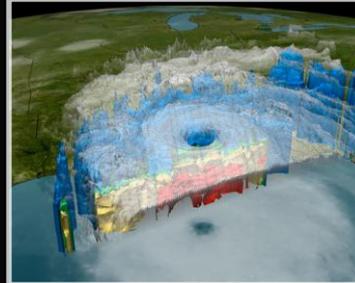
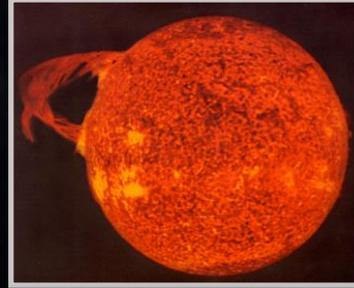
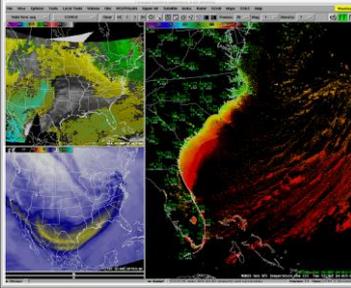




NWS Services: The AFS Portfolio

NWS Partners Meeting

January 14, 2016 • AMS New Orleans, LA



Andrew Stern

Director, Analyze, Forecast and Support Office



Snapshot of AFS Portfolio



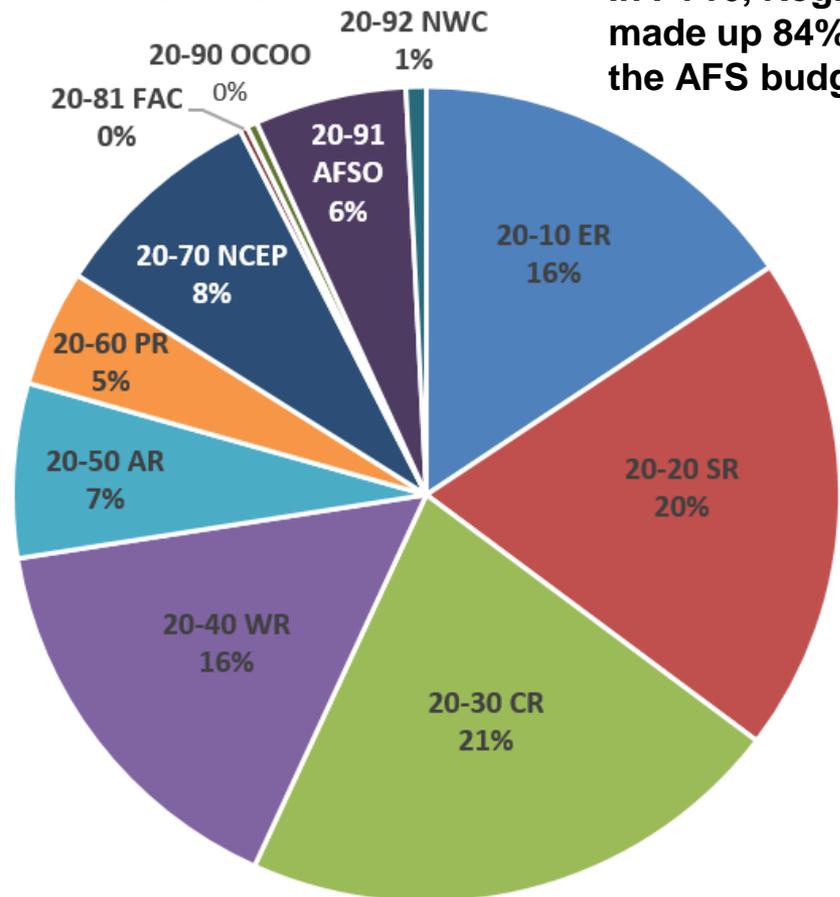
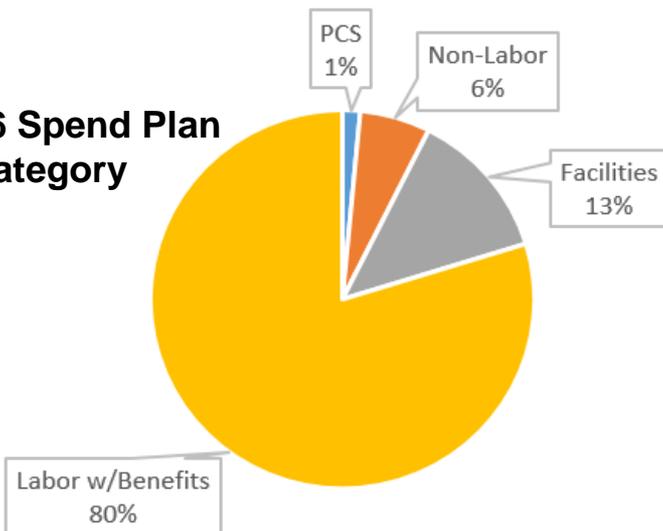
The Analyze, Forecast and Support (AFS) Portfolio Delivers NWS Mission of Protection of Life & Property

AFS is the largest of the NWS Portfolios

- 44% of overall NWS Budget
- 50% of NWS ORF Budget
- 65% of all NWS Staff

In FY16, Regions made up 84% of the AFS budget

FY16 Spend Plan by category





Organizations in the AFS Portfolio

OCOO

- Day-to-Day Field Operations
- Continuity of Operations
- Field Policy
- NWS Operations Center
- Performance Evaluation

AFSO

- Field Requirements
- Directives/Digital Policy
- Annual Operating Plan
- National Service Programs
- Weather-Ready Nation/DSS
- Analysis of new Technologies

NCEP – 7 National Service Centers

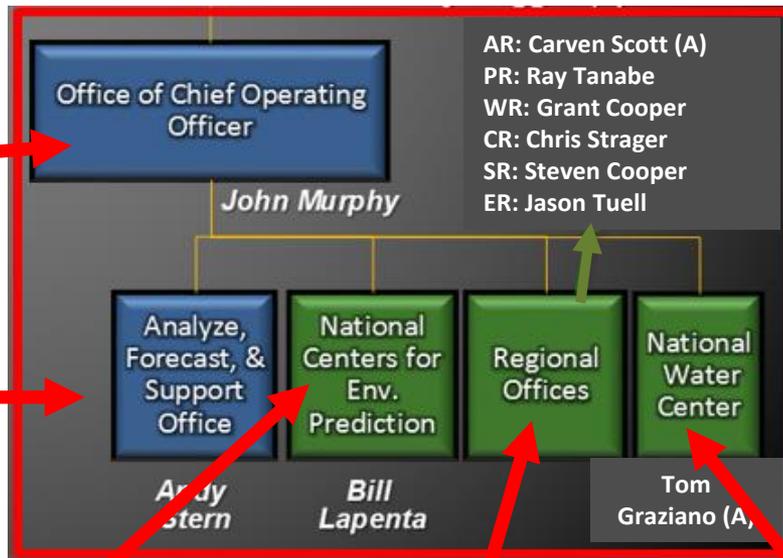
- Aviation Weather Center
- Climate Prediction Center
- National Hurricane Center
- Ocean Prediction Center
- Space Weather Prediction Center
- Storm Prediction Center
- Weather Prediction Center

6 Regions – 4 CONUS/2 OCONUS

- 122 Weather Forecast Offices
- 13 River Forecast Centers
- 2 Tsunami Warning Centers
- 21 Center Weather Service Units
- 1 Volcanic Ash Advisory Center
- 6 Regional Headquarters

NWC

- Newest facility
- Hub of innovation for integrated water prediction
- Supporting water management decisions
- Multiple Federal agency collaboration



The AFS Portfolio

- Delivers NWS Mission of Protection of Life/Property
- 44% of NWS Budget
- 2/3rds of all NWS Staff
- > 130 Facilities

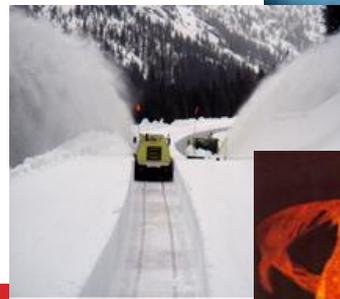




National Service Programs



- Aviation Weather
- Climate
- Fire Weather
- Hydrology/Water Resources
- Marine and Coastal
- Public Weather
- Severe Weather
- Space Weather
- Tropical Weather
- Tsunami
- Winter Weather





New and Enhanced Products and Services

NWSI 10-102 Process



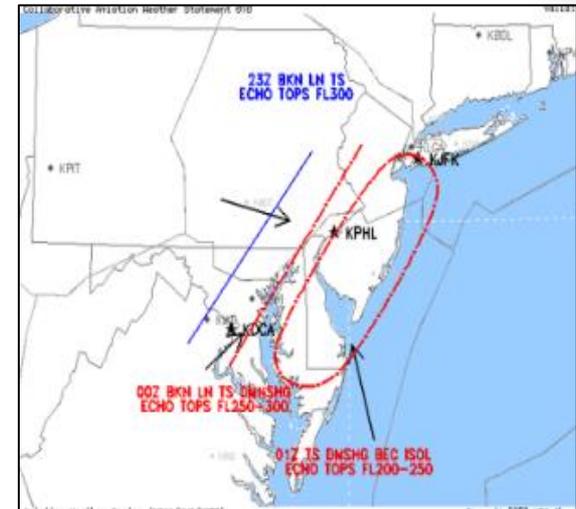
NWS Instruction 10-102

- Ensures that innovative field efforts are recognized and will result in **nationally consistent**, mission relevant products and services
- Required for **all** new experimental products/services or substantial changes to existing operational products/services in the NWS **regardless of the form or method of delivery**
- Requires **thorough vetting** to ensure proposed products/services are scientifically valid, aligned with strategic goals, subject to comment/review and in compliance with NOAA Partnership Policy
- Ensures that developers enter new/enhanced products/services **early in the development process** to promote coordination, reduce duplication of effort and foster efficient use of resources

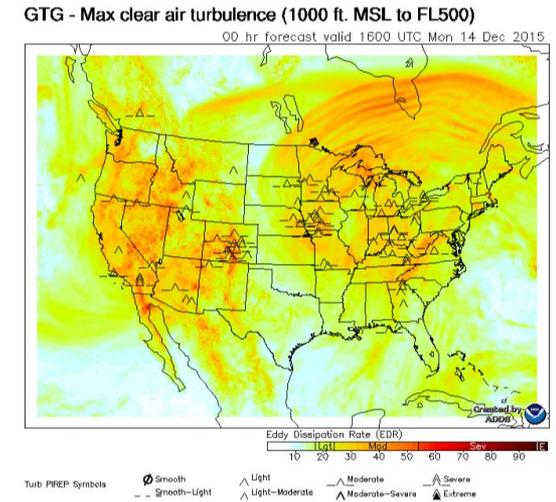
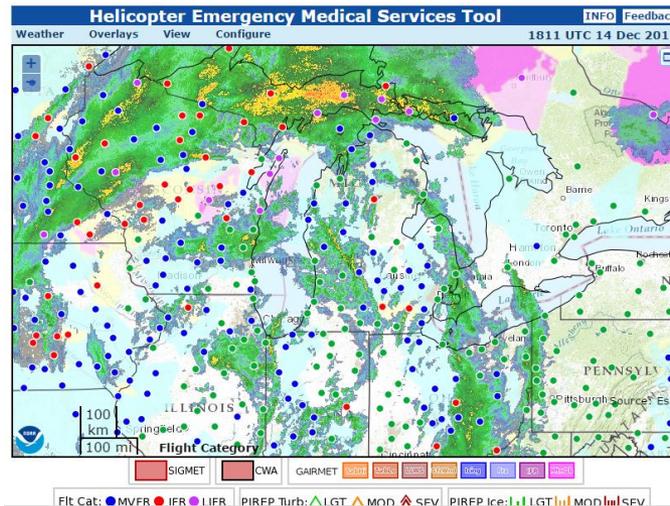
Aviation Weather Program

New & Evolving Products @ AWC

- Collaborative Aviation Weather Statement (CAWS)
- Aviation Digital Data Services (ADDS)
 - Graphical Turbulence Guidance (GTG)
 - Helicopter Emergency Medical Services (HEMS)
- PIREP form



3-Letter SA Identifier MSY New Orleans/Moisant, LA Nearest weather reporting station		Location Lookup Intersection/Fic: _____ OR Lat: DD MM N'S Lon: DDD MM E/W VOR: RQR110010 ARPT: KMSY284007	
1.	<input checked="" type="radio"/> UA (Routine Report) <input type="radio"/> UUA (Urgent Report)		
2. /OV →	Location: KMSY284007	Louis Armstrong New Orleans Intl Site, Bearing/distance from VOR, Route (ex: KTPA, KMCI030025, KOKC-KDFW)	
3. /TM →	Time: 1915 <input type="button" value="Current Time"/>	4 digits UTC (ex: 0915, 2330)	
4. /FL	Altitude/Flight Level: 080 <input type="radio"/> climb <input type="radio"/> descent Unknown <input type="button" value="Erase"/>	3 digits for hundreds of feet MSL. (ex: 095, 210) If unknown check box, select 'climb' or 'descent' if applicable	
5. /TP →	Aircraft Type: B738 BOEING 737-800	4 characters max. If unknown, use UNKN (ex: C210, P3, UNKN)	





Aviation Weather Program

Future Products @ AWC



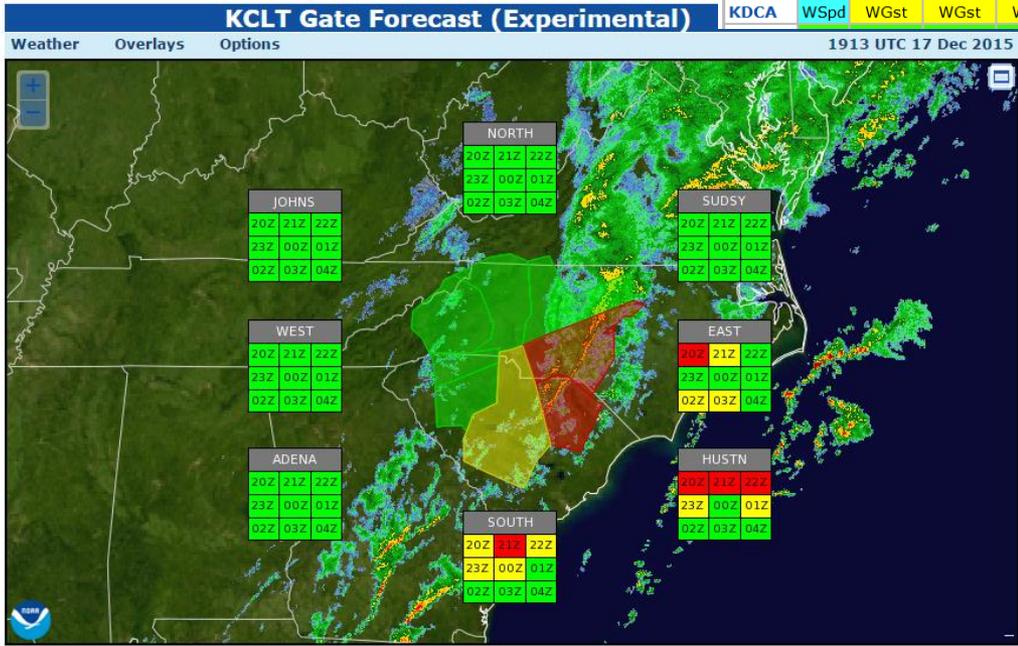
Experimental TRACON Gate Forecasts

Potential Impact **None** **Slight** **Moderate** **High**

Time	OBS	15/20Z	15/21Z	15/22Z	15/23Z	16/00Z	16/01Z	16/02Z	16/03Z	16/04Z	16/05Z	16/06Z	16/07Z	16/08Z
@TOPE														
KBOS	WGst	WGst	WGst	WGst	WGst	WGst	WGst	WSpd						
KCLE	VIS	CIG												
KLGA	WGst	WGst	WGst	WGst	WGst	WGst	WGst	WSpd						
KEWR	WSpd	WGst	WGst	WSpd										
KJFK	WGst	WGst	WGst	WGst	WGst	WGst	WGst	WGst	WGst	WGst	WSpd	WSpd	WSpd	WSpd
KPIT	CIG	CIG	CIG	CIG	CIG	CIG	CIG	CIG	CIG	CIG	CIG	CIG	CIG	CIG
KPHL	WGst	WGst	WGst	WGst	WSpd	WSpd	WSpd	WSpd	WSpd					
KBWI	WGst	WGst	WGst	WSpd										
KIAD	WSpd	WSpd	WSpd											
KDCA	WSpd	WGst	WGst	WGst										

AVIATION WEATHER CENTER
NOAA NATIONAL WEATHER SERVICE

Local Forecast Go [HOME](#) [ADVISORIES](#) [FORECASTS](#) [OBSERVATIONS](#) [TOO](#)



Gate Forecast Product Description
Please answer the survey on the Gate Forecasts

Impact-based TAF Board
(Available on ADDS experimental page)





Climate Program

Local Climate Analysis Toolkit (LCAT)



LCAT is

- **Data analysis and visualization tool** (does not provide prediction guidance)
- Displays local climate variabilities & trends
- Links weather & water trends to climate signals
- Available for access through registration

Link: nws.noaa.gov/lcat/

The screenshot shows the LCAT website interface. At the top, there are logos for NOAA and the National Weather Service, followed by the text "LCAT Local Climate Analysis Tool". To the right, there are input fields for "username" and "password", a "Login" button, and links for "Forgot password" and "Register for LCAT". Below the header is a large image of a desert landscape with the text "Learn. Do. Share." overlaid. Underneath the image, there is a section titled "Use the National Weather Service's Local Climate Analysis Tool (LCAT) to help you:" followed by three bullet points: "Improve professional competency and expertise in providing local information to your users", "Ensure adequate local input to CPC products that depend on local information like, for example, the Drought Monitor", and "Allow testing of local climate variables beyond temperature averages and precipitation totals, provided by CPC, such as climatology of tornado, flash floods, severe storminess, climatic extremes, etc.". To the right of this text are three columns: "Learn" with links to "Data Resources", "Local Climate Analysis", "Local Climate Change", "Compositing", and "Catalogue"; "Do" with links to "Site Specific Analysis", "Climate variability impacts", "ESRL Climate Division Tool", "ESRL Reanalysis Tool", "NDMC Drought Severity Assessment"; and "Share" with a link to "Search the database". At the bottom of the page, there is a footer with "LCAT Help | About LCAT", "Report functionality/plotting issue | Report website issue | Subscribe to ListServ (name lcat_nws)", "©2013 NOAA/NWS Climate Services Division", and logos for "USA.gov", "US Dept of Commerce", "National Oceanic and Atmospheric Administration", and "National Weather Service". There are also links for "Disclaimer", "Information Quality", "Help", "Glossary", "Privacy Policy", "Freedom of Information Act (FOIA)", "About Us", and "Career Opportunities". A "Web Master's Email" is listed as "w-nws.webmaster@noaa.gov".





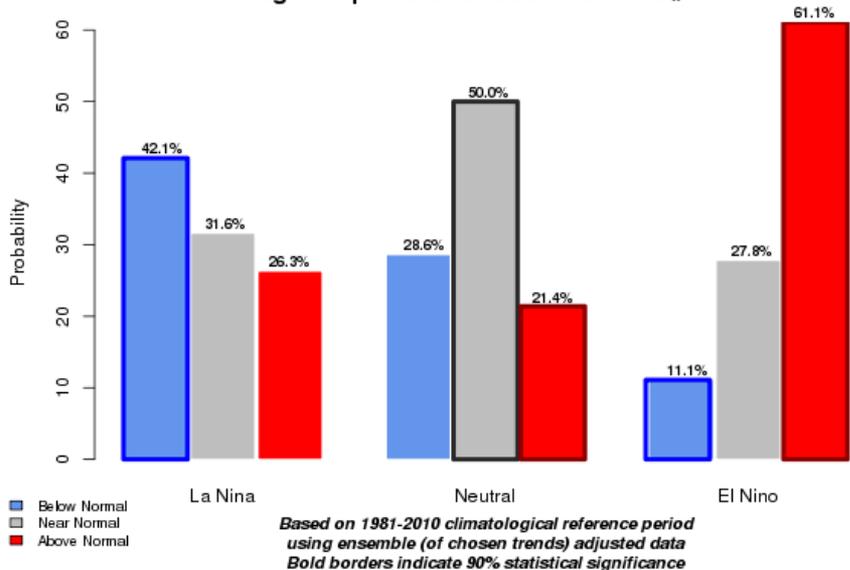
Climate Program

Local LCAT Study: Potential ENSO Impacts

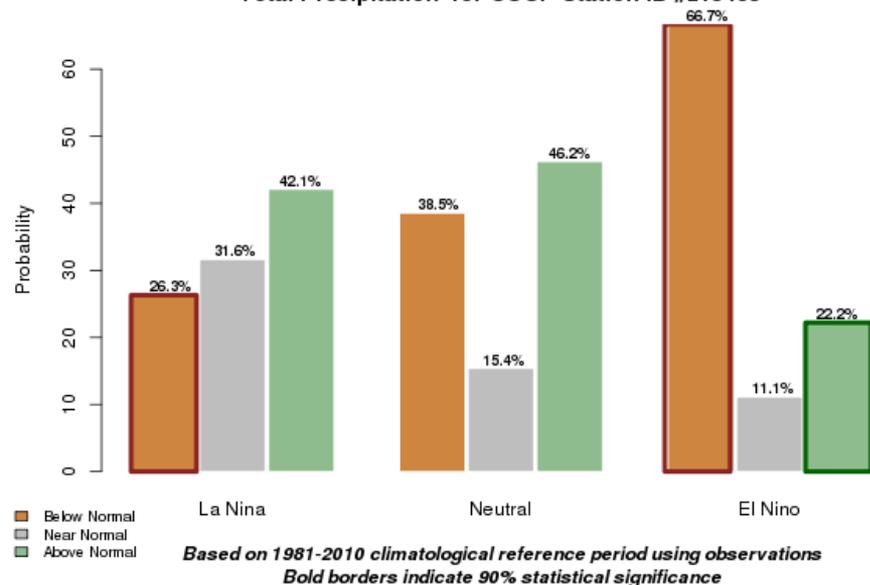


LCAT results for Minneapolis/St. Paul in Jan-Feb-Mar

ENSO Probability Distribution [1950-2014] of January-February-March Average Temperature for COOP Station ID #215435



ENSO Probability Distribution [1950-2012] of January-February-March Total Precipitation for COOP Station ID #215435



- LCAT Output: Significantly higher chance of temperatures like the warmest third of climatology, and precipitation like the driest third of climatology during El Niño for MSP area
- LCAT can be used to improve regional decision support planning





Climate Products & Services



New in FY15

- Experimental Week 3-4 Temperature/Precipitation Outlooks:
<http://www.cpc.ncep.noaa.gov/products/predictions/WK34/>
- Operational North American Mesoscale Ensemble (NMME)
- Experimental Arctic Sea Ice Prediction
- ENSO Blog:
<https://www.climate.gov/news-features/department/enso-blog>

Experimental in FY16

- Incorporation of extreme heat information in Week 2 Hazards Outlook
- Scoping for climate/health products in Africa
- Experimental Week 3-4 Severe Weather Outlook

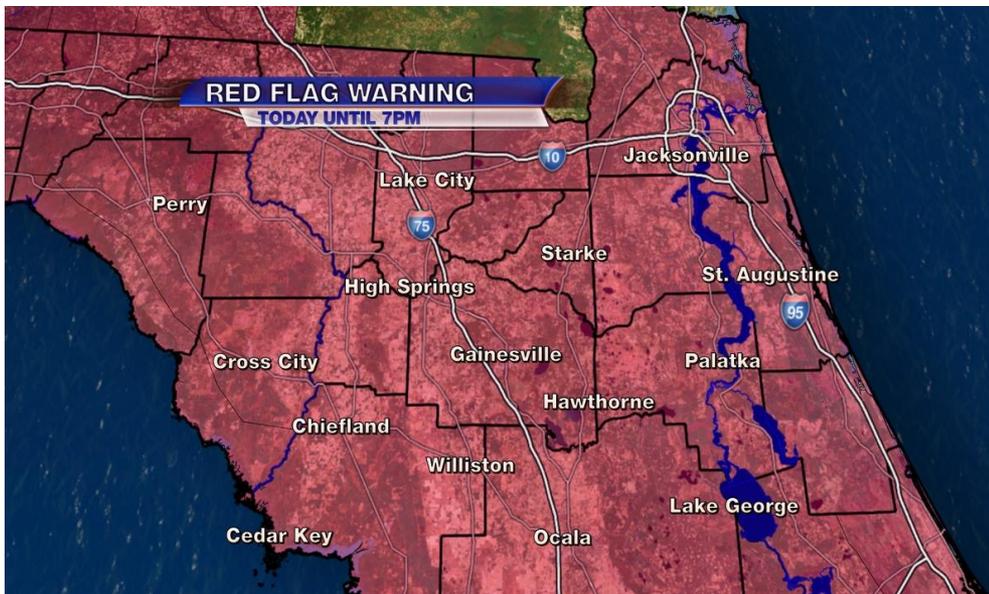


Fire Weather Services

Red Flag Criteria: Finding Efficiencies



- Red Flag Warning criteria from around the country will be published on the NWS national fire weather web page in 2016.
- Red Flag criteria are all locally developed and unique in that they rely on partner agency assessment of fuel dryness.
- Future plans include validating Red Flag criteria against fire behavior and adapting warning process for both public and fire management.





Fire Weather Services

Spot Point Forecast Interface for Emergencies



- In 2016 - one national Spot forecast page that will enable EM's to request Spot Forecasts for:
 - Fire Operations
 - HAZMAT Incidents
 - Search & Rescue Support
 - Marine spills (inland or oceanic)

Based on NWS NDFD Grids

Step 1: Establish incident location using A or B below.

A. Set request location using nearest street address.

Note 1: Valid entries are street address, zip code, city, state, or latitude & longitude.
 Note 2: Latitude & Longitude will return the nearest street address. For exact latitude and longitude points use Step B entry below.
 Note 3: City, State, and Zip Code will return a geoproxy domain.

Enter Location (PLOT ADDRESS)

- OR -

B. Set request location using latitude & longitude, USNG, or the map pointer below.

Note 1: If the map below does not appear you may enter your decimal Lat/Lon below.
 Note 2: To start over click the Reload button on your Web Browser.
 Note 3: Latitude, Longitude information should be entered in WGS84/NAD83 coordinates in order to ensure accurate forecast locations.

Decimal Degree Latitude, Longitude
 West Longitudes Are Negative
 Example: 25.0312, -94.2022

39.1189, -94.5207 (PLOT)

United States National Grid (USNG)
 Valid for points between 64N and 66S Latitude
 Requires 13 character grid + 10 meter precision
 Example: 18SUQ2480247

18SU 6853 3107 (PLOT)

Degree, Minute, Seconds
 Can accept decimal minutes as an input
 Example: 25 deg 12 min 32.661 W

39 Deg 7 min 8 Sec W (PLOT)

94 Deg 31 min 15.560 W (PLOT)

Elevation
 Latitude & Longitude value used to determine elevation.
 If Elevation data is in error, changes can be made on the second page of this spot request.

881 FT

Forecast Information

DELIVER FORECAST
 Date: 06/11/2014
 Time: As Soon As Possible

FORECAST STARTING
 Date: 06/11/2014
 Time: 16:00

TIMEZONE
 (Local Time)
 MOUNTAIN

Narrative FORECAST FORMAT
 2 Hr 2 Hr 2 Hr
 Tabular Time Table Interval

This Afternoon	Tonight	Thursday	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sky/Weather <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Max/Min Temperature <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Max/Min Humidity <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wind (20 FT) <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chance of Wetting <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rain <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lightning Activity <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Level <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ridge Top Winds <input type="checkbox"/>

NOAA Hysplit Model
 Would you like to include a run of the Hysplit Model with this request? If so please verify your email address above as this will be used to send you the Hysplit model run.

YES
 NO

Remarks





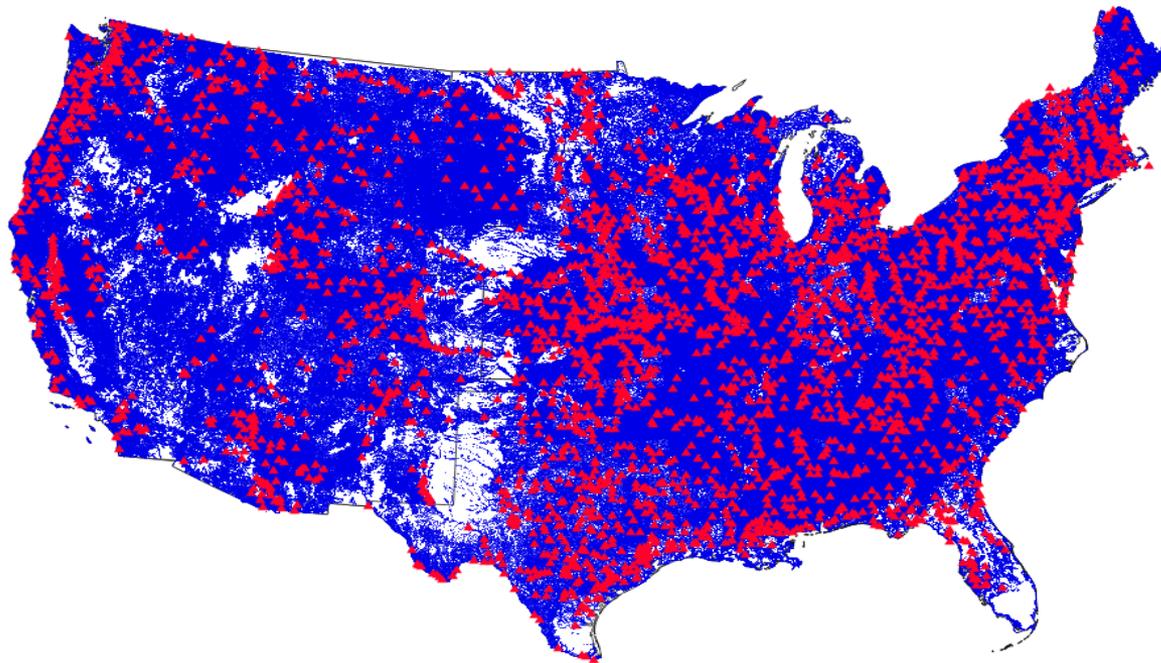
Water Resources: National Water Center

High-Resolution Water Forecasting



The National Water Center high-resolution water forecasting model will provide neighborhood-level forecast information for rivers and streams at 2.67 million locations (blue circles) across the country

- This is a 700-fold increase over the ~3600 locations (red triangles) currently available*





Hydrologic Ensemble Forecast Service

Short-Range River Forecast Uncertainty



Weather Forecast Office Norman, OK

Arkansas Red-Basin River Forecast Center

This probabilistic forecast is issued by the Arkansas Red-Basin River Forecast Center.

Hydrograph

River at a Glance

Download

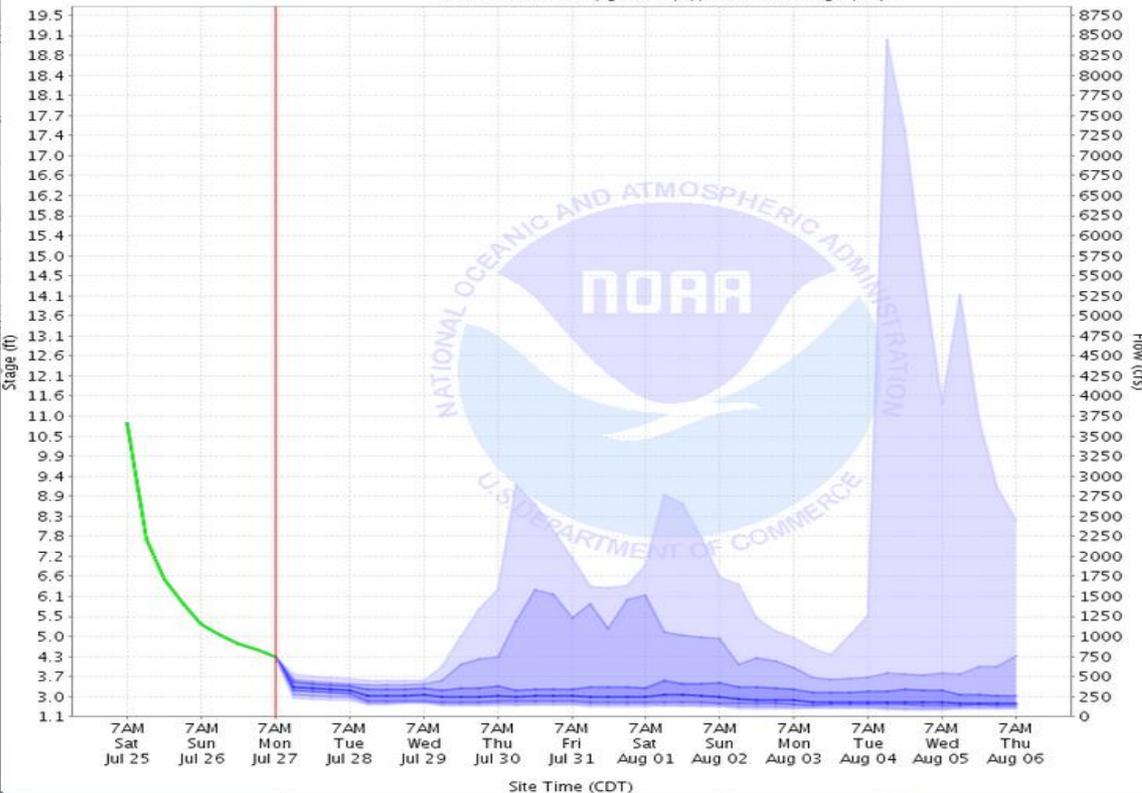
Probability Information

For official forecast click here

Short-term Probabilistic Guidance (Experimental)
BLK02 - CHIKASKIA RIVER AT BLACKWELL 1NE

Data as of 07:00 AM CDT Jul 27

For official forecast, go to <http://water.weather.gov/ahps>



- Experimental HEFS product depicts the uncertainty in short-range river forecasts
- New river service locations will expand throughout 2016
- Provide feedback on this new product at:

<http://www.nws.noaa.gov/survey/nws-survey.php?code=SRRFCSTUNC>

water.weather.gov



Implemented in 2015:

- NHC's Tropical Analysis and Forecast Branch began issuing wind, wave, and marine hazard grids in 3-hour increments out to 72 hours for their tropical Atlantic, Gulf, and Caribbean Waters
- Experimental Beach Forecast webpage and Rip Current Risk Graphic

Experimental Beach Forecast Webpage

[Weather.gov](#) > [Beach](#) > Experimental Beach Forecast Webpage

The map below is color-coded to indicate the forecast rip current risk level; with no color indicating low risk. Click on the beach area of your choice for more information, or click a beach umbrella for the detailed, beach forecast.

Risk Level	Description	Details
Low	Life threatening rip currents often occur in the vicinity of inlets, groins, jetties, and piers. Always supervise those who cannot swim and remember to heed the advice of the local beach patrol and flag warning systems.	Select a shaded area on the map to view details.
Moderate	Swim near a lifeguard. Remember to heed the advice of the local beach patrol and flag warning systems.	
High	The surf is dangerous for all levels of swimmers. Remember to heed the advice of the local beach patrol and flag warning systems.	

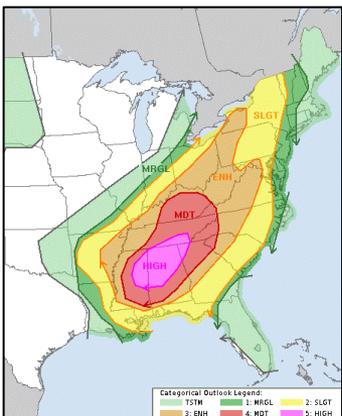
National Weather Service
Mobile - Pensacola
RIP CURRENT RISK for 12/17/2015
 Valid as of 3:36 AM CST **EXPERIMENTAL**

Beach Safety Tips

When Thunder Roars, Go Indoors!
 STOP all activities.
 Seek shelter in a substantial building or hard-topped vehicle.
 Never 20 minutes prior to the start of inclement activities.

Communicating Impacts, Threats and Risks

SPC Convective Outlook



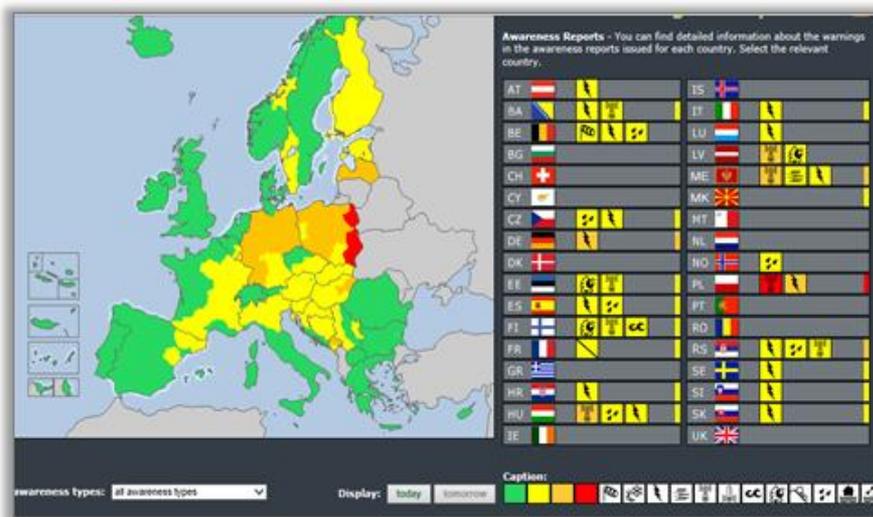
Long Range Winter Storm Threat

High	High threat of high impact winter storm. Potential impacts include significant travel delays, closures, and threats to life and property. Plan ahead to minimize impact on you and your family.
Moderate	Moderate winter storm threat. Potential impacts include significant travel delays and closures. Plan ahead to minimize impact on you and your family.
Enhanced	Enhanced winter storm threat. Primary threat is disruption to travel.
Slight	Slight winter storm threat. May cause travel disruptions, particularly if threat increases.
None	No significant winter storm threat is currently expected. However, light wintry precipitation may still be possible.

Enhanced Hazardous Weather Outlook

Threat Levels	
	Take Action to minimize impact from the expected weather conditions
	Be prepared to protect yourself from the expected weather conditions
	Be aware that weather may have a limited impact on your daily activities
	No negative impact is expected from the weather
	Missing or incomplete weather data

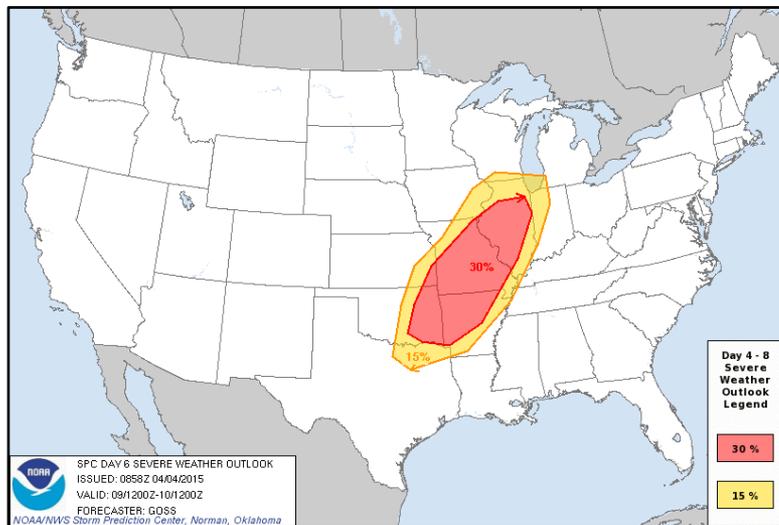
European Meteoalarm



Improved Outlook Resolution, Expanded IBW

Social science research suggests:

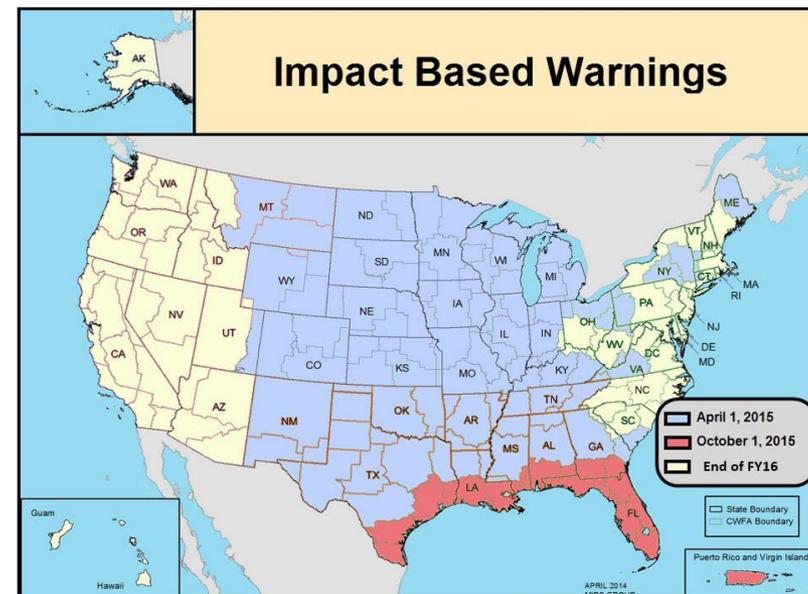
- Reduce phenomena information
Increase hazard/impact information
- Multi-modal
Numbers, Colors, Words
- People seek confirmation –
Consistency matters



Increased risk levels in Day 4-8 Outlooks

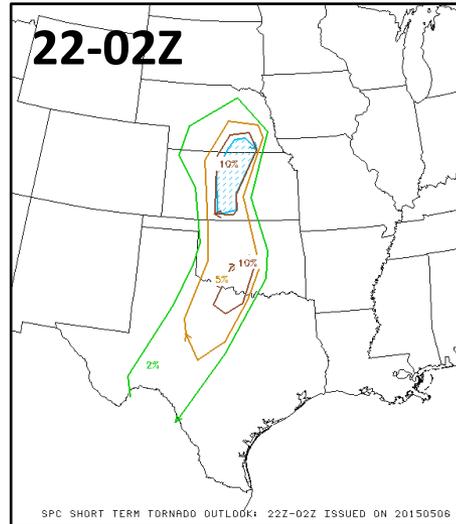
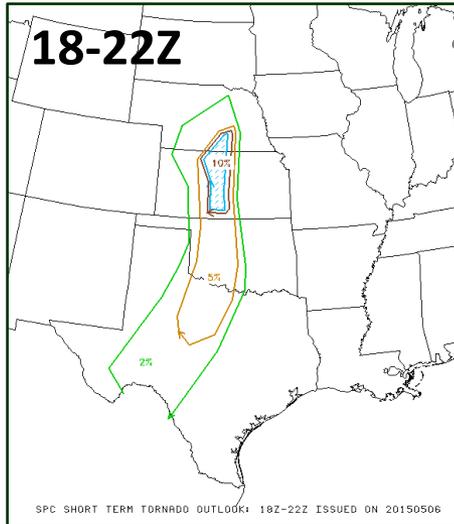
THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms	A few severe thunderstorms	Scattered severe storms possible	Numerous severe storms possible	Widespread severe storms likely	Widespread severe storms expected
Lightning/flooding threats exist with all thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, some intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
• Winds to 40 mph • Small hail	• Winds 40-60 mph • Hail up to 1" • Low tornado risk	• One or two tornadoes • Reports of strong winds/wind damage • Large hail, 1" +	• A few tornadoes • Several reports of wind damage • Destructive hail	• Strong tornadoes • Widespread wind damage • Destructive hail >2"	• Tornado outbreak • Derecho

5 Levels of risk in Day 1-3 Outlooks



Severe Storms Services 2016 and Beyond

Short Range Day 1 Probabilistic Severe Outlooks



Add Outer Marine Zones to Convective Watches



FACETs

A foundational collection of individual forecast process elements

- Robust quantification of hazard risk
- Better** individual and group **decision making**
- Consistent communication and DSS**
- Rigorous **quantification of potential impacts**



← INTEGRATED SOCIAL / BEHAVIORAL / ECONOMIC SCIENCES →

SPACE WEATHER PREDICTION CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Thursday, December 17, 2015 17:56:56 UTC

HOME ABOUT SPACE WEATHER PRODUCTS AND DATA DASHBOARDS MEDIA AND RESOURCES SUBSCRIBE ANNUAL MEETING FEEDBACK

SPACE WEATHER CONDITIONS on NOAA Scales

24-Hour Observed Maximums: R (none), S (none), G (none)

Latest Observed: R (none), S (none), G (none)

Predicted 2015-12-17 UTC: R1-R2 15%, S1 or greater 1%, R3-R5 1%, G (none)

Solar Wind Speed: 466 km/sec Solar Wind Magnetic Fields: Bt 6 nT, Bz -4 nT Noon 10.7cm Radio Flux: 126 sfu

16/0745 UTC: Region 2468, Earth Scale

16/0830 UTC: Coronal Dimming, Earth Scale

16/0845 UTC: Coronal Dimming, Earth Scale

16/1220 UTC: Earth Scale

16/1604 UTC: Earth Scale

G1 (Minor) - G2 (Moderate) Geomagnetic Storms Likely on 18-19 December
published: Thursday, December 17, 2015 16:55 UTC
G1 (Minor) and G2 (Moderate) Geomagnetic Storm Watches have been issued for 18 and 19 December respectively in anticipation of the arrival of the t

Two Possible Earth-directed CME events on 16 December
published: Thursday, December 17, 2015 16:54 UTC
Two coronal mass ejection (CME) events took place on 16 December. The first was associated with a C6 x-ray flare at 0903 UTC (0403 ET).

The NWS Winter Safety Campaign Has Begun
published: Thursday, December 03, 2015 19:11 UTC
December 1 marks the beginning of meteorological winter.

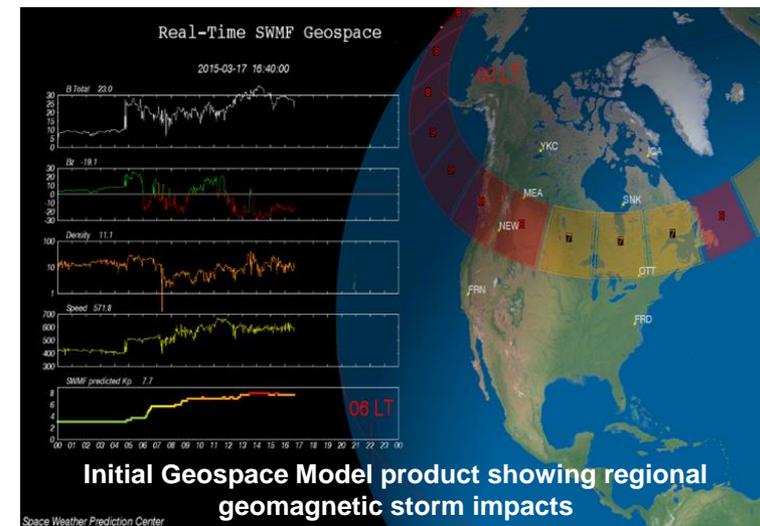
National Space Weather Strategy and Action Plan Released
published: Thursday, October 29, 2015 21:59 UTC
Today, OSTP Director John Holdren announced the release of the

SERVING ESSENTIAL SPACE WEATHER COMMUNITIES

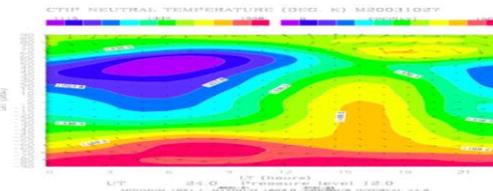
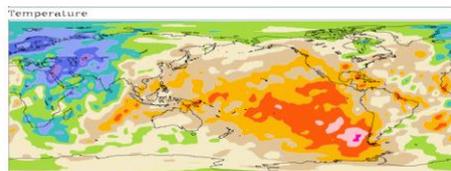
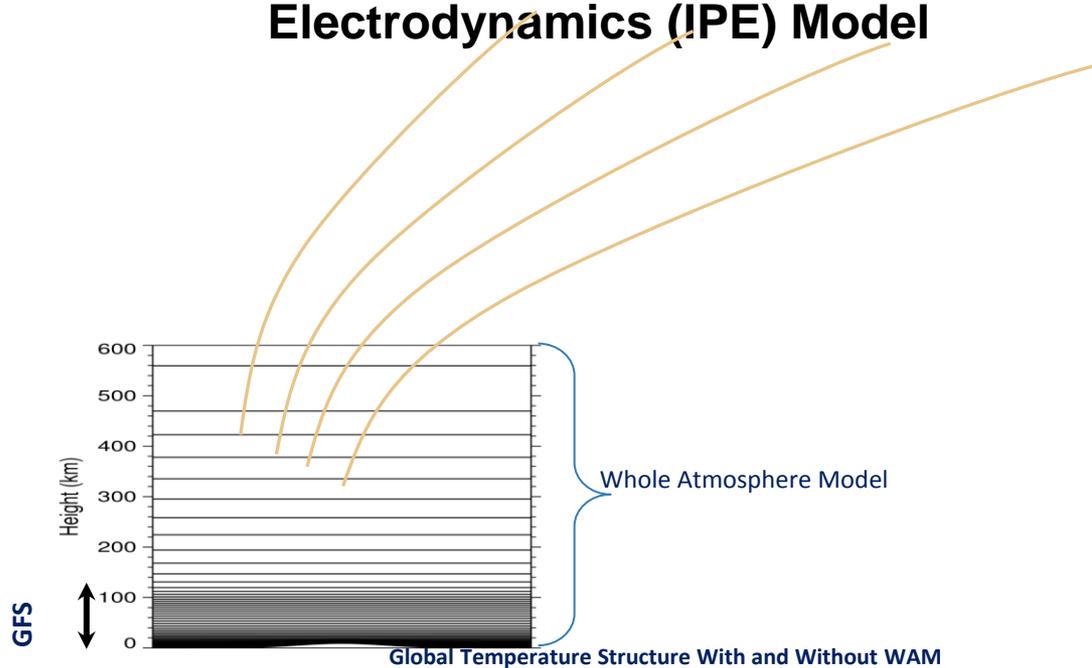
Aviation Electric Power Emergency Management Global Positioning System (GPS)
Radio Communications Satellites Space Weather Enthusiasts

- Research to Ops
- Geospace Model enhanced & runs in real time
- Will transition FY16 Q4
- 20-30 minute warning

- New user-friendly webpage
 - Color-coded for quick look at storm levels and impacts
 - Highlights top four news stories



Ionosphere Plasmasphere Electrodynamics (IPE) Model





NWS Tropical Weather Services 2015 Accomplishments



- **New WFO Local Watch/Warning Statement (TCV)**
 - All local land-based tropical watches/warnings & meteorological information in a one zone-one segment product.
 - Replaced the Hurricane Local Statement (HLS) as the land-based WFO tropical cyclone watch/warning product.
- **Redesigned HLS**
 - Succinct message on local impacts.
 - Non-segmented product.
- **Storm Surge Watch/Warning Graphic**
 - Prototype; Made available from NHC website and linked in NHC TCP
- **Hurricane Threats and Impacts (HTI)**
 - Four elements now official in NDFD
 - Experimental website available
 - Replaces two older WFO tropical pages

The Hurricane Threats and Impacts web site is an experimental internet-based decision-support service consisting of at least four informational elements: high wind impacts, storm surge impacts, inland flooding impacts, and tornado impacts. During the Atlantic & Caribbean Hurricane Season, the information will be generated and posted by 23 coastal WFOs whenever tropical cyclone watches and/or warnings are in effect for their area. View [additional information](#) about this site.

A map is provided below with four tabs at the top. During times when tropical storm or hurricane watches and/or warnings are in effect, click on the point of interest on the map. Then click on the desired tab of interest and scroll down to see the desired information displayed. [Click here](#) for more information about this product.

For storm-based information, visit the [National Hurricane Center](#) website.

Please take the [online survey](#) to let us know what you think of this interface.

Local Forecast Local Statements Local Threats/Potential Impacts Local Threat Meter

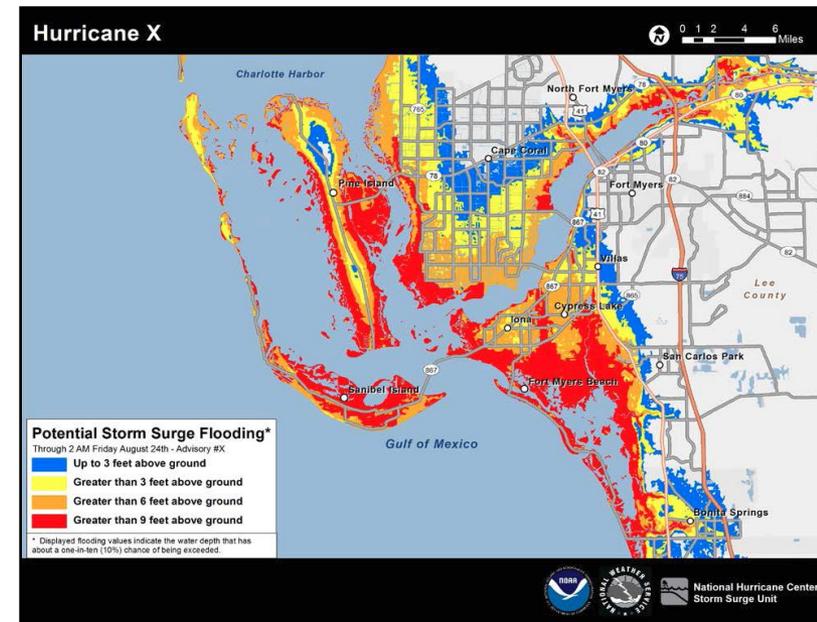


HTI



Tropical Weather Services 2016 Plans

- National (NHC) TCV
 - No operational change
 - Prototype version containing storm surge watch/warning and all land-based wind watch/warning hazards will be made available after an event on NHC website for comment
- Storm Surge Watch/Warning graphic and Hurricane Threats & Impacts (HTI) continue as experimental
- Potential Storm Surge Flooding Map scheduled to become operational
- Start looking at feasibility of tropical watch/warning pre-genesis



Potential SS Flooding Map

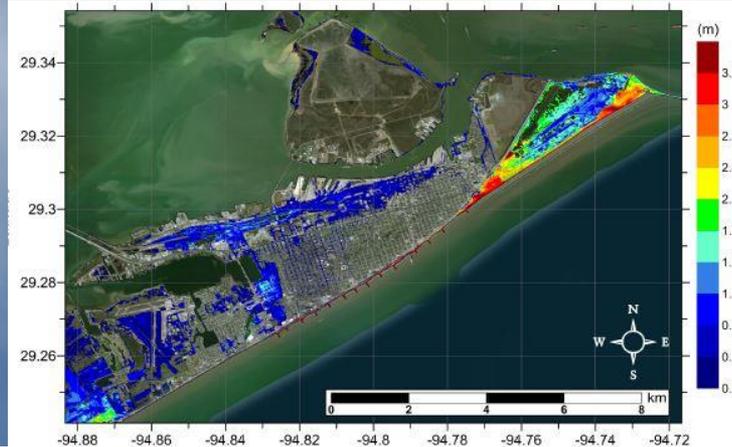
Tsunami National Service Program

2016 Plans

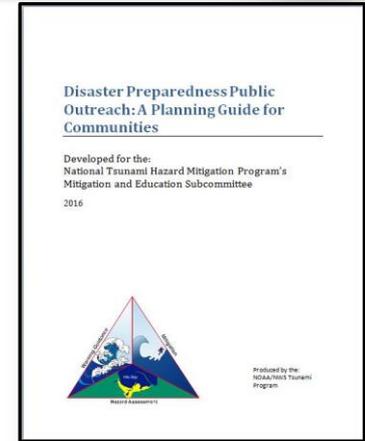
In conjunction with State Partners



Densified Alerting Infrastructure

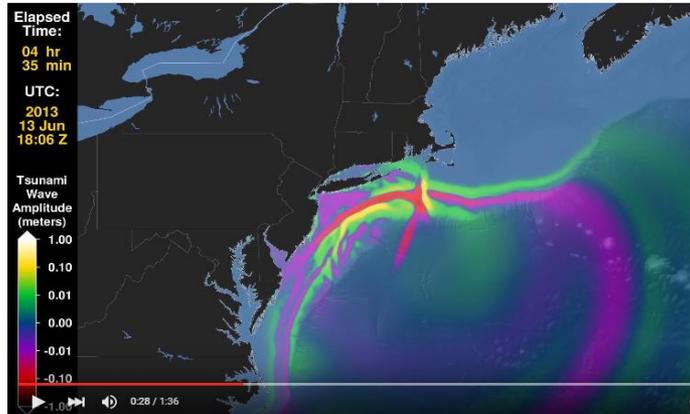


Expanded Inundation Map Coverage

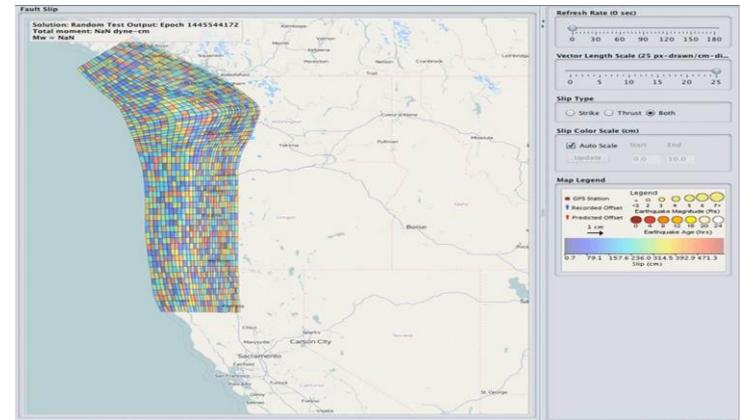


Local Disaster Preparedness Public Outreach Guide

NWS Operational Initiatives



Initial Meteotsunami Alerting Protocol

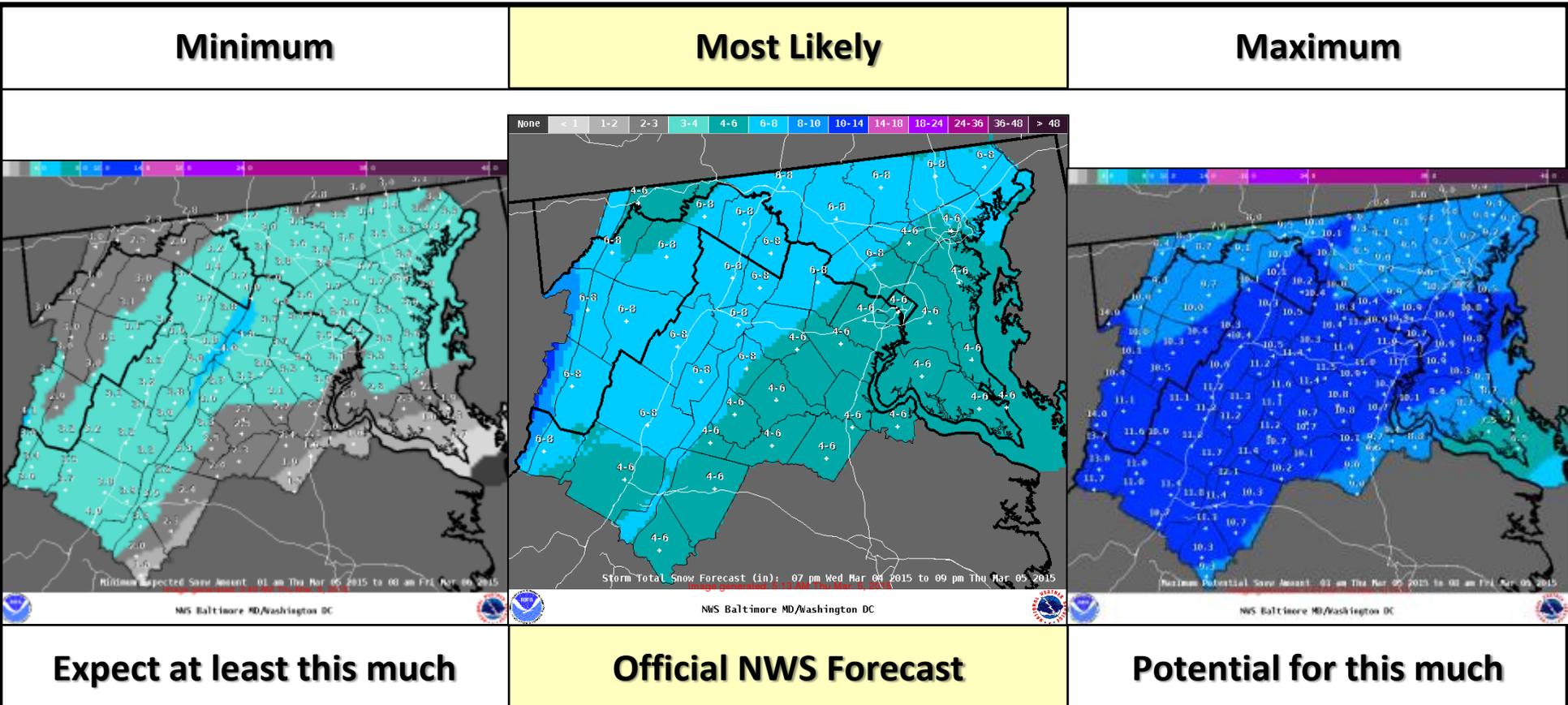


Joint Project (with NASA) on GPS-based Tsunami Detection



Winter Weather Services

Experimental Graphics Now at 18 WFOs



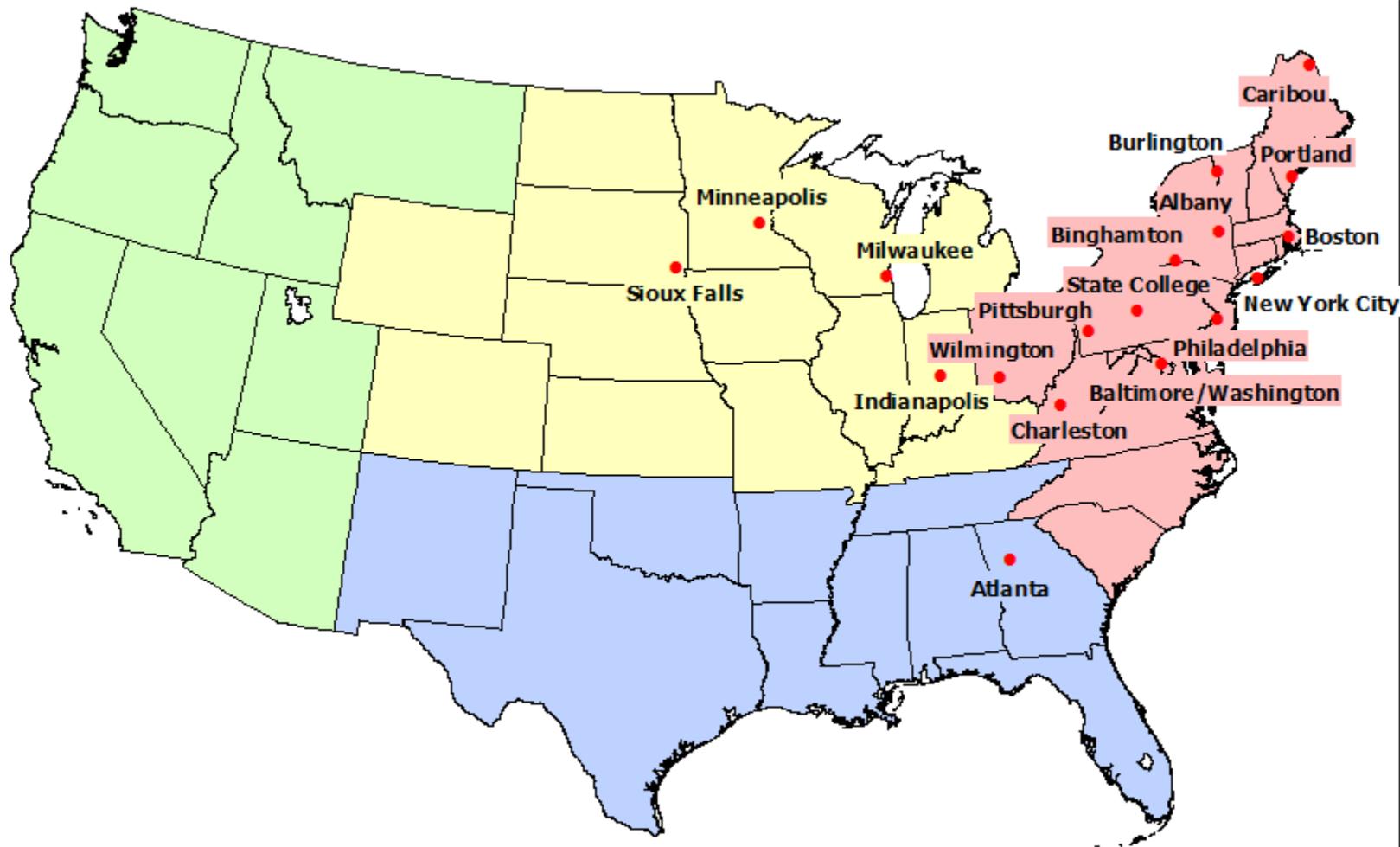
Minimum & Maximum are approximately WPC's 10th & 90th Percentile
Most Likely is the WFO's forecast





Probabilistic Snow Total Forecast Graphics

Participating Offices: Winter 2015-2016



Winter Weather Services

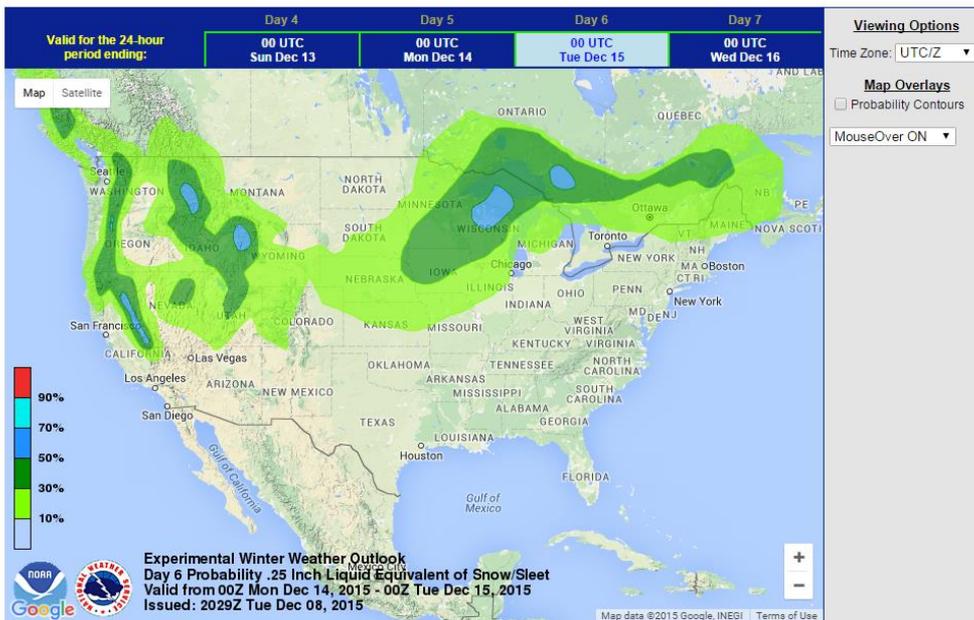
Days 4-7 Probability of Winter Weather

Experimental Day 4-7 Winter Weather Outlook

Probability of At Least .25" Liquid Equivalent of Snow/Sleet

We are interested in your feedback regarding this experimental forecast. Please consider taking our [survey](#) and providing your feedback.

For additional details on this product, please read the official [Product Description Document \(PDD\)](#)



About the Day 4-7 Probabilistic Forecasts (Click to Show/Hide)

[Latest Forecast in GIF Format](#)

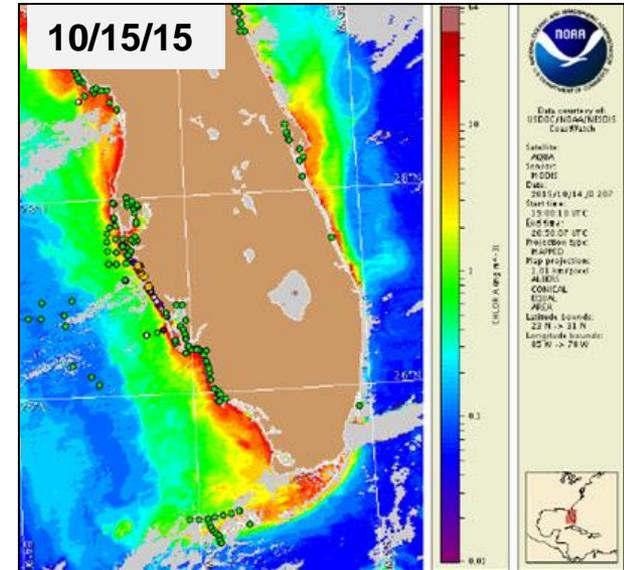
[Product Verification and Archive](#)

- Probability of >0.25" liquid equivalent of snow (~2-4" snowfall) in 24 hrs (e.g., day 6)
- Public experiment this season (feedback welcome!)
- Plan to make available as experimental NDFD grids for the 2016-17 season.
- Winter Weather Desk is now 24x7

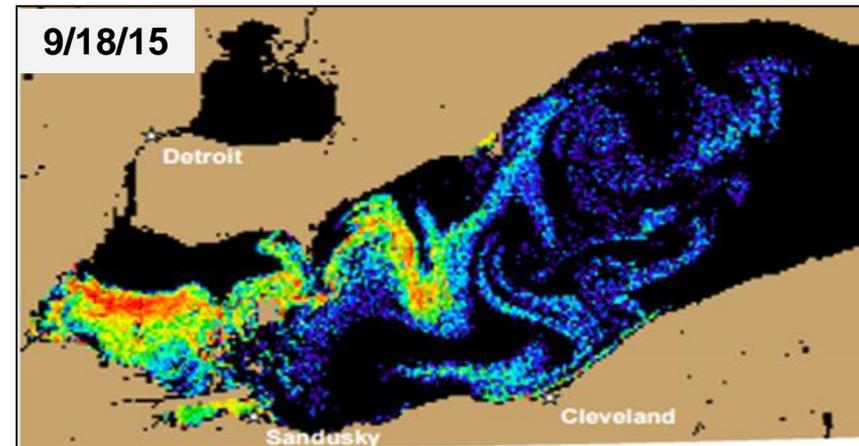
http://www.wpc.ncep.noaa.gov/wwd/pwpf_d47/pwpf_medr.php

Enabling Ecological Forecasting

- NOS models run on NOAA/NWS operational supercomputer
- Harmful Algal Bloom, Hypoxia, Vibrio prediction led by NOS
- HAB - On-going real-time prediction by NOS:



- **Gulf of Mexico (operational)**
 - NWS: WFOs Tampa and **new in 2015**, Miami and Key West, issue Beach Hazard Statements for high respiratory irritation from HAB (Florida Red Tide)
- **Lake Erie (experimental) - new in 2015**
 - WFO Detroit provides decision support dashboard to NOS HAB analysts;
 - WFO Cleveland hosts L. Erie HAB web page





Thank You!

