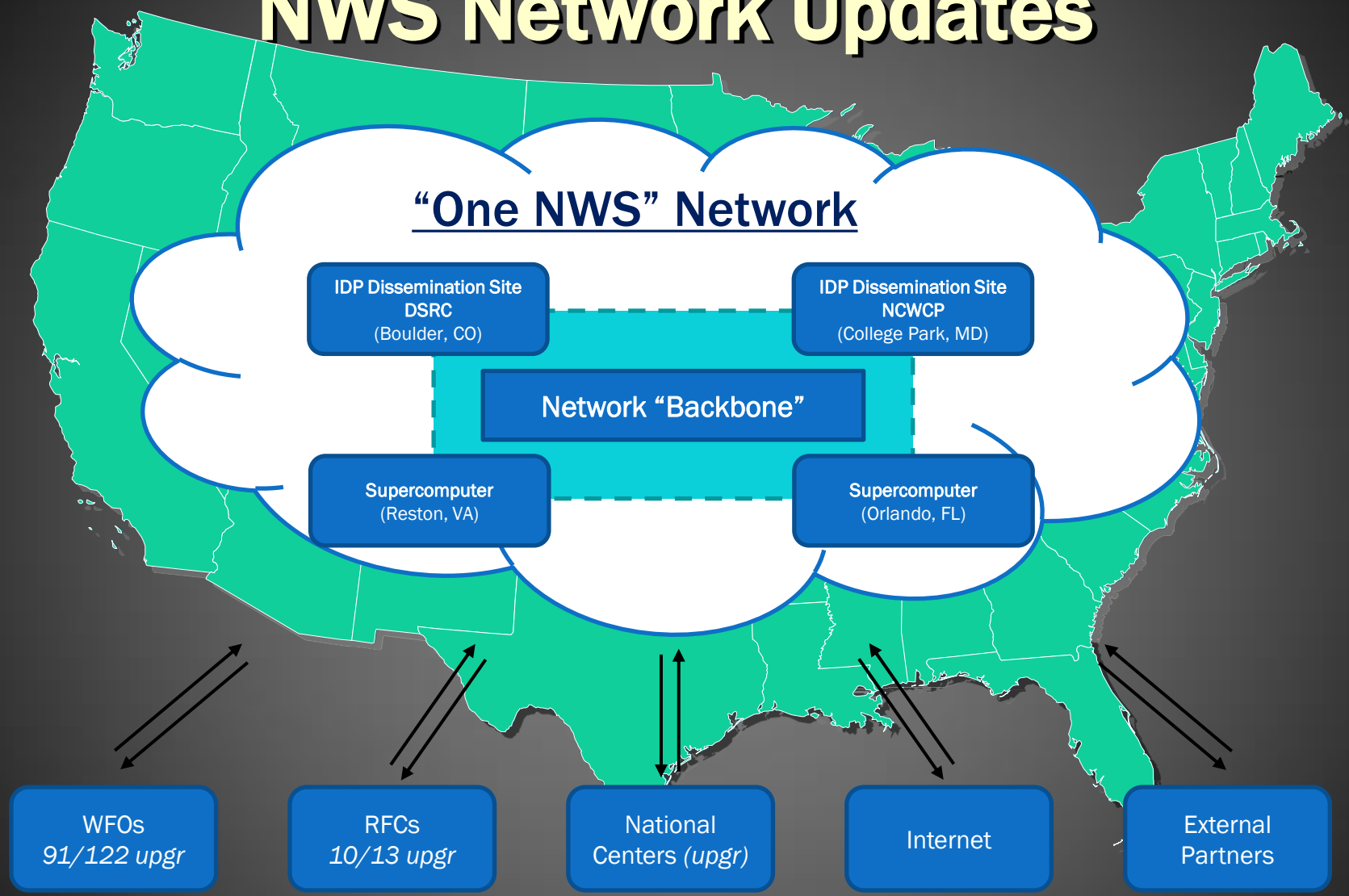
### Facilities:

New building for NLSC/NRC; Facility Assessment and Strategic Planning (1/3 of assets to be completed)

# Dissemination, Computing, and Open Data



# NWS Network Updates



## “One NWS” Network

IDP Dissemination Site  
DSRC  
(Boulder, CO)

IDP Dissemination Site  
NCWCP  
(College Park, MD)

Network “Backbone”

Supercomputer  
(Reston, VA)

Supercomputer  
(Orlando, FL)

WFOs  
91/122 upgr

RFCs  
10/13 upgr

National  
Centers (upgr)

Internet

External  
Partners

The future One-NWS network will consolidate all operational networks (OPSnet, Regional, etc.) under a single managed network.





# Model Implementation Schedule

## Supported through HFIP and Sandy Supplemental

- **Hurricane Models** (new HWRF run at 3km) – considered to be one of the world’s best
- **3km Hourly High Resolution Rapid Refresh (HRRR)** (September 2014)
- **Run NWS Global Forecast Systems at 13km resolution out to 10 days** (14 Jan 2015)
- **Upgrade all Data Assimilation to 4D Enkf/Hybrid working from new data sets: JPSS, GOES-R, COSMIC 2** [Q1 FY16, FY17]
- **Ensembles: Higher Resolutions** [Q3 FY15, FY16]
  - Global Ensemble Forecast System (GEFS) (going from 55km to 35 km)
  - Short Range Ensemble Forecast (SREF) (going from 16 km to 12 km)
- **Accelerate Storm Surge Modeling** (FY 15)

**BIG NEWS: IBM upgrade from 200 to 700 Teraflops per machine by January 2015**

**BIGGER NEWS: 2.5 Petaflops per machine by September 2015 for a total of 5.0 PF supporting operational models**



# Update: Open Environmental Information and Services

- Survey through NCEP released June 2014
- 7 Responses, leading to 18 specific requests
- This is a critical effort—tracked at the DOC secretary level
- I asked NCO director Ben Kyger to code each request “Green/Yellow/Red”
  - Ben Kyger to provide full details



# STI

- **Next Gen. Global Prediction System (NGGPS)**
  - Aimed at replacing the current operational GFS
  - Dyn. Core testing/down select in FY15
  - Leverage Sandy Suppl. Projects, e.g., HIWPP
  - Direct support for testbeds to accelerate R20
- **A CSTAR-VLab-OPG paradigm**
  - Expanding CSTAR (FY15 total awards: \$3.8M, a \$2.5M plus up with NGGPS funds)
  - Collaborative R&D efforts through VLab – a centralized development and testing environment supported by NCEP
  - OPG – enabling end-to-end, from research to broad scale field implementation
- **Position NWS as an equal partner in the weather forecasting improvement R&D**
  - NGGPS is a community effort
  - FACETs implementation plan
  - Revolutionizing water prediction





# Vision Becoming Reality

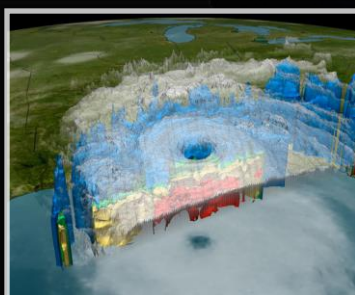
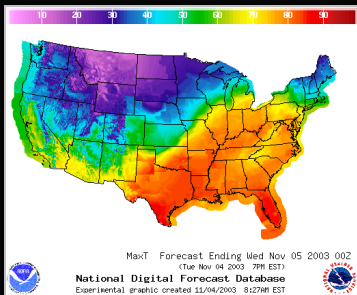
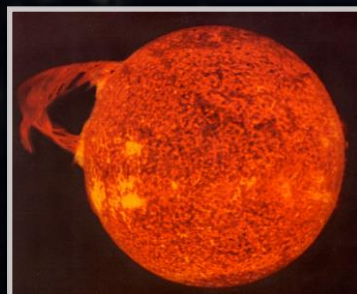
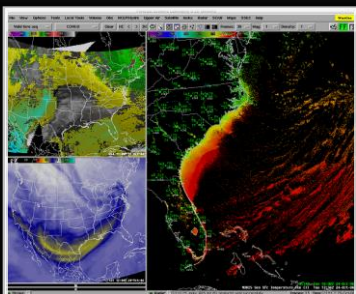
- *Science-based service organization* directed toward Building A Weather-Ready Nation.
- Budget restructuring & HQ reorg are approved. FY15 Budget is a good one for NWS.
- Making progress toward addressing all Strategic Goals; especially as it relates to IDSS.
- Working toward National Water Center IOC (May 2015)
- Model enhancements are on their way, as well as major upgrades of operational computing capabilities (2.5 PF per operational computer, for a total of 5.0 PF by September 2015).

# THANK YOU!

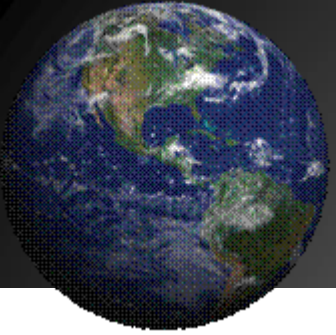


# National Weather Service Partners' Meeting: Observation Systems

AMS Annual Conference  
Phoenix, AZ  
Thursday, January 8, 2015





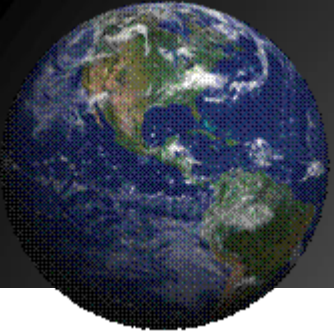


# Observation Systems

## *Overview*

**Includes NWS systems (and 'data buys') that provide observations from radar, upper air, surface and marine environments used to support NWS' mission of providing weather, water, and climate data forecasts and warnings for the protection of life and property; and for the enhancement of the National economy**

**Funding for these systems provide up-to-date and accurate information to the Nation through support of the 122 WFOs, 13 RFCs, and 10 national Centers. It improves the resiliency of the American public and the US economy and reduces the potential of societal and economic impacts due to high impact weather events**



# Observation Systems

## *Marine*



**Comprehensive, reliable systems and marine observations to support missions of NWS and NOAA, promote public safety, and satisfy future needs of many external customers**

**- Operations & maintenance of buoys and coastal stations providing real-time meteorological, climatological, and tsunami data**

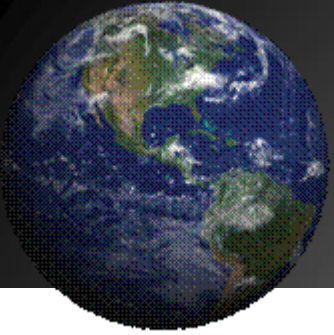
**Hurricane Buoy Ao requirement: 80%; achieved 93%**

**CWB Ao requirement: 73%; achieved 80%**

**C-Man Ao requirement: 80%; achieved 94%**

**TAO Ao requirement: 80%; achieved 94%**

**DART Ao requirement: 80%; achieved 94%**



# Observation Systems

## *Radar*



**Operations and maintenance of the WSR-88D system provide observations used for current weather forecasts and warning services**

**- 122 NWS NEXRAD systems that underpin observations for weather forecast/warning services...crucial for a Weather-Ready Nation**

**- 45 Supplemental Product Generators which provide supplemental observations from 45 FAA Terminal Doppler Radars**

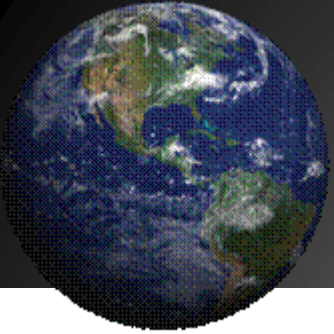
**- 3 Wind Profiler systems located in Alaska which provide horizontal wind speed and direction from near the surface to above the tropopause**



**NEXRAD Ao requirement: 96%; achieved 99%**

**Wind Profiler Ao requirement: 96%; achieved 98%**





# Observation Systems

## *Surface & Upper Air*



**Operations/maintenance of 92 Radiosonde stations in CONUS, Alaska, Pacific islands, and 10 stations in the Caribbean**

**Operations/maintenance of a large combination of systems in North America and the Pacific islands (includes support of stations in Caribbean)**

**Implementation of new observing capabilities such as commercial and NOAA aircraft observations and satellite data buys**



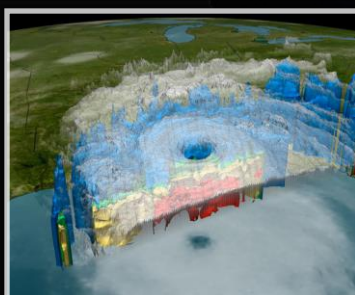
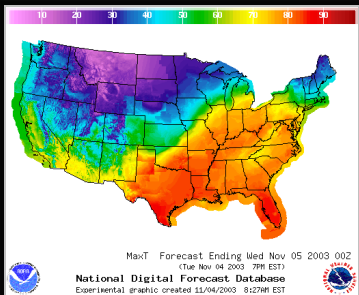
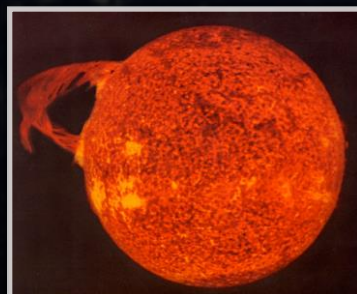
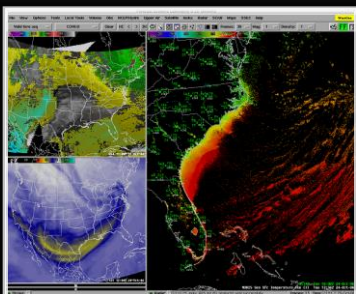
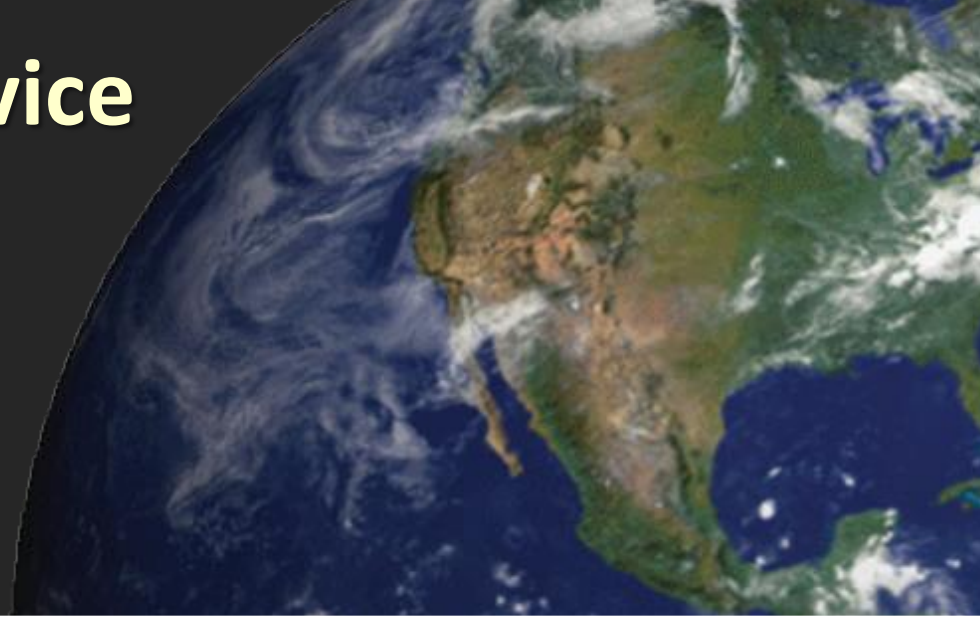
**Maintain 102 RAOB sites with GPS at 2 launches/day**

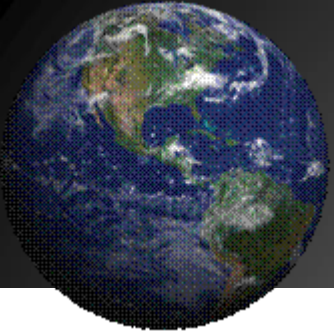
**Maintain 315 NWS/572 FAA ASOS systems**

**Leverage smart data buys and data sharing partnerships**

# National Weather Service Partners' Meeting: Open Data Initiative

*AMS Annual Conference  
Phoenix, AZ  
Thursday, January 8, 2015*



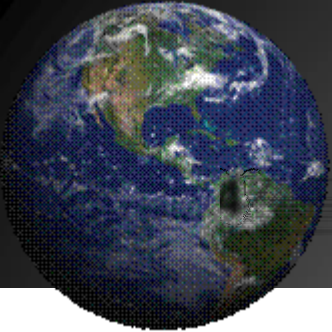


# “Open Data Initiative”

## *Key Takeaways*

- Survey was released in June 2014 to obtain feedback on:
  - additional weather prediction model output needs
  - the required format of the data, and
  - how long to make the data available for evaluation purposes
- NWS received 7 responses to the survey
- A consistent message was received for NWS to provide higher resolution model data both temporally and spatially in GRIB2 or netCDF format for all models
- A total of 18 specific requests were received



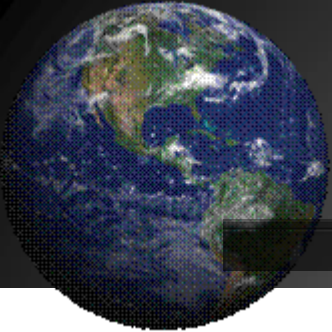


# “Open Data Initiative”

Completed Responses to Requests as of 12/19/2014

Request	Implementation/Dissemination
Simulated Satellite output from the GFS	FTPFRD, NOAAPORT
Request assimilation of automated commercial aircraft reports in GFS, NAM, SREF	Data assimilated in models
Access to post-processed model grids produced by NCEP Centers – such as OPC, NHC, SPC	NDFD grids are publicly available: <a href="http://www.nws.noaa.gov/ndfd/index.htm">http://www.nws.noaa.gov/ndfd/index.htm</a> List of Center-specific products: <a href="http://graphical.weather.gov/docs/NDFDelem_complete.xls">http://graphical.weather.gov/docs/NDFDelem_complete.xls</a>
Access to model catalog on NCEP produced model data	Available at: <a href="http://www.nco.ncep.noaa.gov/pmb/products/">http://www.nco.ncep.noaa.gov/pmb/products/</a>
Evaluate model output from one month to two years prior to implementation	<ul style="list-style-type: none"><li>• The NCEP process for model evaluations includes a 30-day customer evaluation</li><li>• NCO will review options for access during model development</li></ul>
Access to the “Extreme Weather Index” tools currently in experimental mode	The experimental tool is available at: <a href="http://ssd.wrh.noaa.gov/satable/">http://ssd.wrh.noaa.gov/satable/</a>  Planned to be implemented operationally by Q4FY15





# “Open Data Initiative”

## Responses to Requests in Process as of 12/19/2014

Request	Action	Date to be Resolved	Dissemination Method
Hourly output from the GFS through 8 days	NCEP will commit to providing hourly output to 5 days and investigate possibility to extend to 8 days	Q1FY16	FTPFRD, NOMADS, NOAAPORT, MAG
Provide consistent temporal resolution for GFS after F192	Extend consistency to 3 hourly from F000 to F240, 12-hrly F240 to F384	1/14/2015	FTPFRD, NOMADS, NOAAPORT, MAG
Add BUFR sounding data for The Netherland Schiphol Airport and the Japan Narita Airport	Additional BUFR soundings will be available with the GFS upgrade. Full list available at: <a href="http://www.nco.ncep.noaa.gov/pmb/changes/gfs_upgrade.shtml">http://www.nco.ncep.noaa.gov/pmb/changes/gfs_upgrade.shtml</a>	1/14/2015	FTPFRD
Remove GEFS delay in products between F192 and F204	0.50° resolution output for entire model Spatial resolution consistency will reduce delay	Q3FY15	FTPFRD, NOMADS, NOAAPORT, MAG
Increase GEFS spatial resolution			
Customer would like separate meeting with NCO to discuss data sampling and formats	NWS will reach out to customer to discuss data sampling and formats	1/30/2015	N/A



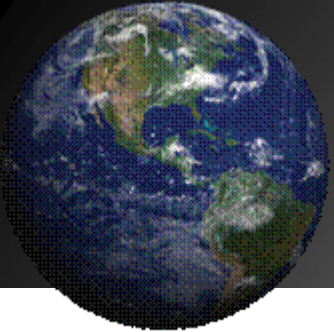


# “Open Data Initiative”

## Responses to Requests

Long Term Action or on Hold as of 12/19/2014

Request	Response	Issue with Request
Simulated Radar data from the GFS	No Plans to include in FY15-FY16	Issue is due to the sophistication of the microphysics scheme
Access to GFS in its native resolution	No Plans to provide the Master files	We believe the spectral files are too difficult to use in their raw format
Provide earlier availability times for GFS and GEFS	Times of the model output are based on data input cutoff times	
Access to commercial airline data assimilated into models	The ACARS data is restricted	NOAA is not allowed to redistribute this data
Access to ATCF model guidance for the global forecast basins	Atlantic, East Pacific, and Central Pacific ATCF guidance available via NHC <a href="ftp://ftp.nhc.noaa.gov/atcf">ftp://ftp.nhc.noaa.gov/atcf</a>	JTWC, part of the U.S. Navy, does not publicly make the guidance available for the Western North Pacific, Northern Indian, and Southern Hemisphere.
Provide ability to customize data requests under a unique login to prevent outside parties knowing which customer accesses certain data types	NWS must ensure equal access to data for all customers.	Violates NWS Policy



# “Open Data Initiative”

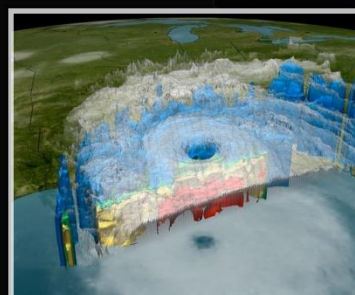
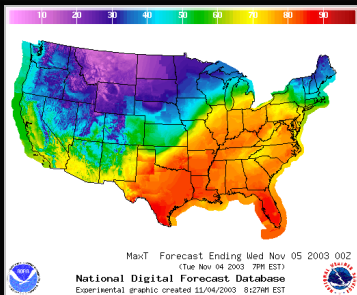
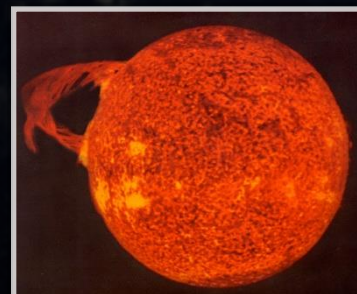
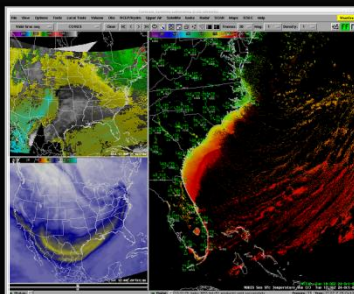
Request: How does one find NCEP Model Data?

- NCEP provides in excess of 3 TB of output and disseminates it through various outlets:
  - <http://nomads.ncep.noaa.gov> - grib filter, http, and OpenDAP options
  - <ftp://ftpprd.ncep.noaa.gov> – most comprehensive list
  - <http://mag.ncep.noaa.gov> – graphical model output
  - <ftp://tgftp.nws.noaa.gov> - includes model and observational data
- Product inventories available at:  
<http://www.nco.ncep.noaa.gov/pmb/products/>
- If you still can't find what you need, please contact NCO's Dataflow Group at [ncep.list.pmb-dataflow@noaa.gov](mailto:ncep.list.pmb-dataflow@noaa.gov)



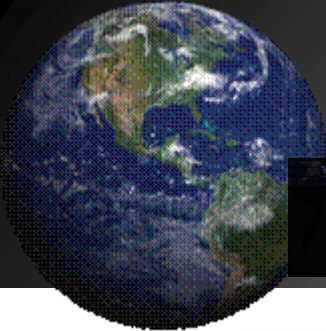
# The NWS' Analyze, Forecast & Support Portfolio (AFS) NWS Services Updates

*NWS Partners' Meeting  
95<sup>th</sup> AMS Annual Meeting Phoenix  
Thursday, January 8, 2015*

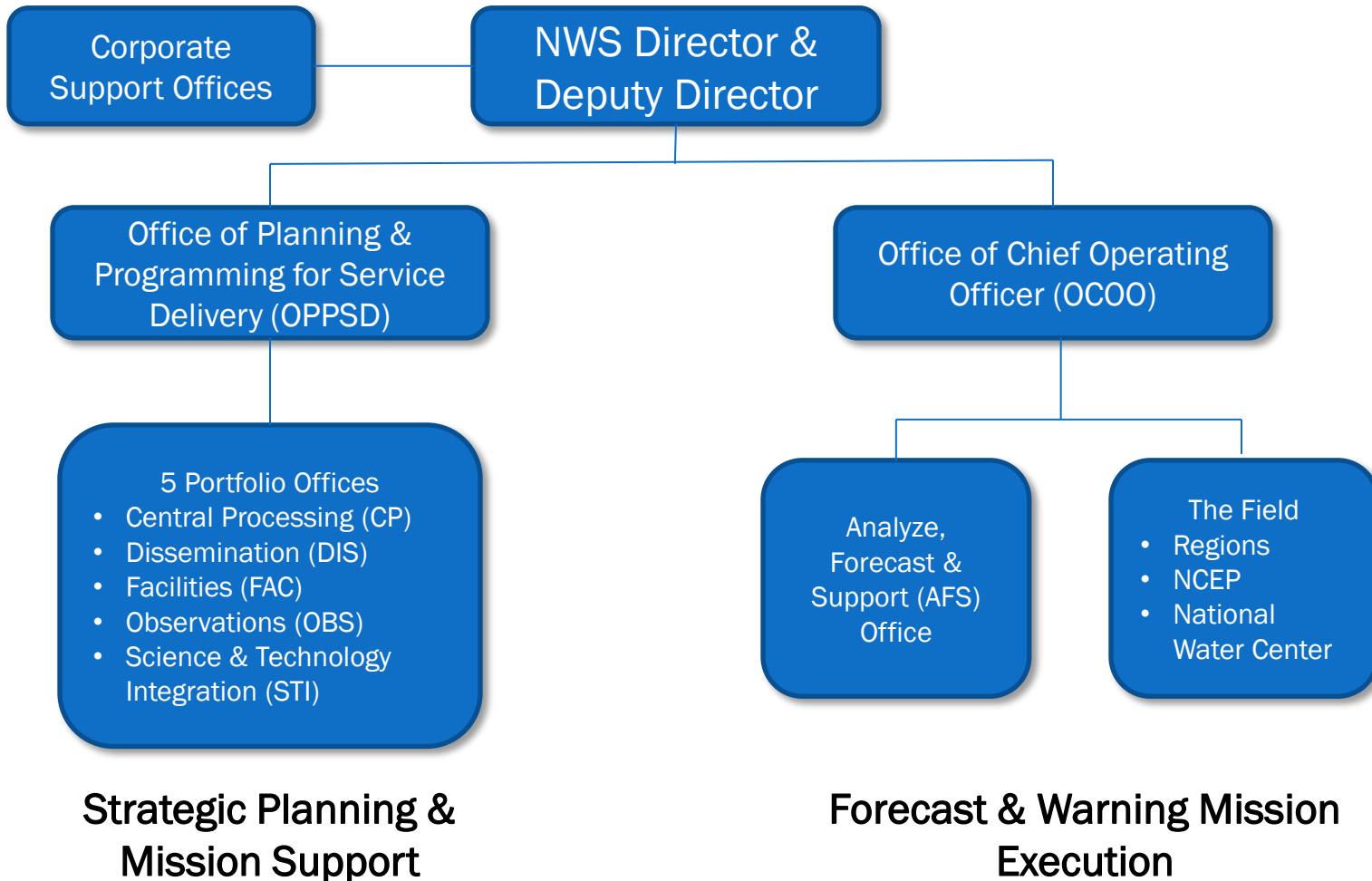


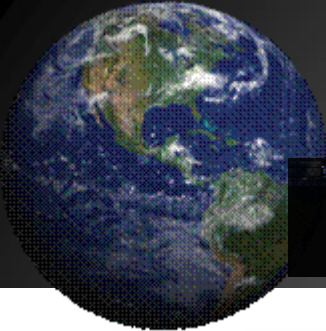
**Andrew Stern**

*Acting Director NWS/Office of Climate, Water & Weather Services  
Acting Portfolio Director, AFS*

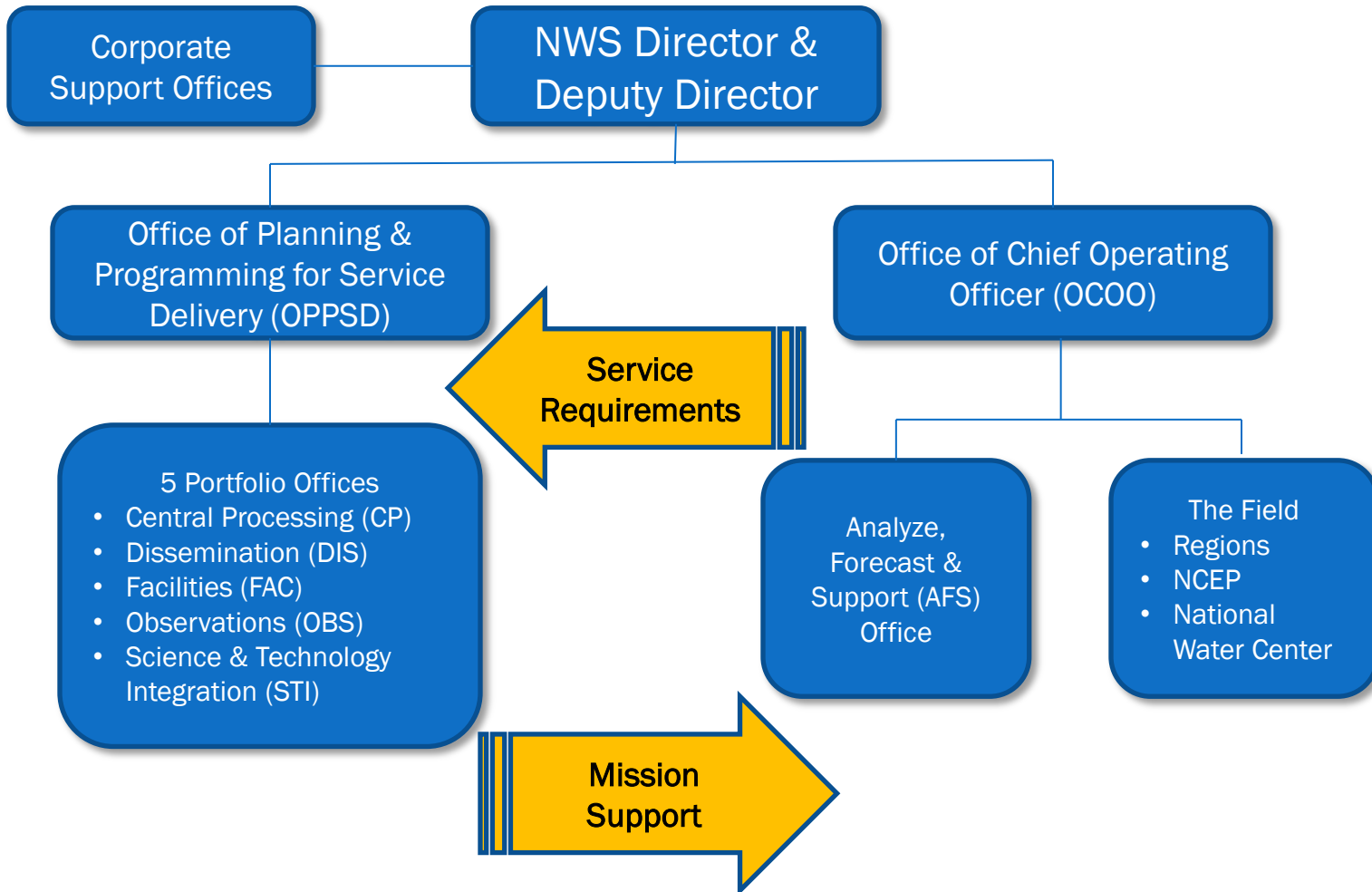


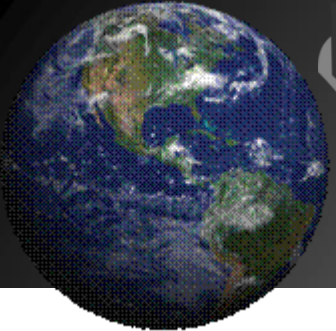
# AFS in the new NWS Structure





# AFS in the new NWS Structure





# Spotlight on Analyze, Forecast & Support

- Unified Field Leadership under COO
- Accountable for Mission Delivery
- Continuity of Operations
- NWS Operations Center
- Performance Evaluation

## Portfolio

- Annual Operating Plan
- Budget Planning & Execution

## Analyze

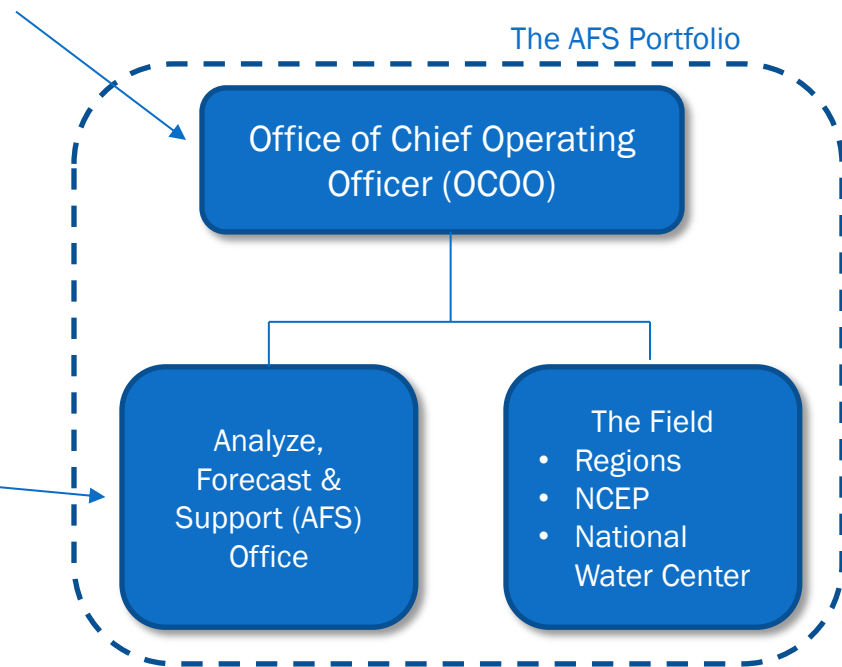
- Analysis & Recommendations on Technologies for the field

## Forecast

- National Service Programs
- Field Requirements
- Directives/Policy

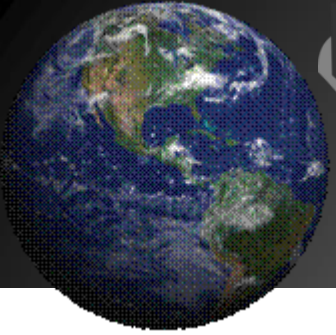
## Support

- WCM/Decision Support
- Weather-Ready Nation Initiatives
- Digital Policy & Services



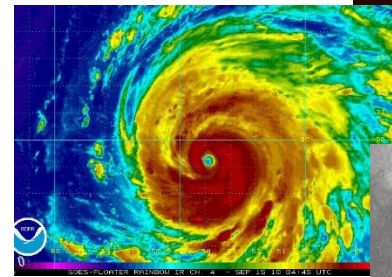
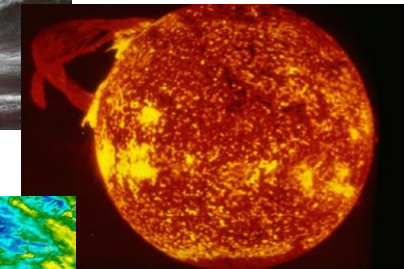
3000+ Staff and nearly half of the NWS Budget

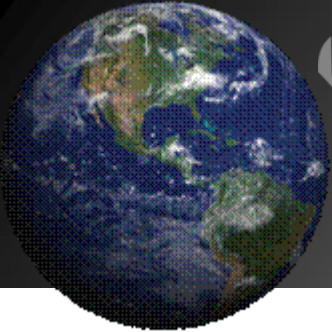




# Spotlight on National Service Programs

Aviation  
Climate  
Fire Weather  
Hydrology  
Marine & Coastal  
Public Weather  
Severe Weather  
Space Weather  
Tropical  
Tsunami  
Winter Weather

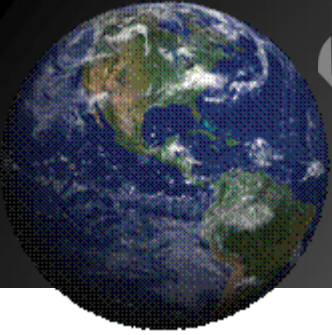




# Consistency Improvements

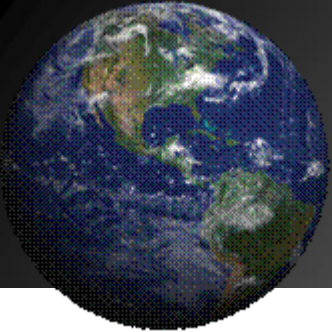
- **Standing up Regional Operations Centers\***
  - Grid monitoring; More consistent grid update times
  - Active collaboration between WFOs, RFCs and NCEP
- **National Center Leadership**
  - Routine NCEP-WFO coordination calls
  - More reliance on national center grids for initial forecasts
- **CONUS Regions use of model blends**
  - Precursor toward use of a national model blend for initial forecasts
- **Development of Common Operating Picture (COP)**
  - First step is to develop COP for Aviation Convection
- **Standardize output**
  - Color curves, web update times, use of same snowfall grid population tools, new Winter PDS training, new Hydro simulations
- **Policy Training**
  - National Webinar on 10-102 Directive
  - New DSS Directive

\*Pending Negotiations



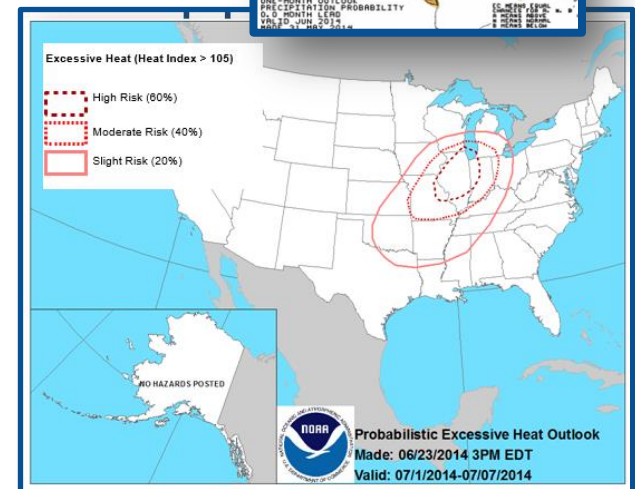
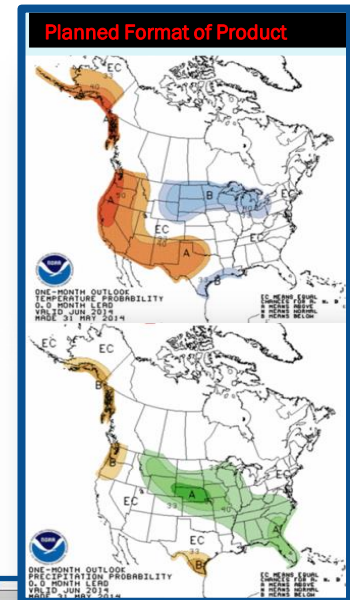
# New DSS Directive Series

- **New directive series to house policies & procedures for Decision Support Services (DSS)**
- **Recognizes a continuum of DSS to our core partners**
- **Providing clarification on**
  - **Internal roles/responsibilities especially with respect to NWSHQ reorganization**
  - **Mission/service boundaries between NWS and America's Weather & Climate Industry and where NWS will focus its DSS**
  - **Providing a connection to existing NWS policies that require comment/review per NOAA Partnership Policy**

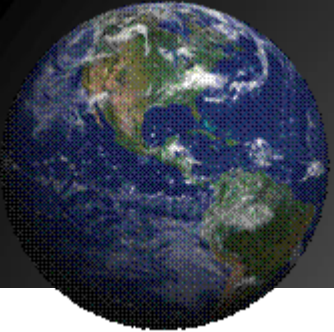


# Experimental Climate Products

- **Experimental combined Weeks 3-4 Temperature and Precipitation Outlook**
  - For weekly issuance – available for comment Sept 15
  - Will use extended GEFS, ECMWF, CFS, JMA, Canadian, reforecast data and statistical tools
- **Experimental Week 2 Excessive Heat Outlook**
  - Available for comment Spring 2016
  - Focus on excessive heat criteria anchored by GEFS reforecasts
  - Outlook to use low (20%), moderate (40%) and high (60%) to denote risk of excessive heat







# Tropical Products

## 2015 Tropical Season

- Operational HLS and TCV Products (replacing legacy HLS)
- Experimental Tropical Storm Surge Watch/Warning Graphic (Phase 1 – for evaluation only)
- Hurricane Threats and Impacts (HTI) grids and graphics (winds, surge, flooding rain & tornado threats)
- Storm Surge Training for External Partners
- Continue issuance of Experimental Potential Storm Surge Flooding Map
- Guidance Updates: P-Surge, ETSS, SLOSH for Southern CA & HI

## Sept 2015

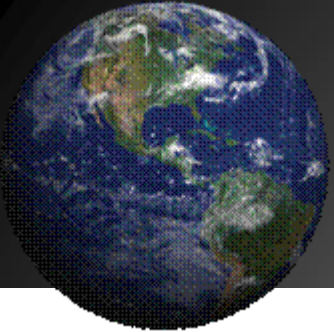
- Draft Comprehensive Storm Surge Roadmap (to be reported at 2016 AMS Meeting)

## 2016 Tropical Season

- Experimental Tropical Storm Surge Watch/Warning Graphic & Hazard Grids (Phase 2 for external evaluation)
- Continue issuance of Experimental Potential Storm Surge Flooding Map
- Guidance Updates: P-Surge, Probabilistic ETSS

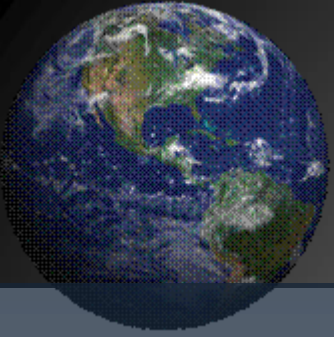
## 2017 Tropical Season

- Operational Tropical Storm Surge Watch/Warning Graphic & Hazard Grids (Phase 3)
- Operational Potential Storm Surge Flooding Map



# Additional AFS Service Updates

- Aviation: Automated CCFP guidance & Collaborative Aviation Weather Statement (CAWS) demo
- Fire Wx: Expansion to a 7-day National Fire Danger Rating System forecast
- Hydrology: Initial Operating Capability at the National Water Center
- Hydrology: Centralized Water Forecasting Master Plan developed
- Public: Prototypes depicting simplified hazard information as an alternative to the use of WWA (HAZSimp)
- Severe: Social science evaluation of Impact-based Warning (IBW) demo
- Severe: Proposal for articulating extreme straight line wind events (new tags in IBW demo)
- Tsunami: TsunamiReady Guidelines revised
- Winter: NDFD Snow & Ice Accum grids implemented across CONUS to 72 hrs
- Winter: Probabilistic Snowfall experiment expanded to DC, PHL, NYC & BOS



**Thank You for your Attention**

**Andrew Stern**

**Andrew dot Stern at NOAA dot gov**



**[www.weather.gov](http://www.weather.gov)**

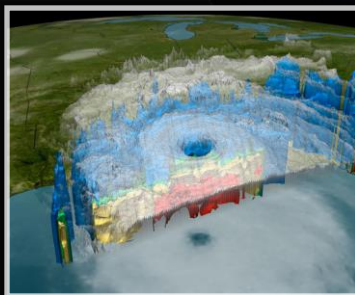
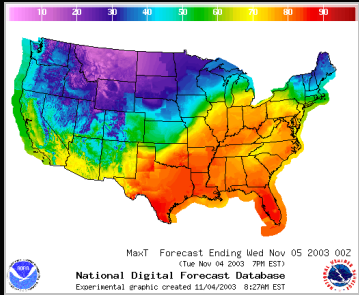
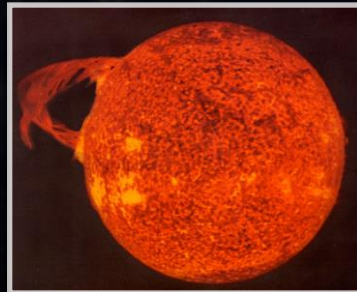
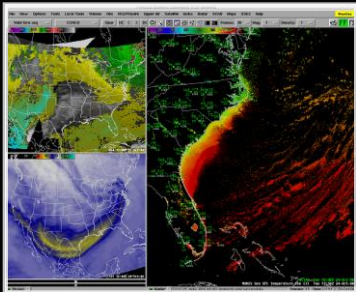
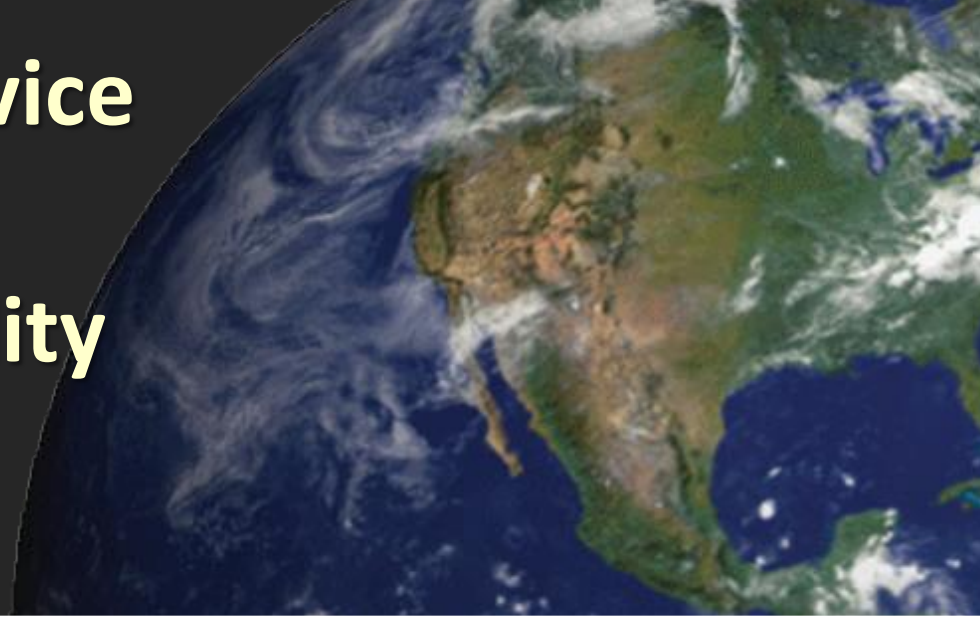
**[www.noaa.gov/wrn](http://www.noaa.gov/wrn)**



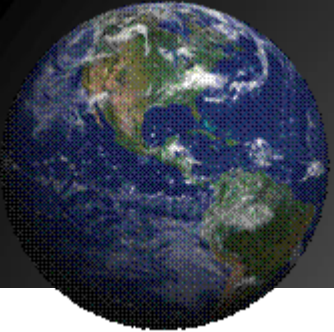


# National Weather Service Partners' Meeting: Dissemination Reliability

AMS Annual Conference  
Phoenix, AZ  
Thursday, January 8, 2015

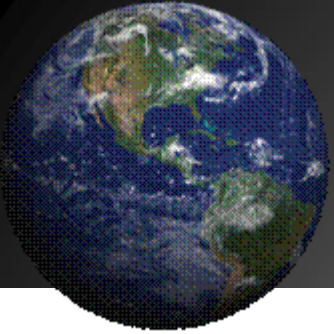






# NWS Dissemination Portfolio Overview

- The NWS Dissemination Portfolio provides NWS improved ability to communicate warnings and forecasts to the public essential to protect property and save lives
- FY 2015 approved omnibus \$85M
- Includes:
  - NOAA Integrated Dissemination Program (IDP)
  - NWS Internet Dissemination System (NIDS) (e.g., [www.weather.gov](http://www.weather.gov) & NWSChat)
  - NOAA Weather Radio (NWR)
  - NOAA Weather Wire Service (NWWS)
  - Emergency Managers Weather Information Network (EMWIN)
  - NWS Telecommunication Gateway (NWSTG)
  - NWS Operational System Network (OPSNet)
  - Meteorological Assimilation Data Ingest System (MADIS)
  - Multi-Radar/Multi-Sensor (MRMS)
  - Other dissemination systems are being added



# NWS Dissemination Portfolio Resiliency and Capacity

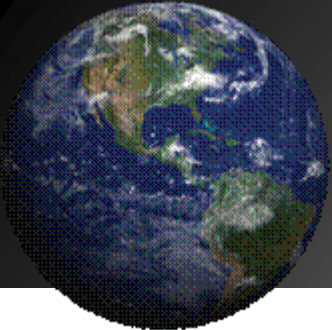
- Dissemination infrastructure outages related to failing telecommunications services, Web sites and with other dissemination system outages
- The Dissemination Portfolio's approach
  - Fix and maintain the current operational telecommunication networks and dissemination systems
  - Deliver near-term incremental capacity and reliability upgrades/improvements
  - Plan and execute long-term dissemination upgrades to comprehensively move NWS from a collection of stovepipes to a single, reliable, end-to-end managed system



# Dissemination Resiliency (an example)

## *NOMADS & FTPPRD Outage: December 19, 2014*

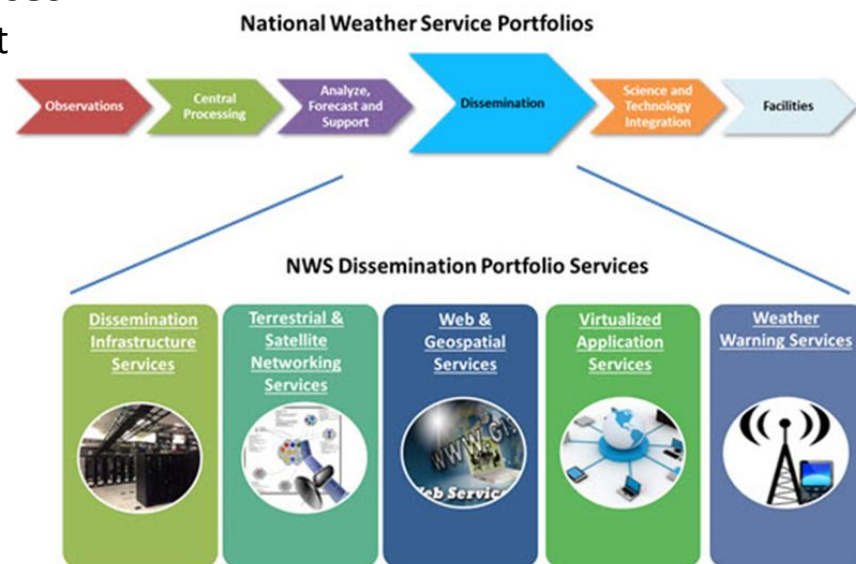
- NOAA Operational Model Archive and Distribution System (NOMADS) and File Transfer Protocol Production (FTPPRD) impacts
  - Failure of one of the four network attached storage systems
  - Delayed availability of forecast models (e.g., GFS, NAM)
- Follow-on steps
  - Continue to build out 100% backup capabilities with IDP's second Dissemination Infrastructure at David Skaggs Research Center (DSRC) in Boulder, CO to be completed in 2015
    - In FY 2014, the first instance of an operational IDP dissemination infrastructure went live at the NOAA Center for Weather and Climate Prediction (NCWCP) located in College Park, MD
  - Continue working with hardware vendors to minimize hardware failures
  - Continue improving communications to partners and customers
    - <https://lstsrv.ncep.noaa.gov/mailman/listinfo/ncep.list.nomads-ftpprd>



# Dissemination Reliability

## Dissemination Portfolio Services

- NWS Dissemination Portfolio consists of following five services:
  - **Weather Warning Services**
    - Provide timely communication of weather and non-weather related warnings directly to the public as well as emergency managers
  - **Dissemination Infrastructure Services**
    - Standup of operational dissemination infrastructure
  - **Terrestrial and Satellite Networking Services**
    - Augment and optimize NOAA's NWS' current terrestrial and satellite network
  - **Web and Geospatial Services**
    - Leverage Web services and Geographic Information System (GIS) to disseminate critical weather and environmental data
  - **Virtualized Application Services**
    - Provide aggregated and consolidated critical software applications



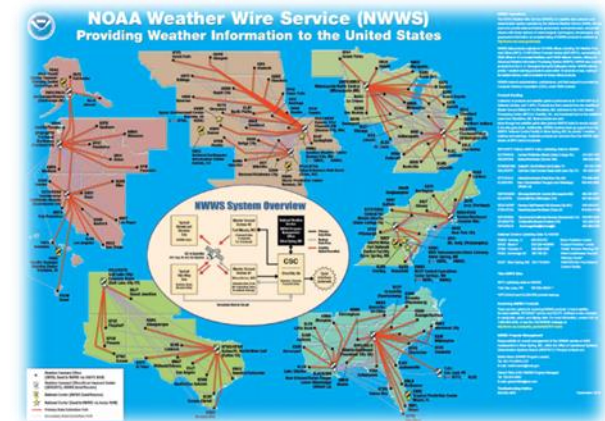
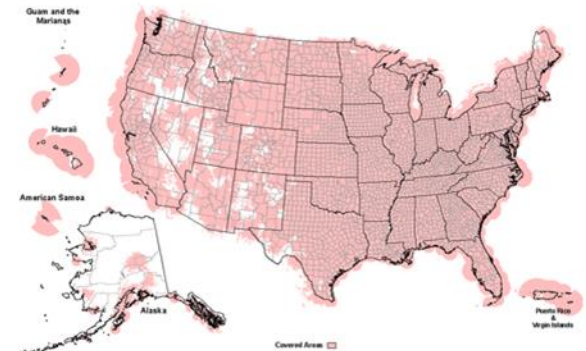




# Dissemination Reliability

## Dissemination Portfolio: Weather Warning Services

- Weather Warning Services
- NOAA Weather Radio (NWR)
  - Operates/maintains broadcast network of 1025 transmitters to provide continuous weather information from nearest NWS office
  - Broadcasts official warnings, watches, forecasts and other hazard information 24/7
  - Upgrade remaining 133 to solid state NWR transmitters
- NOAA Weather Wire Service (NWWS)
  - Satellite data collection and redistribution system
  - Timely meteorological, hydrological, climatological, and geophysical information
  - New NWS enterprise architecture solution will be operational in FY15





# Dissemination Reliability

## *Dissemination Portfolio: Dissemination Infrastructure*

- Standup of Operational Dissemination Infrastructure
  - Scalable, robust, secure, and 7x24x365 operational dissemination infrastructure at the NOAA Center for Weather and Climate Prediction (NCWCP), College Park, MD, and the David Skaggs Research Center (DSRC), Boulder, CO
    - Migrating critical NOAA and NWS operational dissemination applications including NWS Telecommunications Gateway (NWSTG), Multi-Radar/Multi-Sensor (MRMS), Meteorological Assimilation Data Ingest System (MADIS), NWS Information Dissemination System (NIDS), and GIS
  - Execute termination of obsolete dissemination programs, projects and systems
  - Continuous system scanning and monitoring for security vulnerabilities and detection of security threats or intrusions

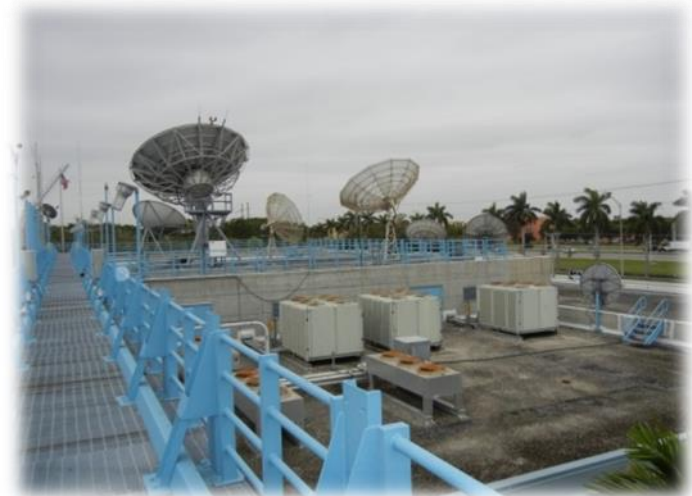




# Dissemination Reliability

## Dissemination Portfolio: Terrestrial and Satellite Networking Services

- Increase Network Bandwidth and Reliability of all Offices with NWS Nationwide
  - Network Upgrade and Optimization
    - Fixing and maintaining NWS operational networks
    - Delivering near-term incremental capability and reliability upgrades/improvements
    - Planning and executing long-term upgrade to comprehensively move NWS networks to a single end-to-end managed system that is reliable and meets capacity requirements
  - NWS Geostationary Weather Satellite Antenna
    - Updating NWS geostationary downlink antennas and ingest systems for Geostationary Operational Environmental Satellite R-Series
  - Satellite Broadcast Network (SBN) Expansion
    - Increased NWS' SBN from 30 to 60+ Mbps
    - Disseminates crucial satellite, radar and model data to NWS field offices and to external partners







# Dissemination Reliability

## *Dissemination Portfolio: Web and Geospatial Services*

- Standup and Maintain an Enterprise GIS Infrastructure
  - Leveraging web services and GIS to disseminate NOAA and NWS critical data to forecasters, NOAA users, Federal partners (Federal Aviation Administration (FAA) and Federal Emergency Management Agency (FEMA)), International community and public
  - Implementing net-centric weather information dissemination capability to fulfill NWS' role in the Congressionally mandated Next Generation Air Traffic System (NextGen) directive
  - Onboarding current GIS capabilities on an operational dissemination infrastructure
  - Establishing common format framework for operating GIS data sets
- Establishing consistent metadata and a consolidated catalog for discovery and access of NOAA and NWS geospatial content







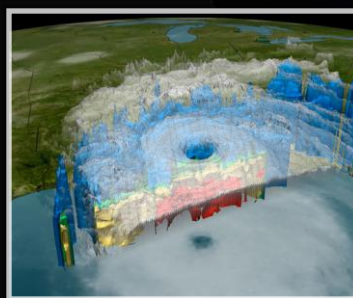
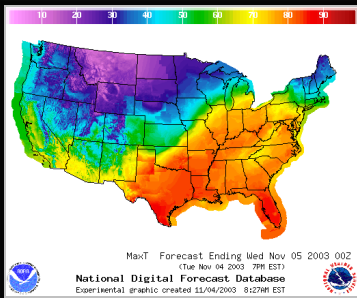
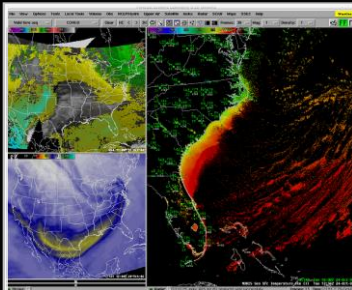
# Dissemination Reliability

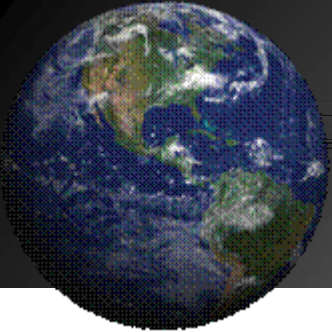
## *Dissemination Portfolio Way Forward/Next Steps*

- Fixing and maintaining
  - Upgrading 133 of 1025 NWR transmitters to solid state transmitters
- Delivering near-term and incremental upgrades
  - Robust and reliable 7x24 operational IDP dissemination infrastructure in two geographical diverse locations
  - Upgrading NWS Field Offices for 4-50 times increases in Internet bandwidth
  - Operationalizing enterprise GIS services
  - GOES-R Re-Broadcast antenna installation for NWS ground readiness
- Planning and executing long-term solutions
  - Transition [www.weather.gov](http://www.weather.gov) and other NWS websites to operational IDP dissemination infrastructure
  - 100% backup dissemination infrastructure (College Park, MD & Boulder, CO) with increased capacity to meet growing demands for NWS' products
  - Conduct a comprehensive network single point of failure audit of 140 NWS Field Offices to fix and upgrade NWS network
  - Single end-to-end managed network

# National Weather Service Partners' Meeting: Science & Technology Integration

AMS Annual Conference  
Phoenix, AZ  
Thursday, January 8, 2015





# Operational Model Upgrades

## Ozone prediction update

### Model updates:

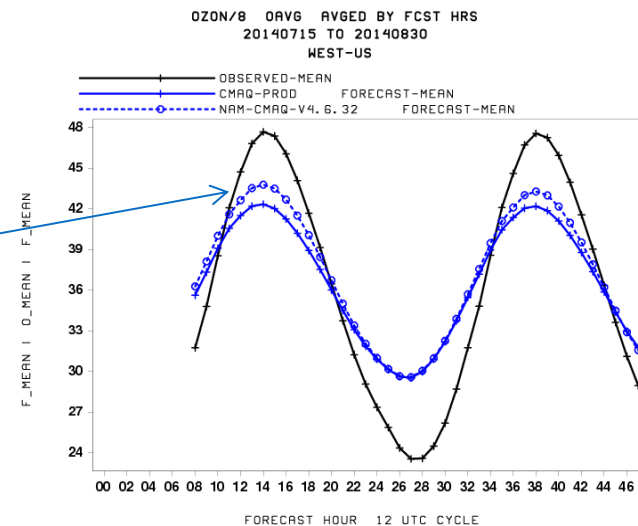
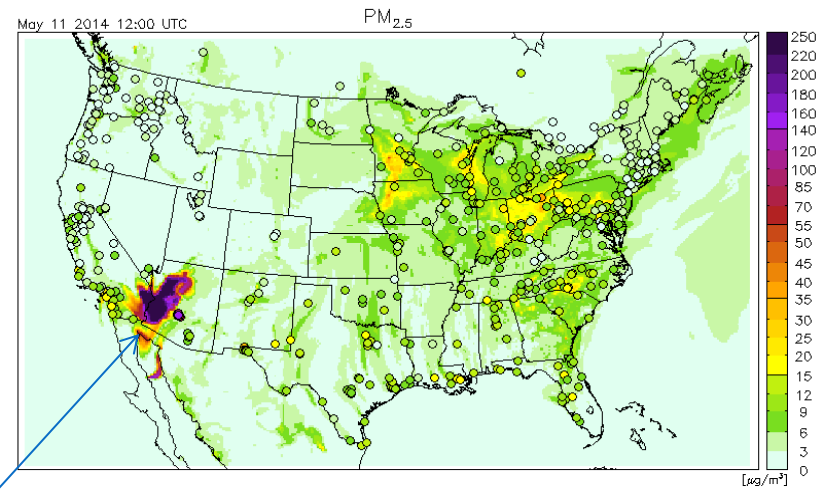
- CB05 chemical mechanism replaces earlier CB-IV mechanism in CMAQ model
- Monthly lateral boundary conditions replace previous static ones
- Dry deposition representation is modified
- A constraint on minimum PBL height is included
- Faster removal of organic nitrate

### Developmental testing from the same system:

- Testing of fine particulate matter (PM<sub>2.5</sub>) prediction, which includes contributions from anthropogenic and natural sources, including wildfire smoke and windblown dust

### Updated ozone predictions have:

- Increased (better) diurnal variability
- Increased (better) peak ozone in the Western US
- Decreased (better) night-time minimum in the Eastern US
- Slightly increased (worse) peak ozone in the Eastern US
- Changes in fraction correct for 75ppb threshold are small





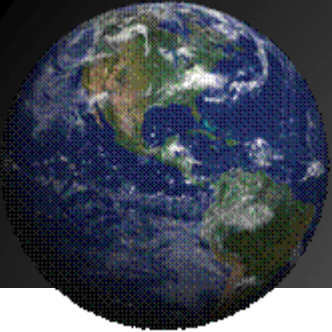


# Operational Model Upgrades

## *Nearshore Wave Prediction System (NWPS)*

- Provides high-resolution model guidance in the nearshore, produced locally at the WFO level, within the new AWIPS II system
- Establishes a pilot for central execution of local applications on WCOSS
- Sandy supplemental funding enables:
  - Inclusion of time-dependent probabilistic water level input from the P-surge model
  - Implementation of a two-way coupling between the wave model and a surge model (ADCIRC)
- Directly supports rip current and wave run-up forecast models
- Rollout of centrally-executed NWPS occurs in June 2015





# Support for a WRN Impacts Catalog

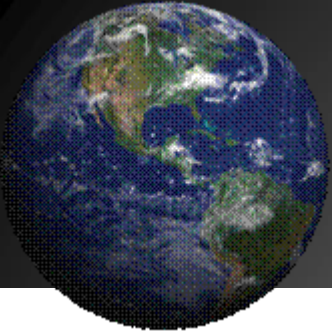
**Goal:** Develop a centralized database of weather-, water-, and climate-dependent societal impact information to allow the NWS to support data-driven decision making in the provision of DSS and the issuance of hazards products.

## FY 14 Accomplishments

- Completed Requirements Definition
- Completed OT&E of Impacts Catalog Prototype Version

## FY 15 Plans

- Stand-by migration of Impacts Catalog to IDP
- OT&E of Impacts Catalog Beta Version



# Support for a WRN

## *Aviation R&D*

FY 15 will continue a small agile portfolio with strong collaboration and coordination with the FAA Aviation Weather Research Program, Aviation Weather Center/Testbed, Alaska Aviation Weather Unit, Center Weather Service Units and NWS Aviation Services.

Working collaboratively across the weather community to develop tools, techniques and technologies to support Digital Aviation Services

Gridded Guidance – enhancing ceiling, visibility and convection guidance for aviation

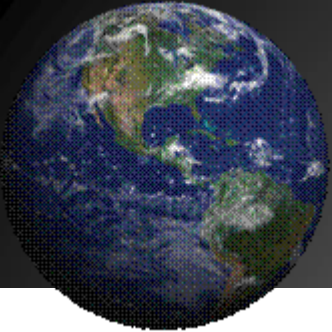
- Ceiling & Visibility (C&V) National Grid: Prototype Development
- LAMP - Localized Aviation MOS Product

Digital Aviation Services – moving aviation products from legacy text based to digital/gridded products

- AWIPS tools for Digital Services
- CL31 PBL - CL31 Planetary Boundary Layer

Decision Support Tools – Impact-Based Decision Support Services for aviation users

- INSITE - Enhancements to the INTe grated Support for Impacted air-Traffic Environments



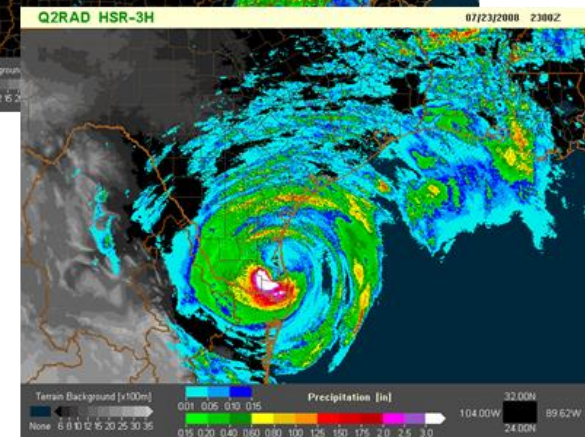
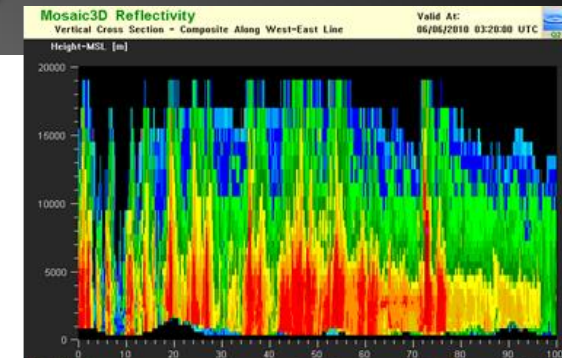
# Support for a WRN MRMS Implementation

## Background:

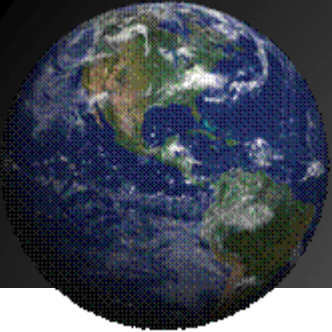
- The Multi-Sensor, Multi-Radar (MRMS) system integrates radar, surface observations, satellite data, and numerical analysis and prediction and generates an automated, seamless national mosaic of 3-D reflectivity, storm attributes and precipitation phase at very high temporal and spatial resolution
- The system went operational at NCEP in September 2014
  - Generates over 180GB of data per day, most products updated every 2 minutes on a 1km Grid
  - Products available via LDM to NWS offices and external users
  - Some products will be added to SBN data feed in Feb

## Future Plans:

- Next version will include minor upgrades and transition of legacy web pages to NCEP
  - Operational Q3, 2014
- Full capability will include all planned products and fully redundant backup
  - Operational Q2, 2016; Backup in Boulder
  - Includes 2 hour convective forecast
- Modifying to provide radar data for Ridge II system which feeds Weather.gov
  - Transition to operations in Sep, 2015
  - Expand from current CONUS domain to include Puerto Rico, Alaska, Hawaii, and Guam domains





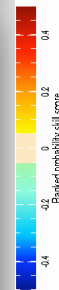
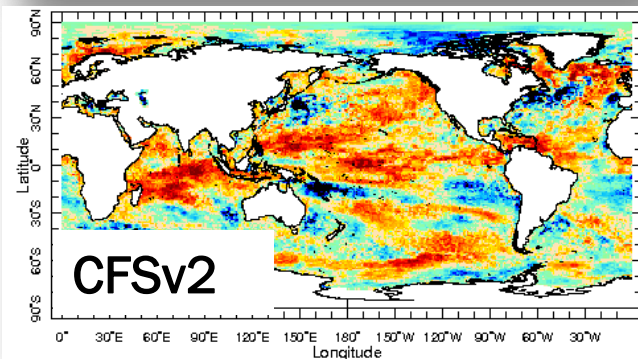
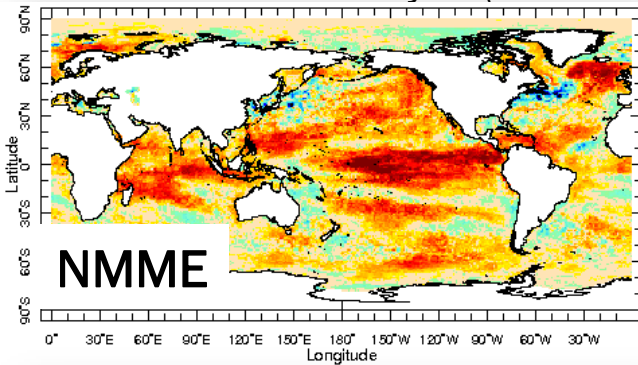


# Support for a WRN

## The North American Multi-Model Ensemble

NMME - An unprecedented multi-model system to improve seasonal climate prediction

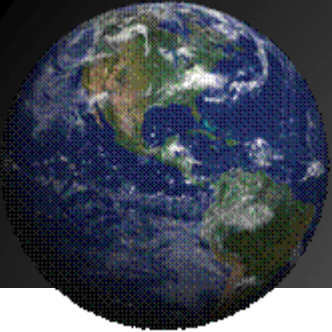
DJF SST Forecasts July IC (B. Kirtman)



- Based on leading climate models in the US and Canada (6 models, up to 100 members),
- Contributing experimentally to NOAA operational seasonal outlooks (up to 9 months) since 2011
- Contributing to prediction and predictability research and informing model development
- Will be operational in NCEP late 2015;
- Most comprehensive seasonal prediction data set accessible to the public
  - Real-time at CPC web site
  - Hindcast at IRI and NCAR

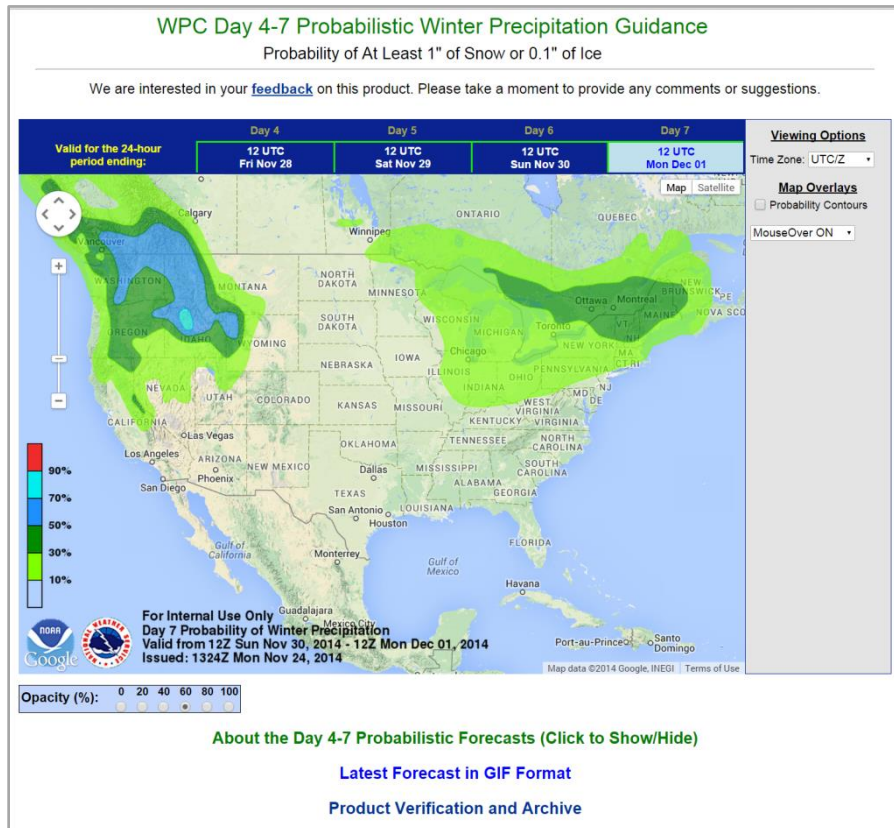
The multi-model approach enhances seasonal predictions beyond individual model predictions.



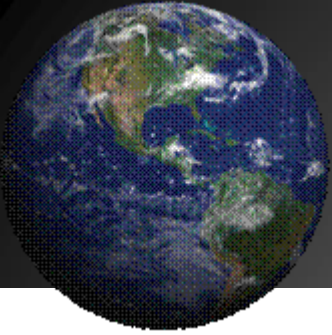


# Experimental Products/Services Under Development

## Day 4-7 Probability of Winter Weather

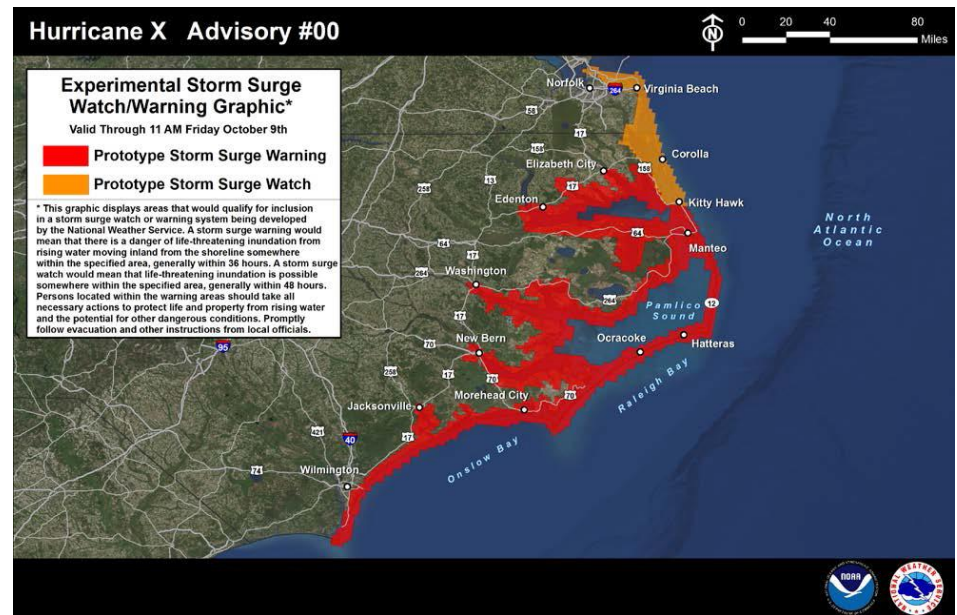


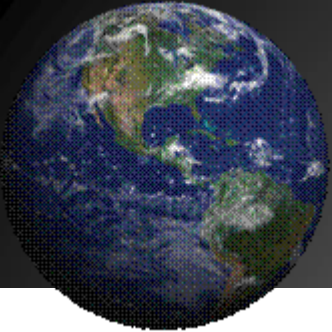
- Probability of  $>0.10$ " frozen QPF ( $\sim 1$ " snow or 0.1" ice) in 24 hrs (e.g., day 4)
- Prototype for internal NWS feedback started 1 December
- *Anticipate publically experimental during the 2015-6 season.*



# New NWS Storm Surge Watch and Warning

- 2015: NWS storm surge watch/warning system debuts via experimental graphic on hurricanes.gov
- 2016: Experimental Storm Surge Watch/Warning in NHC and WFO Hurricane Watch/Warning products (TCV/HLS) introduced
- 2017: Storm surge watch/warning, including text products, TCV, graphics, and gridded data, implemented





# New NWS Storm Surge Watch and Warning

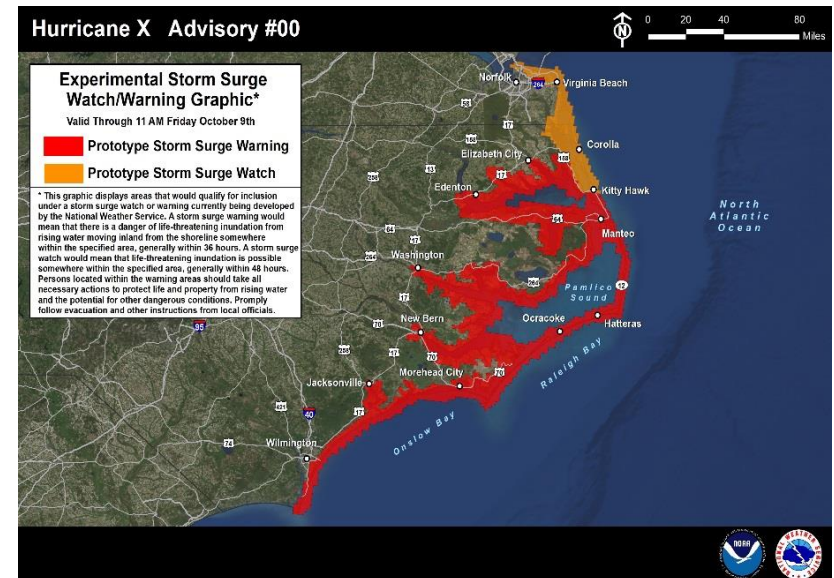
## 2015: Experimental storm surge watch/warning graphic

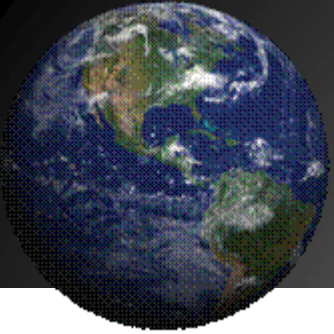
- Collaborated NHC/WFO graphic available via NHC website
- Statement in Hazard Section of the NHC Public Advisory
- Statement and geographic reference in WFO Hurricane Local Statement (HLS)

## 2016: Enhance national TCV to include storm surge

- Inland and coastal wind watches/warnings merged in national TCV
- Storm surge watch/warning VTEC added to national and local TCVs
- Gridded version available from the NWS WWA map and NDFD

## 2017: Full operational implementation





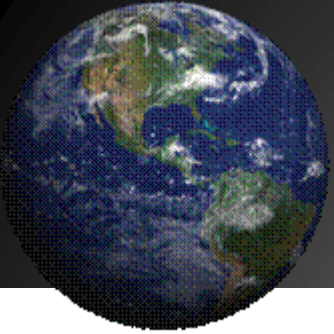
# R&D Partnership

## *Including Testbeds*

### CSTAR

- Program Description
- The last 2 FFO's have each funded 6 projects.
- Projects are 2-3 years, \$125K/year.
- 12 projects are currently funded into 2016 or 2017. Total FY15 program funding: approx. 1.3M/year
- 4 more are under no-cost extensions into 2015.
- Next FFO: Summer of 2015
- CSTAR web site:  
<http://www.nws.noaa.gov/ost/cstar.htm>





# R&D Partnership

## *Including Testbeds*

### R2O/ NGGPS Initiative

- New program aims to accelerate research into operations
- Focus on demonstrating modeling research, forecast tools, and improved software
- FFO closed Sept 30<sup>th</sup>
- To support up to 20 projects; begin May 2015
- Each proposal: \$250K/year up to 2 years.
- Total expected funding: \$3.7M includes \$2.5M for NGGPS Research, and \$1.2M for Testbed activities



*Open Q&A*



# NWS Partners' Meeting



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## Status of Service Description Documents (SDD) on IDSS for EM Community and Government Core Partners

Edward Johnson,  
Strategic Planning & Policy Office  
National Weather Service

January 8, 2015



# Background



- NAPA report expressed need for improved clarity on plans for initiatives supporting NWS Weather-Ready Nation Roadmap – e.g., Impact-based Decision Support Services (IDSS)
- May 2013 – NWS released original SDD describing proposed enhanced IDSS for the Emergency Management (EM) Community
- May-September 2013 – Comment/Review period
- May 2014 – NWS release revised SDD for comment
- May-August 2014 – Comment/Review period for revised SDD





# Responses Received



- 23 – EM community/government partners
- 3 – Private sector
- 2 – Academia
- 2 – Internal
- 1 – Other



# Comments/Concerns on Revised SDD



- Scope of service:
  - Expand scope of service to medical/health, utilities, international government partners
  - Need to narrow scope of “safety and emergency personnel from universities and other large entities”
- Communication of information provided to EM/gov’t partners
  - Don’t limit redistribution of information
  - Some info shouldn’t go to the public
- Longer term/planning support is critical



# Comments/Concerns on Revised SDD (cont.)



- Need transparent and consistent process for approving new users for NWS IDSS
- Define consistent procedures for all situations where there is an intersection between AWCI and NWS core partner user community (not just in 1 scenario)
- Need better understanding of NWS actions under “emergency conditions” – our actions may disrupt AWCI services



# SDD modification areas



- Tier 3 definition – decision-specific information/products (vs. products for general product) – to achieve consistency with previously defined continuum of DSS
- Address scope issues
- Note that information on approved IDSS users will be centrally available for transparency
- Clarify consistent procedures for situations where there is an intersection between AWCI and NWS core partner user communities





# SDD modifications (cont.)



- Address availability of information provided to EM/gov't partners to others
- Clarify actions under “emergency conditions” as rare exceptions. Provide consistent procedures for use.



# NWS Internal Policy Dialog



NWS has been engaging all Warning Coordination Meteorologists/Service Coordination Hydrologists in discussions about critical policy issues related to service delivery:

- Policy implications of direct email/text services for the entire country
- WRN Ambassadors--What incentives/interaction is appropriate
- Social Media - Guidelines for Official and Personal Use
- NWS Support for Sporting Events



# Backup Slides

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# NWS “Core Partners” – EM Community



- Definition - public safety officials who serve as employees or contract agents of a government agency at the federal, state, local, or tribal level and are charged with protecting the public from hazards that are influenced by weather or weather-related events.
- Also includes: safety and emergency personnel, from universities or other large entities with large populations whose roles are functionally equivalent to public safety officials, Skywarn Net Control Operators, such as Amateur Radio Emergency Services (ARES) and Radio Amateur Civil Emergency Services (RACES).





# NWS “Core Partners” – Government Partners



- Federal/state/local government partners who have missions that require close coordination with the NWS. Includes (but not limited to) the FAA, and water and land management officials.



# Panel Session

AMBASSADOR™  
WRN  
WEATHER-READY NATION



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[www.weather.gov](http://www.weather.gov)  
[www.noaa.gov/wrn](http://www.noaa.gov/wrn)