

# The National Weather Service of the Future: Building a Weather-Ready Nation



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# Outline

- **Building a Weather-Ready Nation**
- **Model Implementation & Increased Collaboration**
  - **Model Highlights Based on Community Approach**
  - **Network Updates**
  - **National Water Center**
  - **SOO-DOH Conference**



# 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*





# NWS Strategic Outcome: Weather-Ready Nation

## NWS Strategic Goals

- Improve Weather Impact-Based Decision Support Services
- Improve Water Forecasting Services
- Enhance Climate Services and adapt to climate-related risks
- Improve sector-relevant information in support of economic productivity
- Enable environmental forecast services supporting healthy communities and ecosystems
- Sustain a highly skilled, professional workforce equipped with training, tools, and infrastructure to meet mission

Interdisciplinary/Earth System  
Model Approach

1. Water Quality, 2. Food 3. Health



*Prediction is what makes NOAA/NWS unique and indispensable!*




# **“Evolving” the National Weather Service**

## **Overarching Goals:**

- **Creating an Organization Capable of Change and Innovation**
- **Implementing a Fully Integrated Field Structure providing consistent, accurate, timely and reliable products and services.**

# **Model Implementation & Increased Collaboration**





# 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
- **High Resolution Rapid Refresh (HRRR) (September 2014)**
  - 3 kilometer resolution
  - Runs every hour
- **Run NWS Global Forecast Systems at higher resolution (13km) out to 10 days (January 2014)**
- **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 (January 2015)**

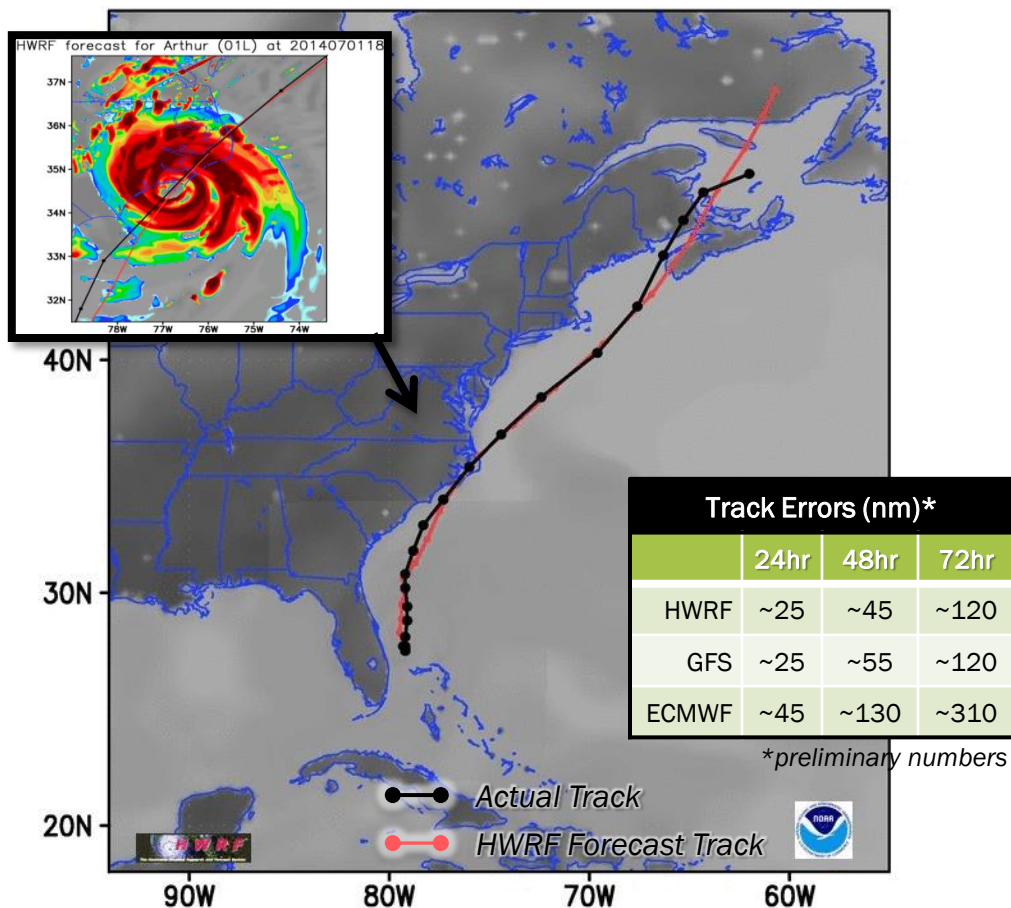




# 2014: Improved Forecasts & Products

## Hurricane WRF Model & New Storm Surge Graphics

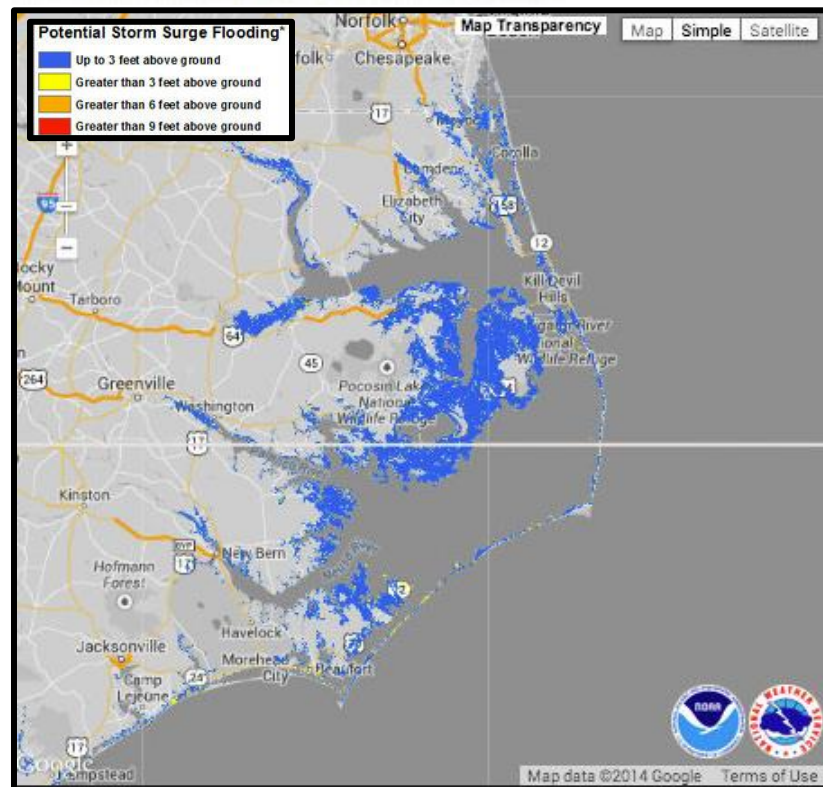
### HWRP Forecast Track & Forecast Radar Reflectivity for Hurricane Arthur (18z 01 JUL '14)



### Hurricane Arthur 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







# HRRR Svr Wx: Derecho Forecast

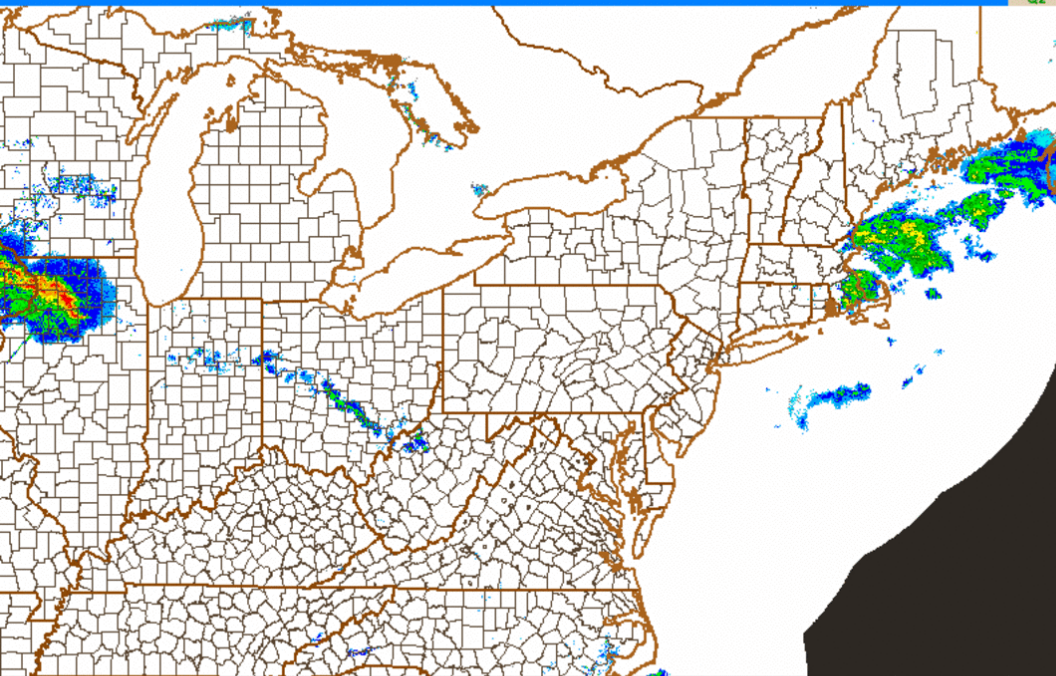
## Reflectivity Observations

### Composite Reflectivity

Derived From Mosaic3D

Valid At:

06/29/2012 15:00:00 UTC



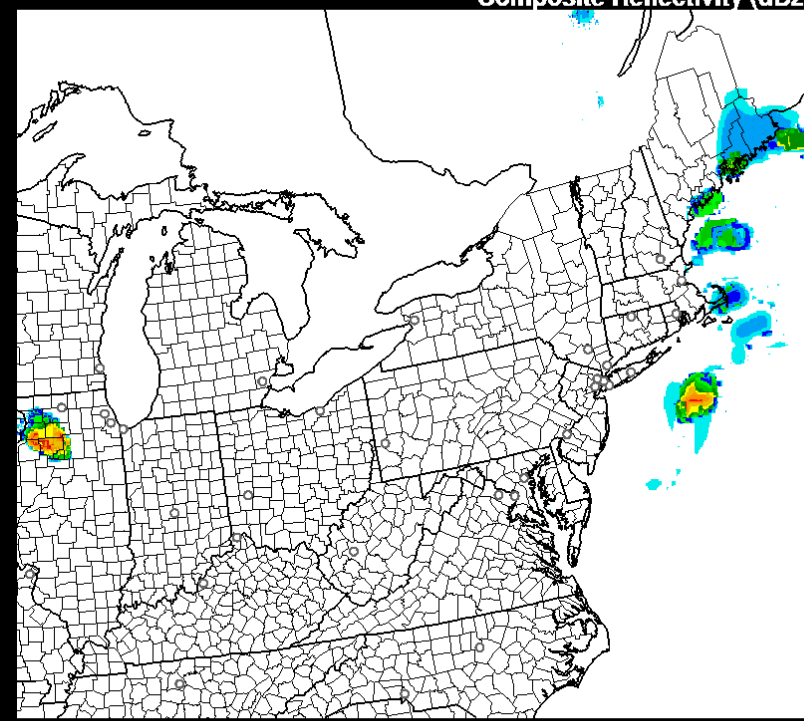
Reflectivity [dBZ]

91.00W 47.00N  
35.00N 65.76W

## HRRR 15 UTC 29 June 2012

HRRR 06/29/2012 (15:00) 00:00 hr fcst - Experimental

Valid 06/29/2012 15:00 UTC  
Composite Reflectivity (dBZ)



0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



National Weather Service



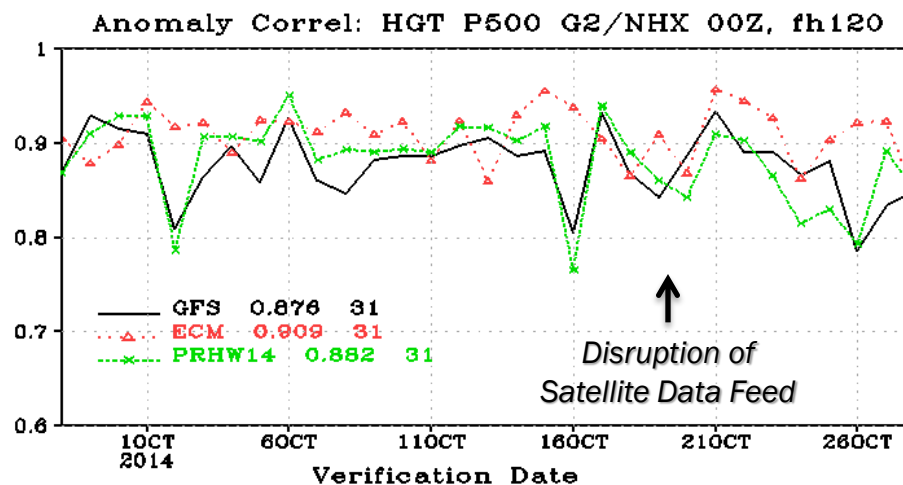
# GFS Improvements

## Improvements in

- **Resolution:** 13km to 10 days (vs. 23km to 8 days)
- **Observations:** hourly GOES & EUMETSAT winds, SSM/IS, etc
- **Algorithms:** data assimilation
  - higher res EnKF with better spread
- **Model Physics:**
  - cloud-radiation interaction
  - land characteristics (hi-res topography, SST and sea ice analysis, and initial snow conditions)
  - boundary layer physics

## Benefits

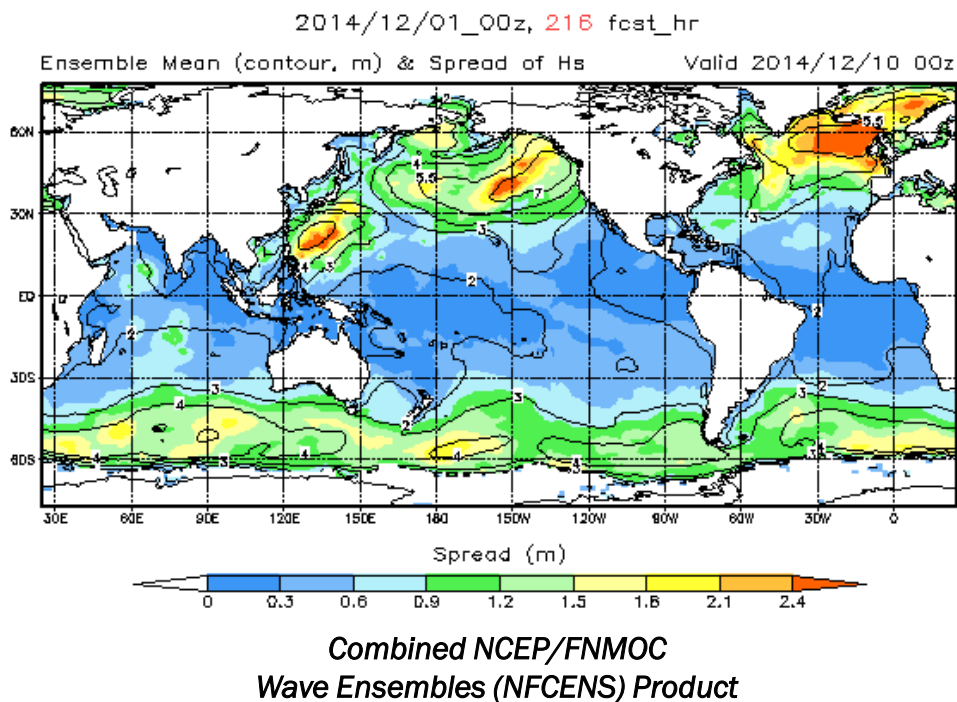
- Resolve smaller scale features
- Improved
  - 500mb height anomaly correlations
  - Precipitation forecasts
  - Tropical storm track & intensity





# Ocean

- Community modeling approach
- Hycom Ocean Model
  - Also provides boundary condition to NOS coastal models
- NRL – NCODA
- WaveWatch III / Navy Wave Model Ensemble System (NFCENS)

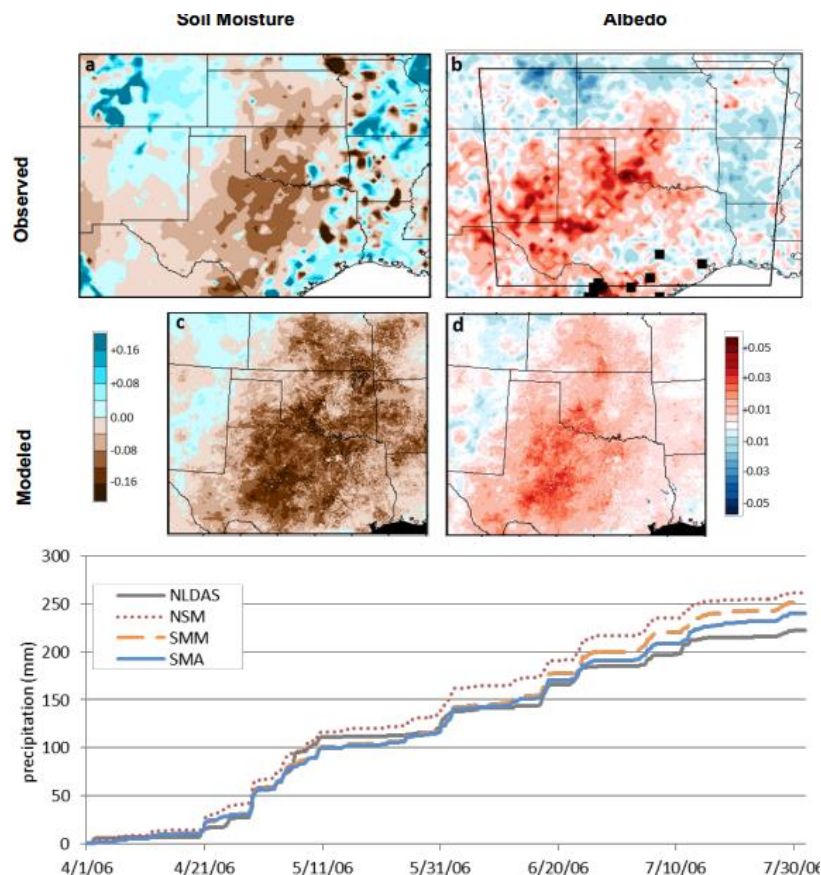






# Joint Center for Satellite Data Assimilation (JCSDA)

## Soil Moisture Feedback During Drought: NU-WRF

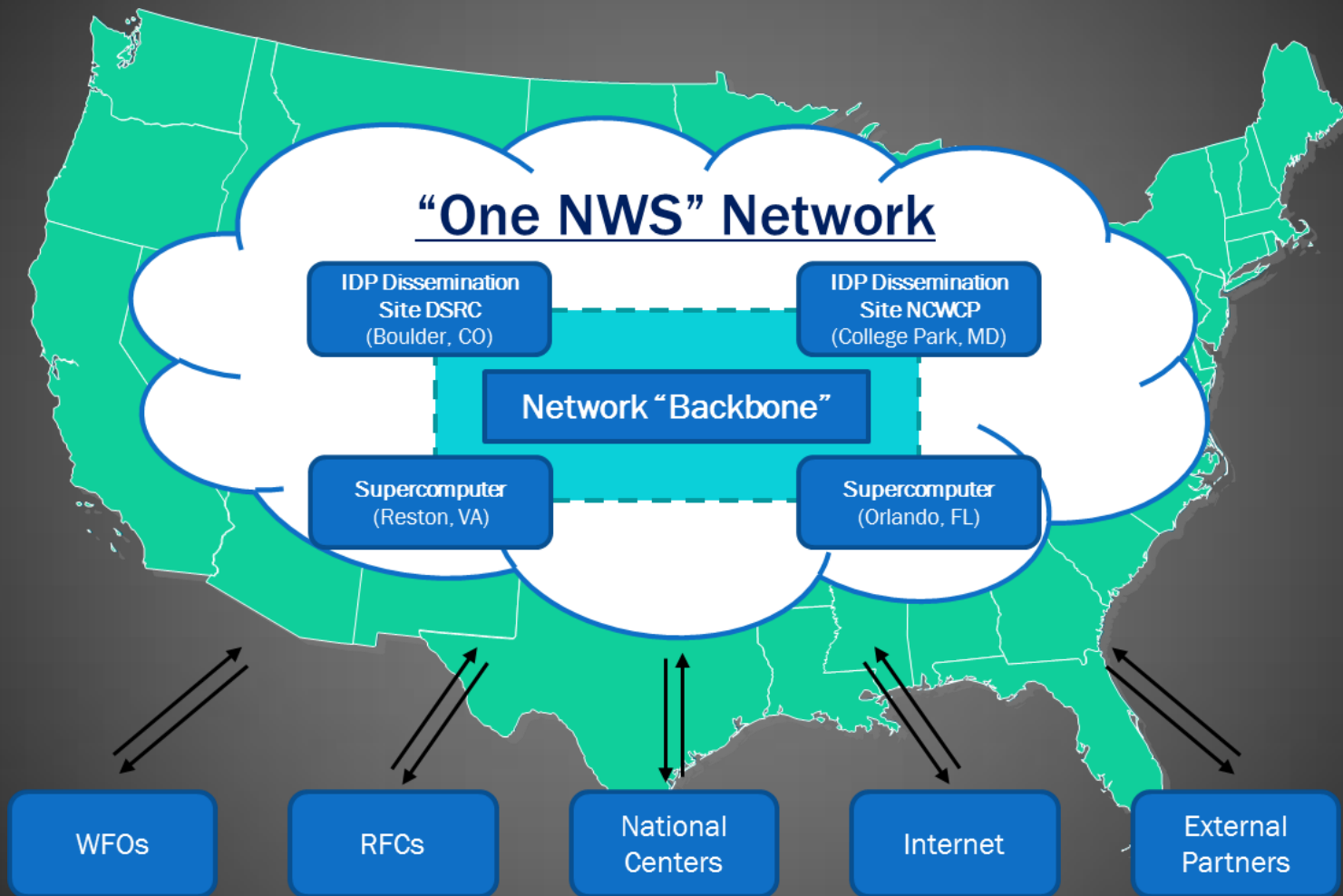


Zaitchik et al (2013)

- Getting ready for JPSS & GOES-R
- Working with the larger research community
  - GPM
  - SMAP
- ← • Land-atmosphere coupling in WRF
- Community Radiative Transfer Model (CRTM)



# NWS Network Updates



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

# Establishing the National Water Center

May 2015: Initial Operating Capability



**MISSION:** Deliver state-of-the-science, summit-to-sea, treetop-to-bedrock hydrologic analyses, forecast information, and decision support services to address the Nation's growing water resources challenges.

**Location:** Tuscaloosa, AL

**Co-located Partners:** *visiting scientists and*

**Impact:** Revolutionize  
'Total Water Prediction'



**FEMA**



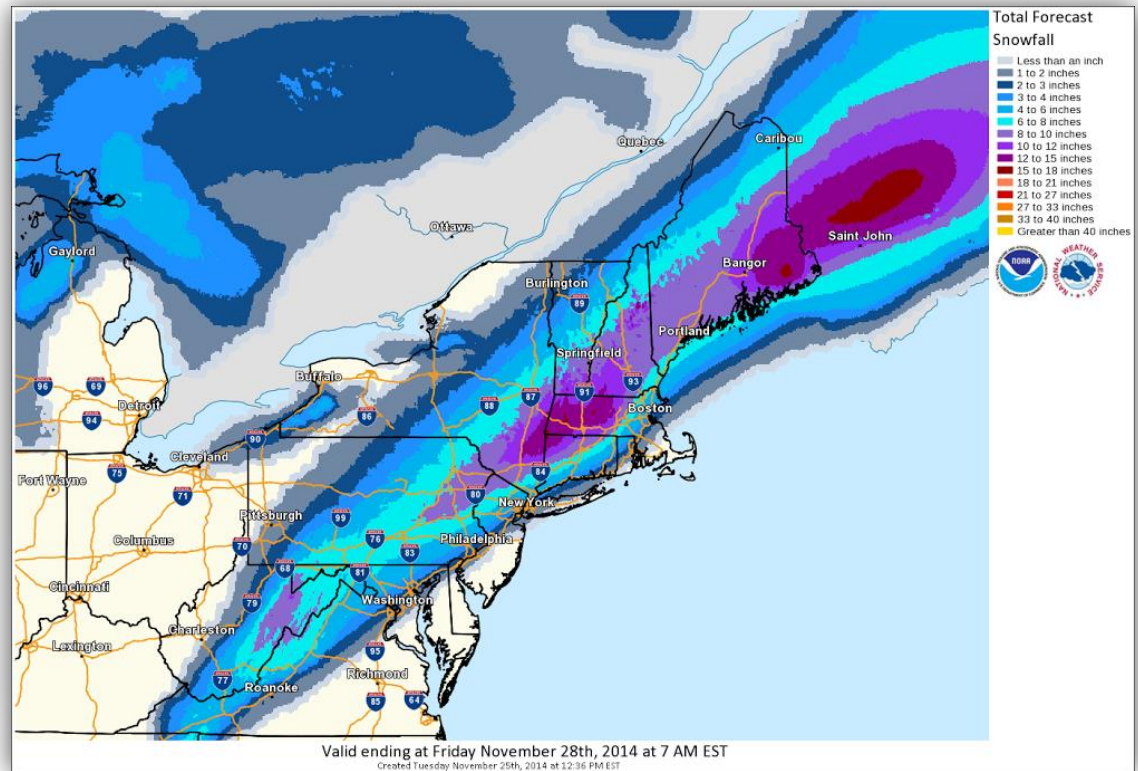


# NCEP & Field Collaboration

## Thanksgiving Travel 2014



Watch-Warning Map

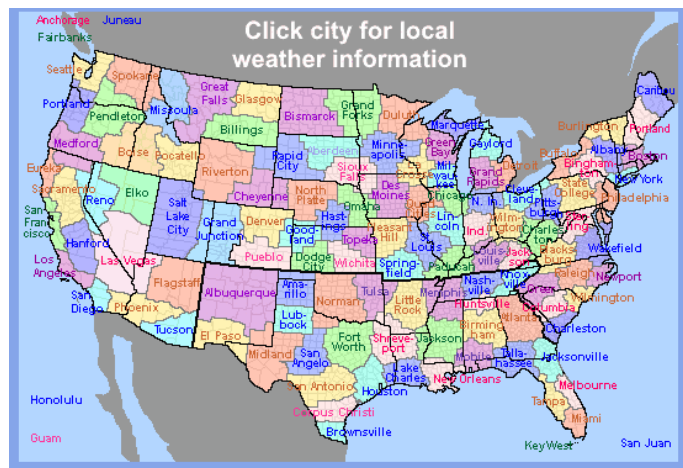


WPC Snowfall Map





# SSD & SOO-DOH Collaboration



- Over 135 fields offices, 6 Regions, and 9 National Centers – all with brilliant science minds working on projects
- Future SSD & SOO-DOH relationship will take advantage of our existing resources by connecting them - rather than working solely on individual projects







# SOO-DOH Conference

**WHEN:** September 14-18, 2015

**WHERE:** NCWCP

**WHO:** All SOOs, DOHs, SSD chiefs, Regional Directors, Training staff (KC, Norman, DC), STI Representatives from NCEP, and others

**WHAT:** Build connections among field representatives and with centers/headquarters, re-focus on new direction for SOO-DOH Program





# Vision Becoming Reality

- *Science-based service organization* directed toward Building A Weather-Ready Nation.
- AOP/Budget planning directed toward creating an organization capable of change that supports and advances the NWS mission through a fully integrated field structure.
- NOAA/NWS/NCEP/Community modeling advances will provide a key foundation for moving the NWS forward as we build a Weather-Ready Nation.

# THANK YOU!

