

# NOAA's National Weather Service:

## Weather, Water, Climate, and Beyond



### *Board on Atmospheric Sciences and Climate*

***John E. Jones, Jr.***

*Deputy NOAA Assistant Administrator for Weather Services*

*April 20, 2004*

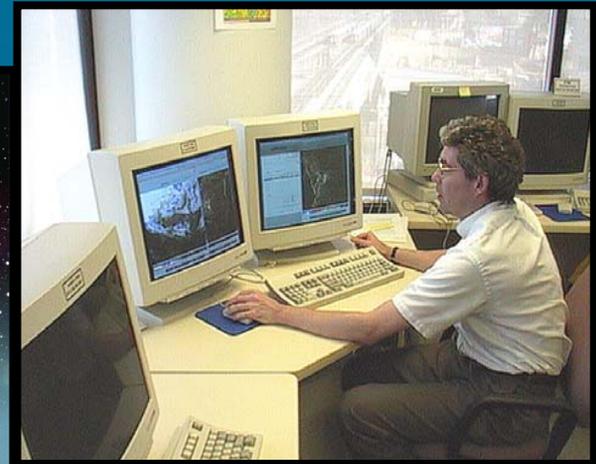
# NOAA's National Weather Service:

*contents*

# Modernization

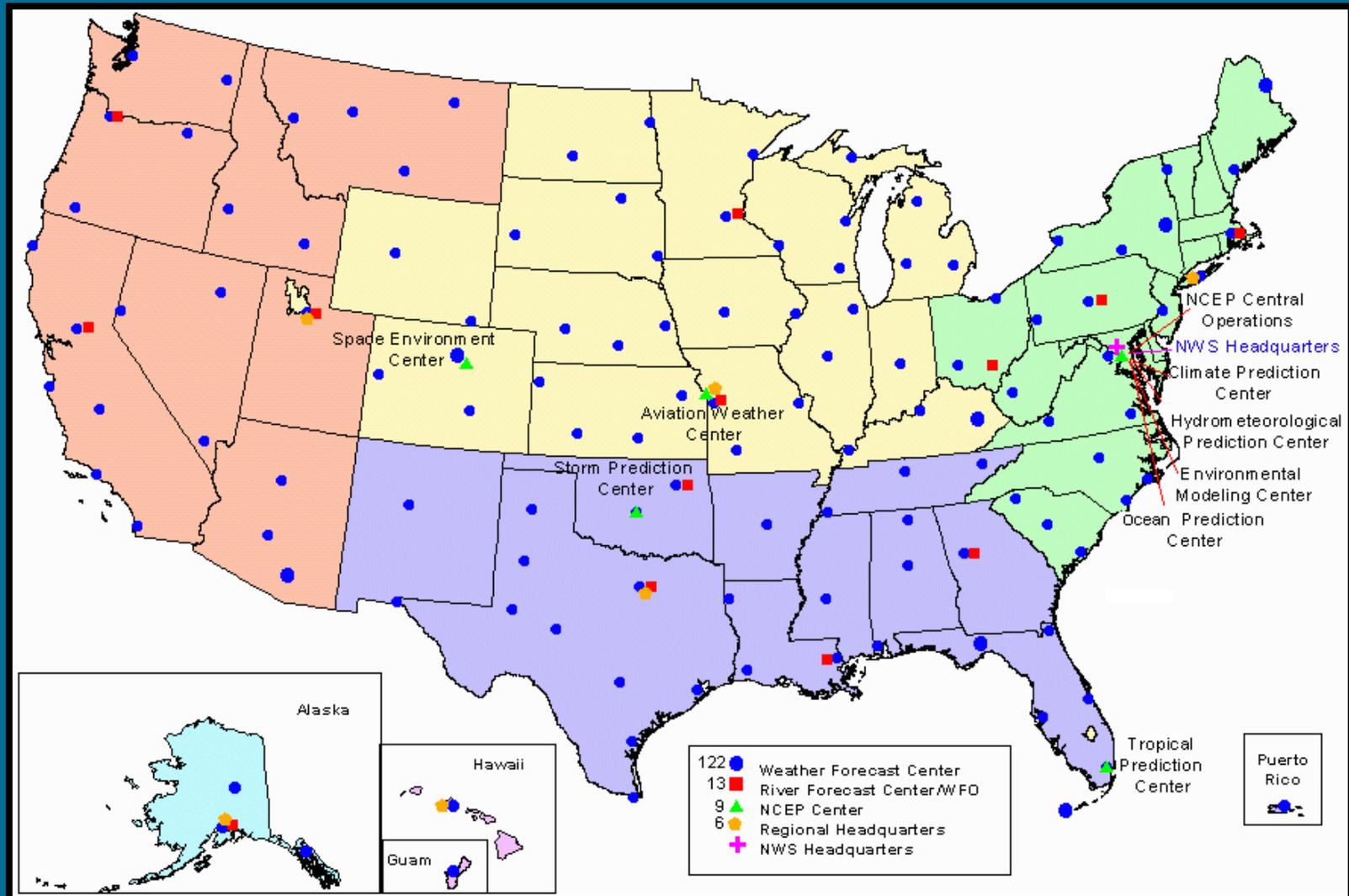
*Leveraging Taxpayers' \$4.5 Billion Investment*

- **NEXRAD (125)**
- **AWIPS (154)**
- **ASOS (313)**
- **Supercomputer**
- **Workforce Restructuring**
- **Office Construction**
- **Satellites**



# Modernization

## NWS Service Delivery Facilities

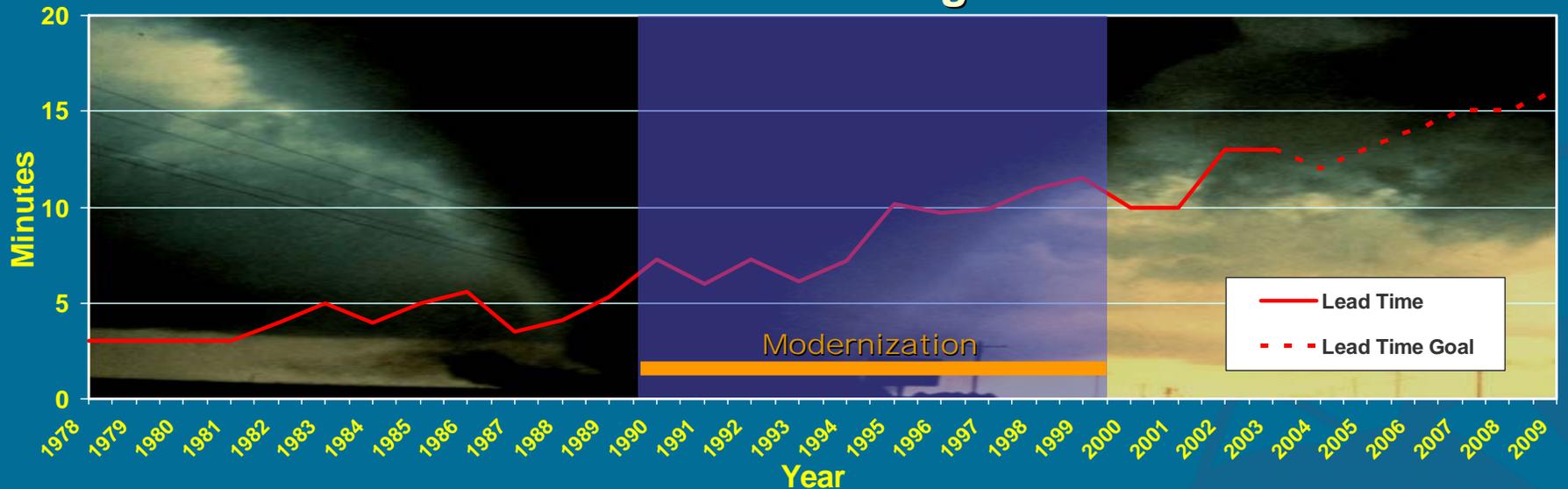


# NWS Modernization Made a Difference

## Flash Flood Warnings

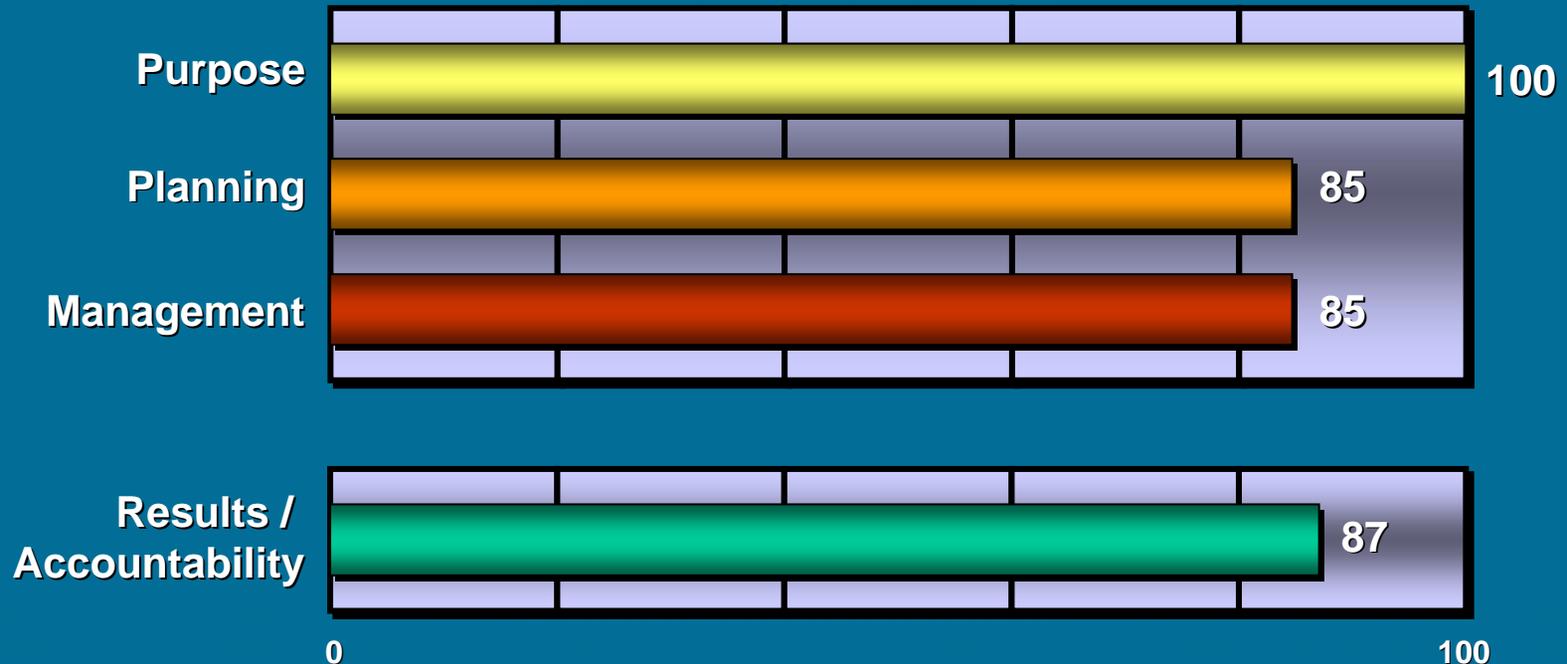


## Tornado Warnings



# FY 2005 Program Assessment

## Rating Tool



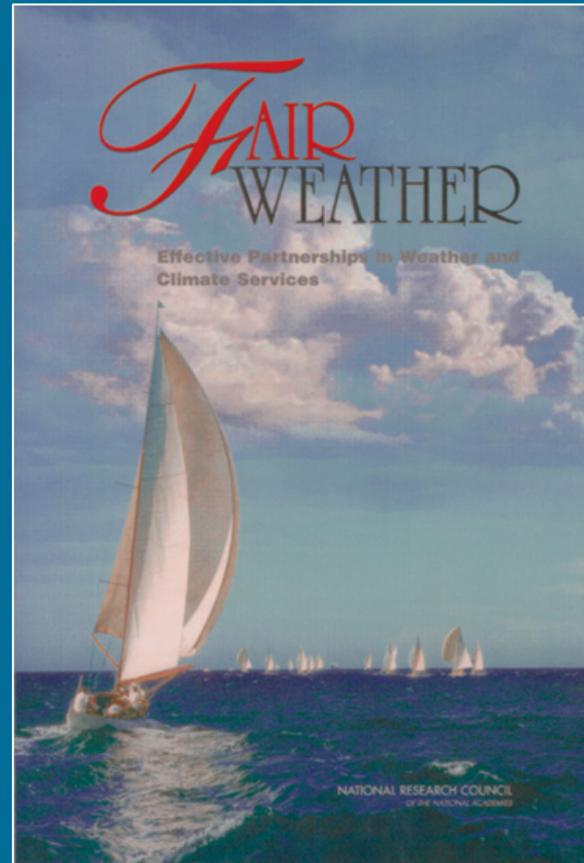
*“NWS is well-managed and results-oriented.”*

Office of Management and Budget

# Modernization

## *National Academies of Science/National Research Council Interaction Was and Is Critical*

- **Then:**
  - *Dec 29, 1989, NRC established the NWS Modernization Committee at NOAA's request*
- **Now:**
  - *February 2003, Fair Weather: Effective Partnerships in Weather and Climate Services*

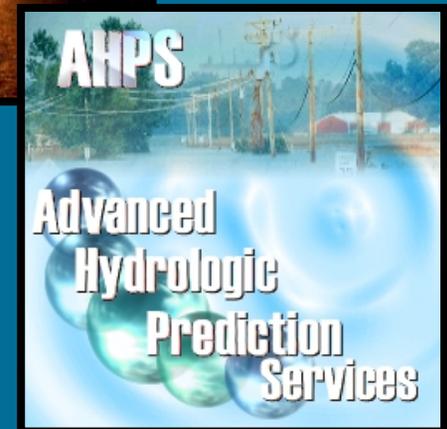
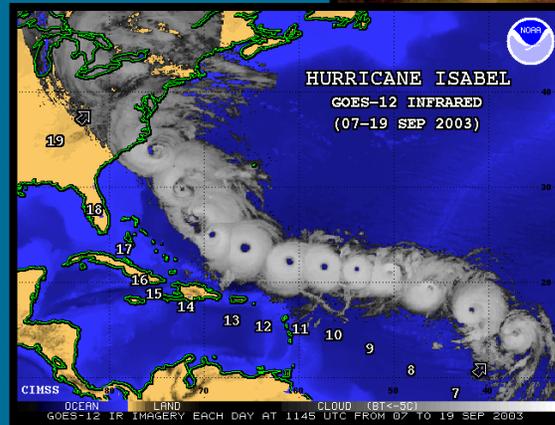


# Cannot Stand Still...

✓ Users Continue to Have Needs

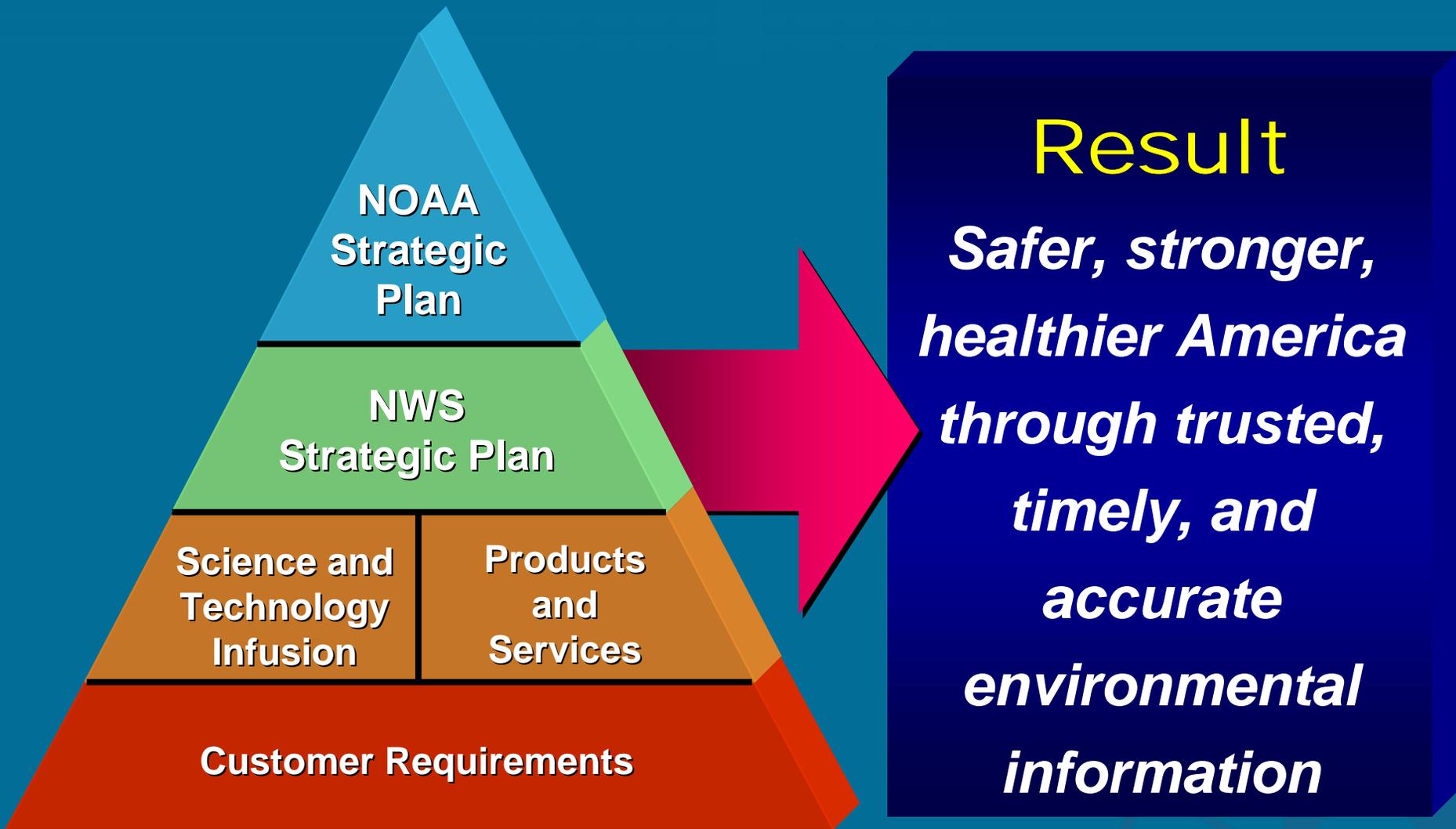


✓ Science and Technology Continues to Advance





# Beyond Modernization

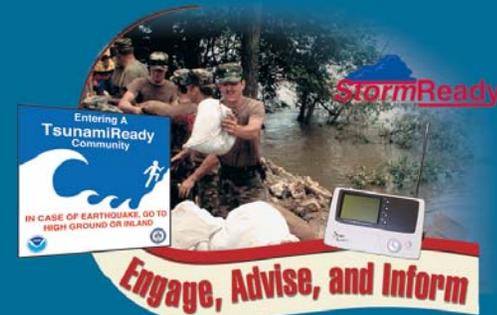


# Environmental Services

*“From Mud to Sun”*



# Strategies



**Vision:** Observations when and where needed—integrated, adaptable, extensible, stable, continuous, and quality-assured.



# Monitor and Observe

## *Objectives*

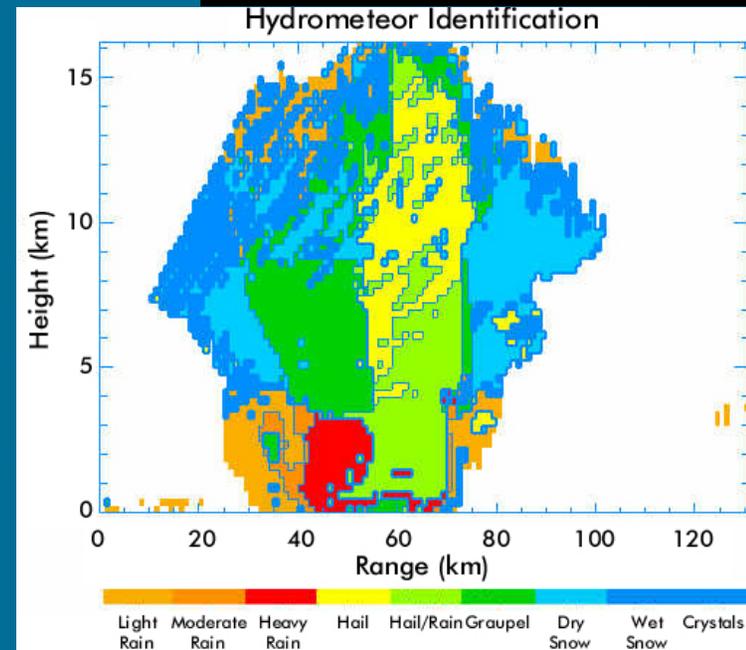
- Improve temporal, spatial, and spectral resolution at all scales
- Obtain observations of new environmental elements
- Improve data quality and timeliness
- Integrate multi-purpose observing systems and networks within an extensible enterprise architecture (EA)



# Monitor and Observe

## Radar

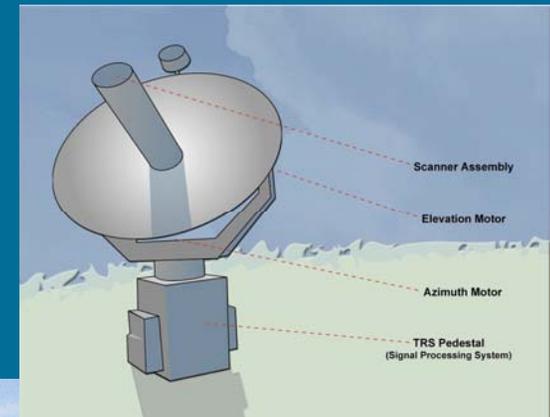
- **Open Systems Radar Data Acquisition**
  - *1st deployment scheduled late FY04*
  - *About 80 systems upgraded prior to 2005 storm season*
- **Complete Development and Deployment of Dual Polarization Capability**



# Monitor and Observe:

## *Upper Air*

- **Complete Radiosonde Replacement Program**
- **Sustain and Grow Meteorological Data Reporting and Dissemination System**
- **Integrate Profilers into Operational Observing Network**



# Monitor and Observe

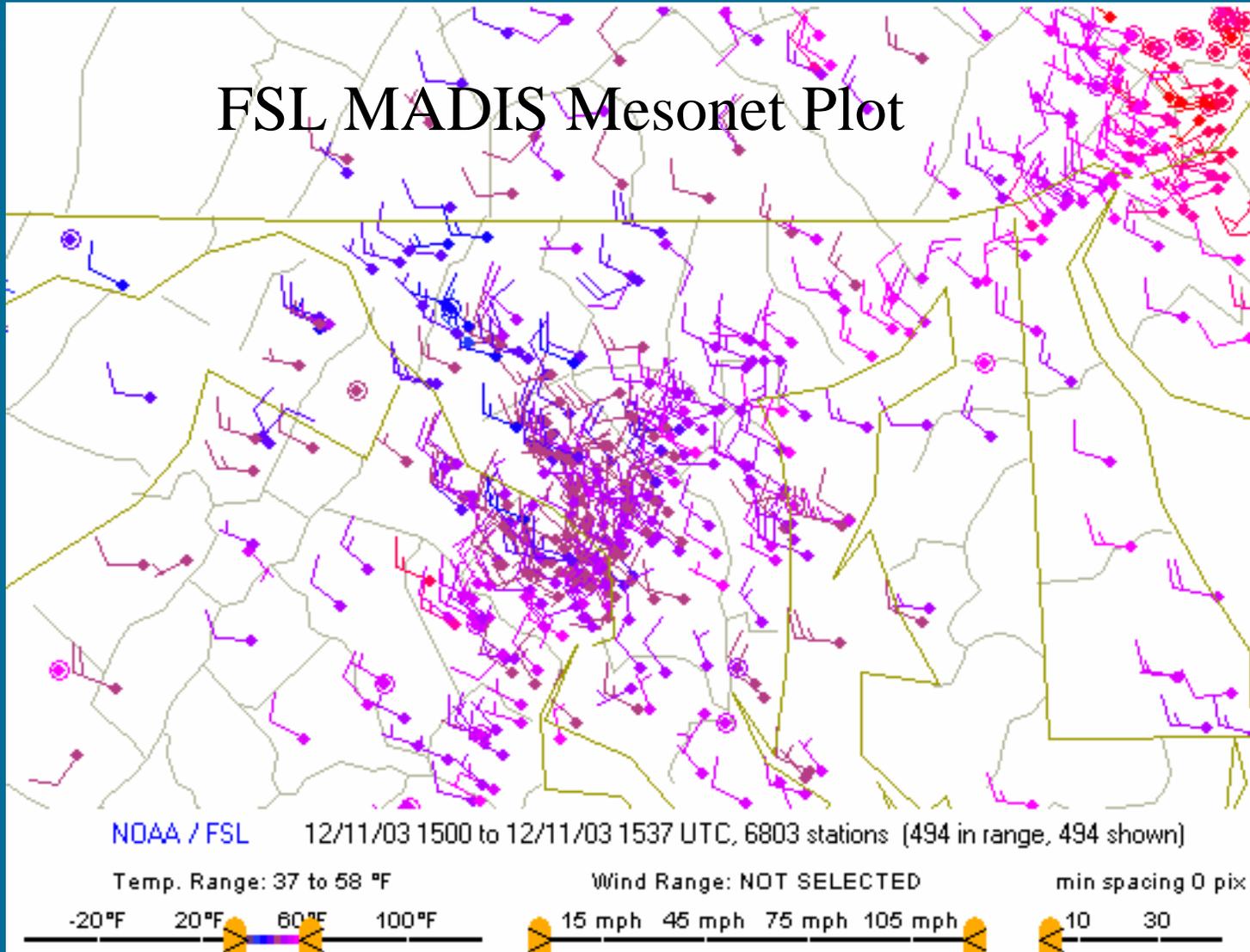
## *COOP Modernization Program*

- **COOP Modernization will provide U.S. with network of accurate, near real-time surface data**
- **Program change of \$1.4M funds operation & maintenance of 460 modernized COOP sites installed during FY03/04 in New England and New York State**



# Monitor and Observe *Mesonets*

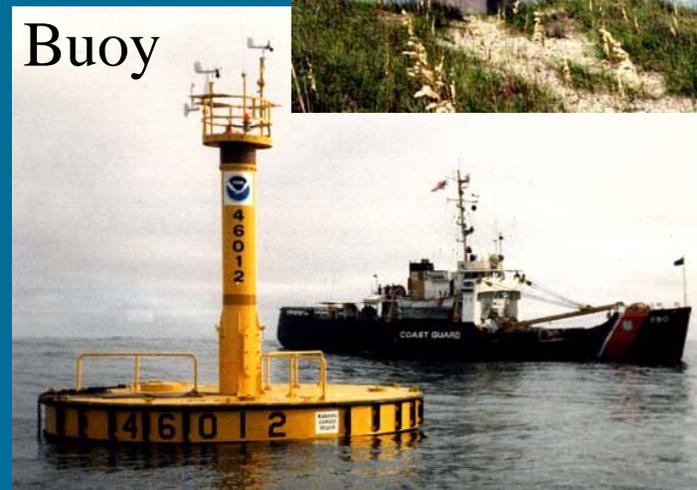
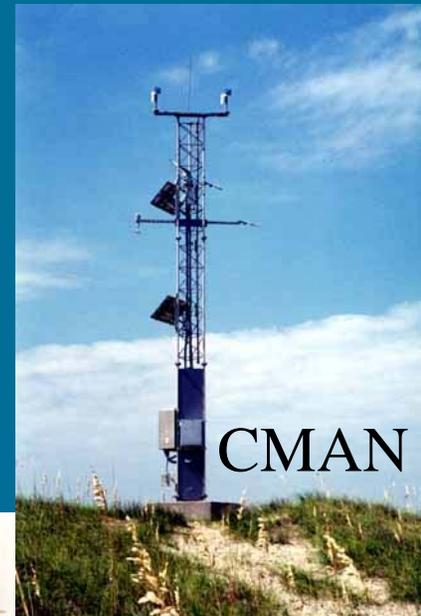
## FSL MADIS Mesonet Plot



# Monitor and Observe

## *Coastal Global Ocean Observing System (CGOOS)*

- Add sensors to 14 existing buoys and 6 Coastal Marine (C-MAN) stations
- Fill Marine Buoy Coverage Gaps
- Address Recommendations in National Research Council Report
- Provide NOAA with a 3D view of the oceans



# Monitor and Observe

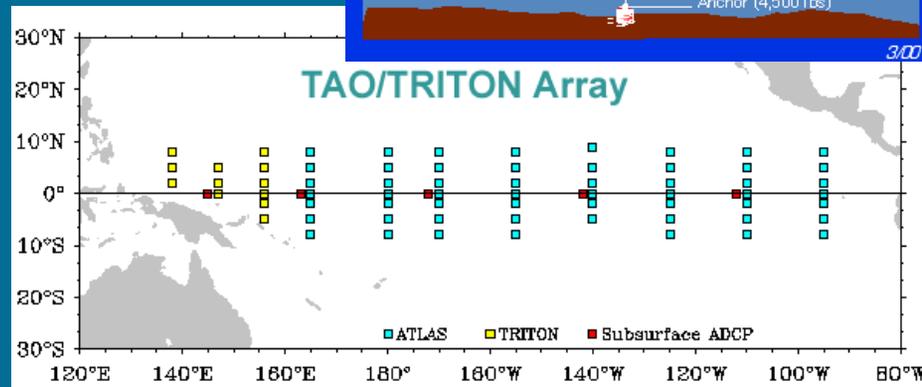
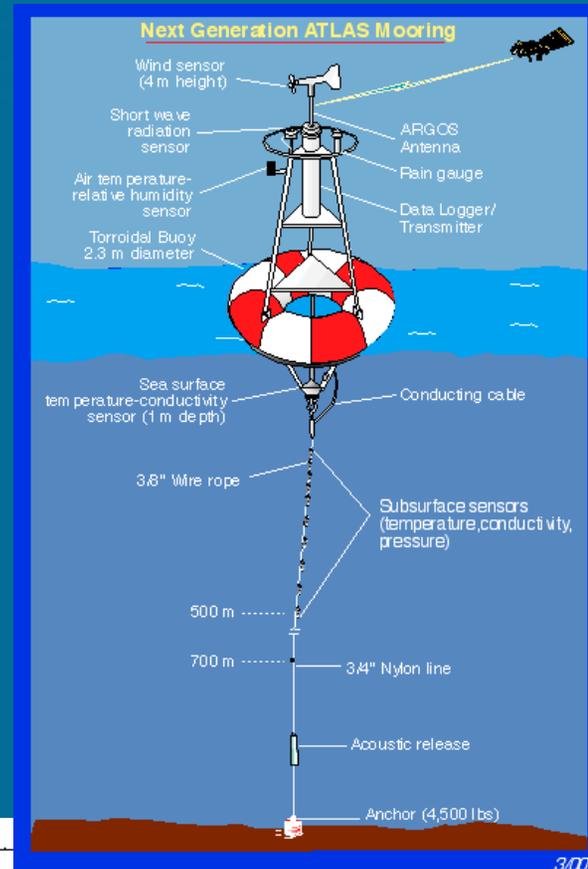
## Tropical Atmosphere and Ocean (TAO) System

### Current Status

- Completed in 1994
- Managed by OAR Pacific Marine Environmental Laboratory (PMEL)
- 70 moored buoys with real-time collection of high quality oceanographic and surface meteorological data
- Used for predicting La Nina/El Nino and validating satellite remotely sensed atmospheric and marine observations

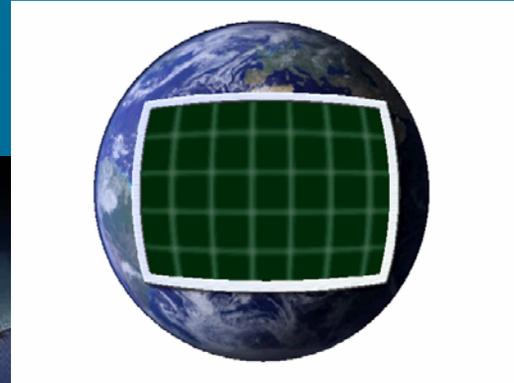
### Where are we going?

- Transferred to NWS National Data Buoy Center (NDBC) in FY05
- Will be maintained as a component of the Global Climate Observing System



# Monitor and Observe

## *Integrated Observations*

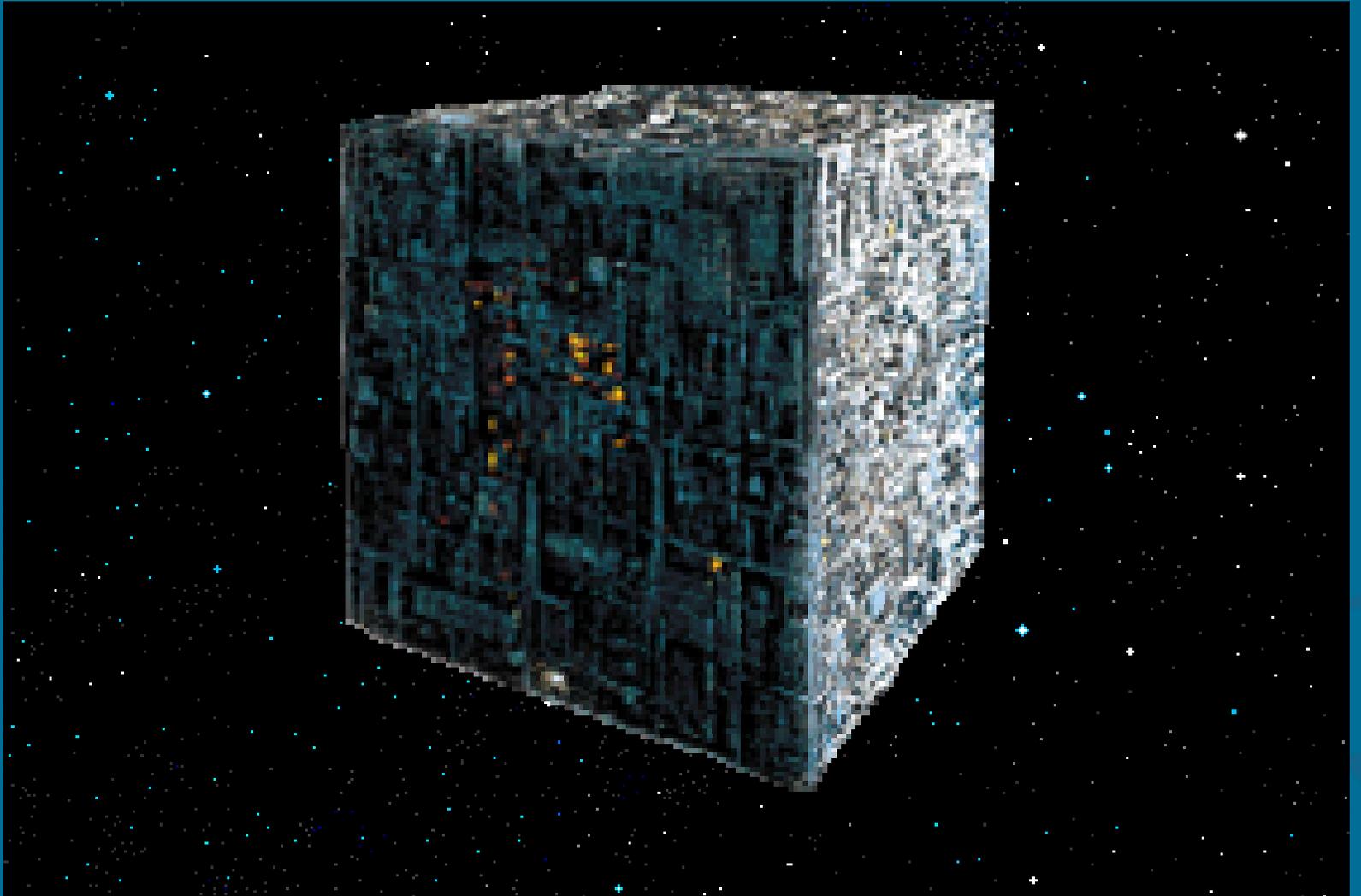




**Vision:** Integrated probabilistic environmental forecasts and information.



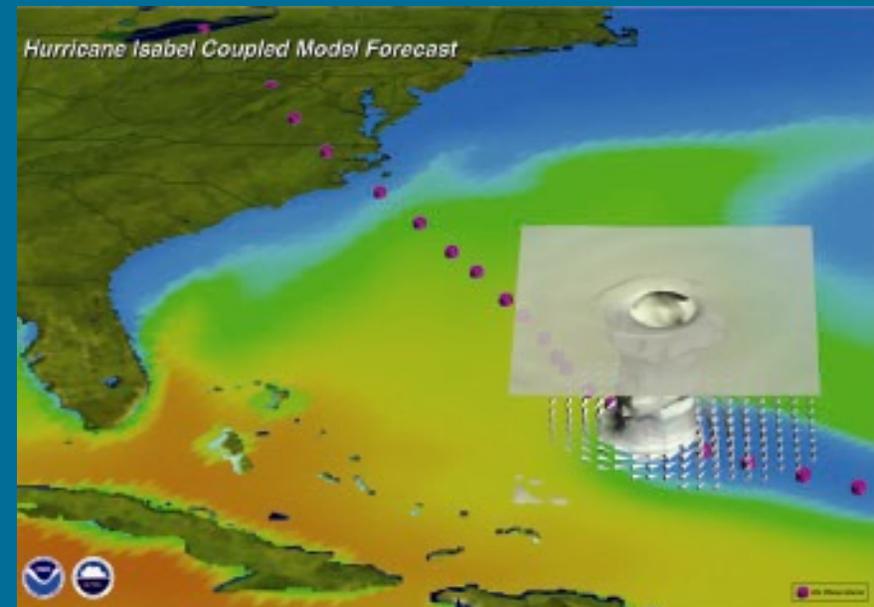
# We Will Assimilate



# Assess and Predict

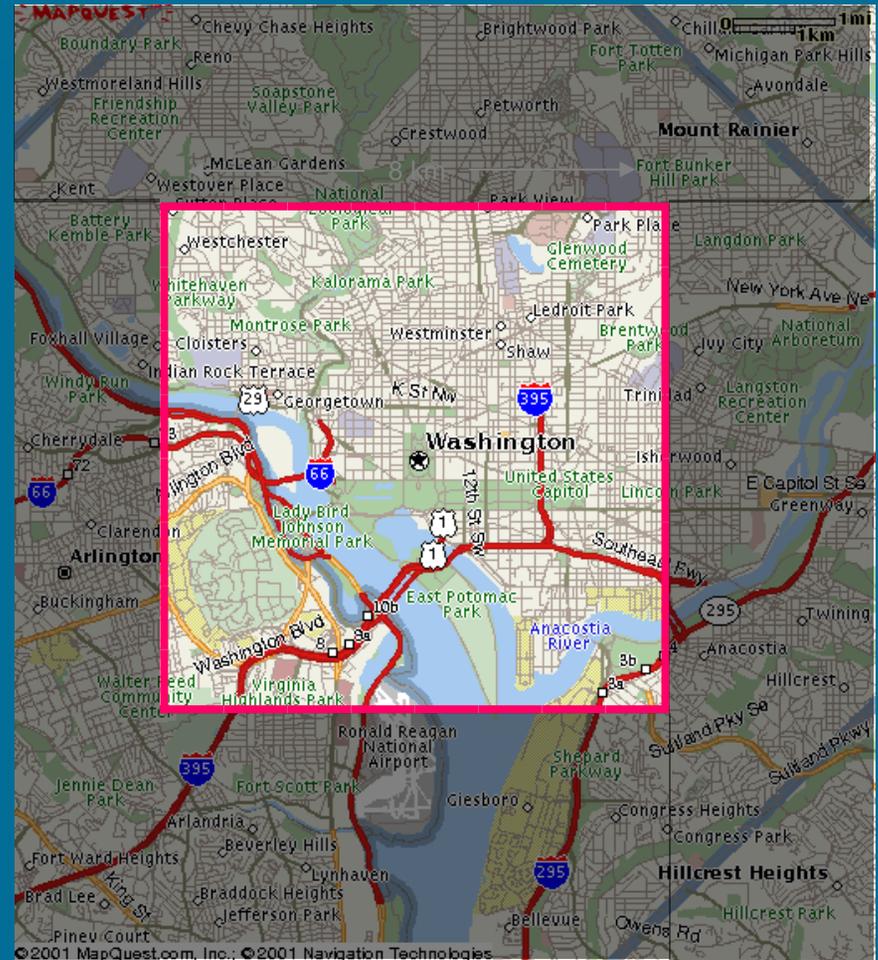
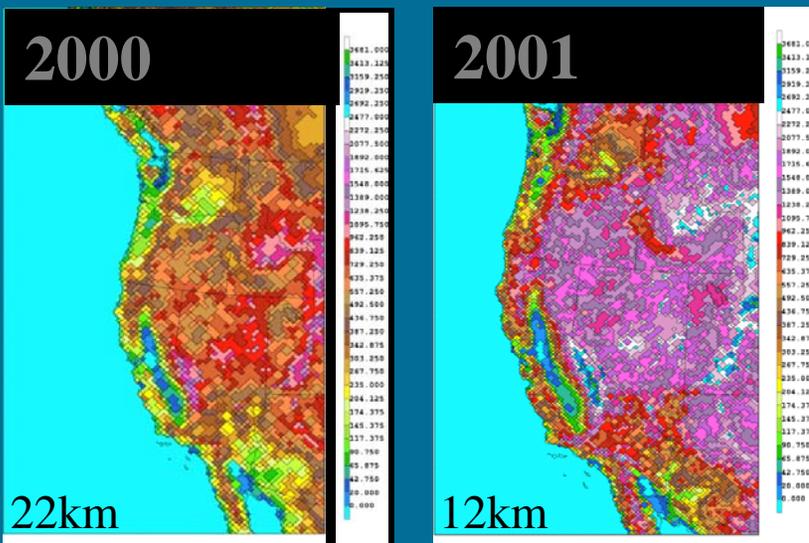
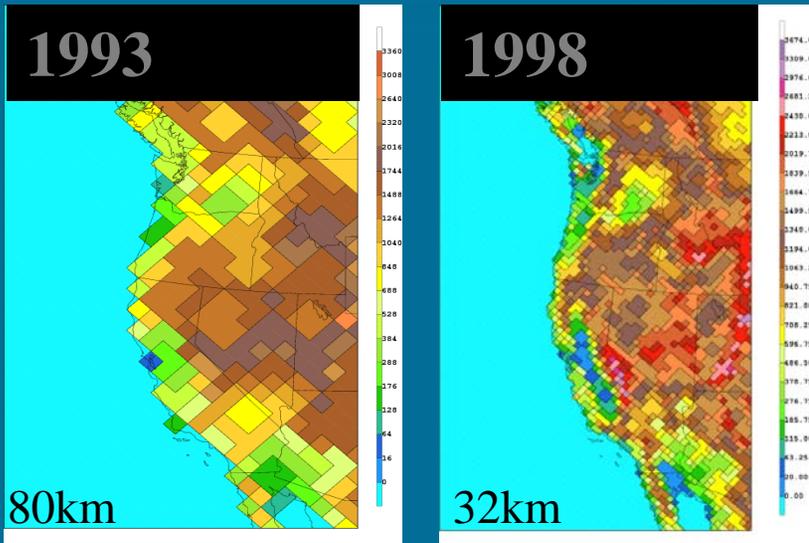
## *Objectives*

- **Develop Advanced and High Resolution Data Assimilation Techniques**
- **Improve Models and Linkages Among Weather, Water, and Climate Processes**
- **Improve Probabilistic Environmental Information by Fully Establishing and Applying Ensemble Prediction Systems**
- **Improved Forecast Applications**



# Assess and Predict

## *Data Assimilation and Modeling*



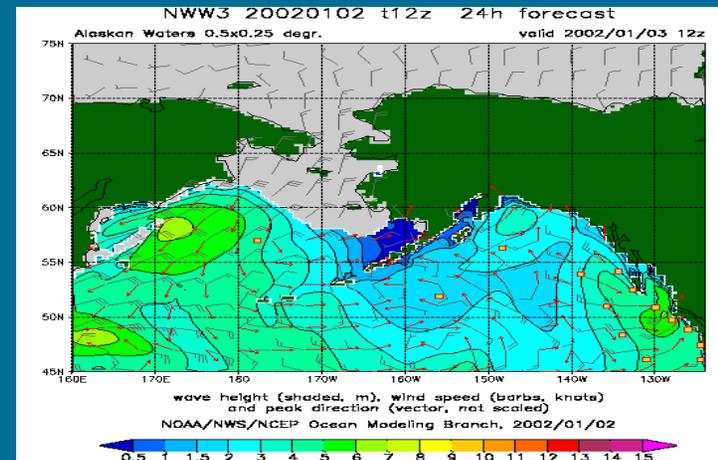
↑ Sample coverage of an 8 km grid point

# Assess and Predict

## *Ocean Prediction*

### Ocean Prediction Center Analysis & Forecast Products:

- winds, sea state, restrictions to visibility
- vessel superstructure icing, coastal flooding, surf conditions, rip currents, sea ice
- Gulf Stream location, sea surface temperature,
- tropical cyclones, ocean storm surge, tsunamis
- radiological dispersion
- aviation-related fields

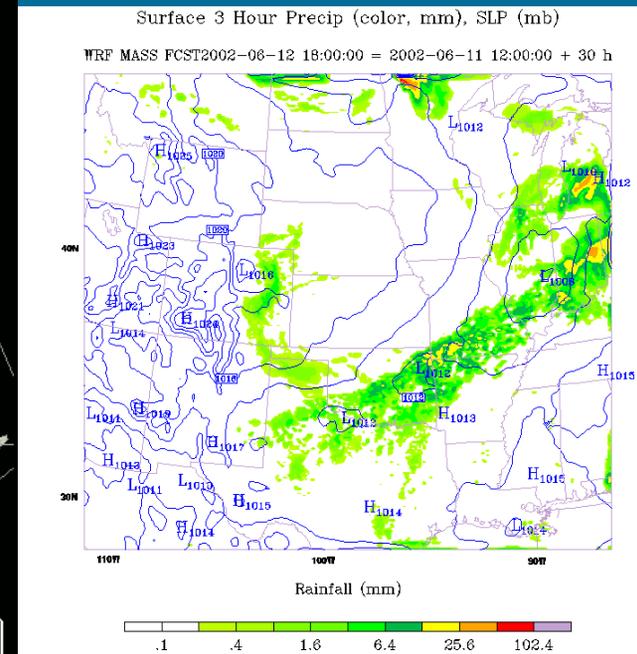
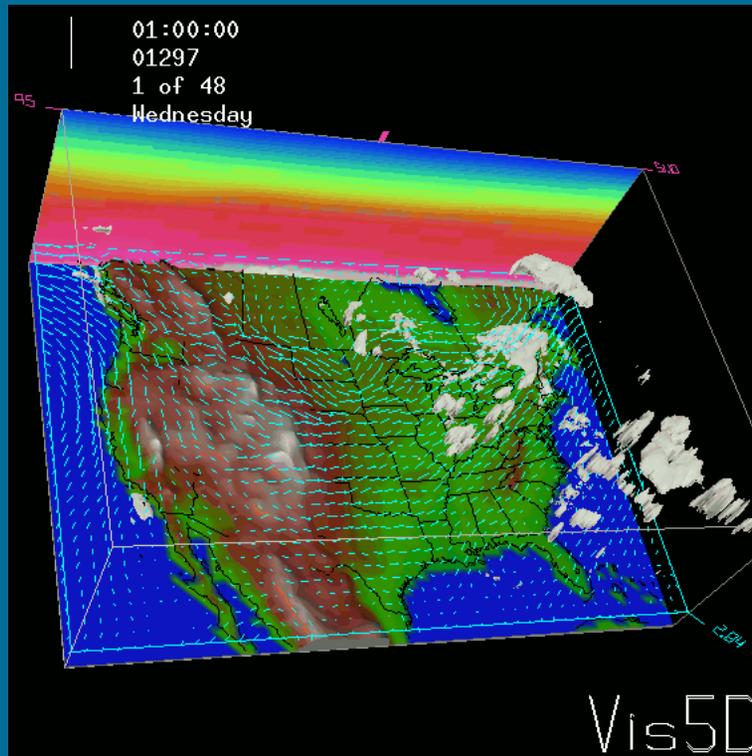


**Wavewatch III**

# Assess and Predict

## Weather Research Forecast Model

- **Initial Operating Capability in Fall 2004**
- **NOAA participation in Earth System Modeling Framework**



# Assess and Predict

## Advanced Hydrologic Prediction Service

Insert GIS flood inundation animation here



# Assess and Predict

## NWS Climate Services Improvements

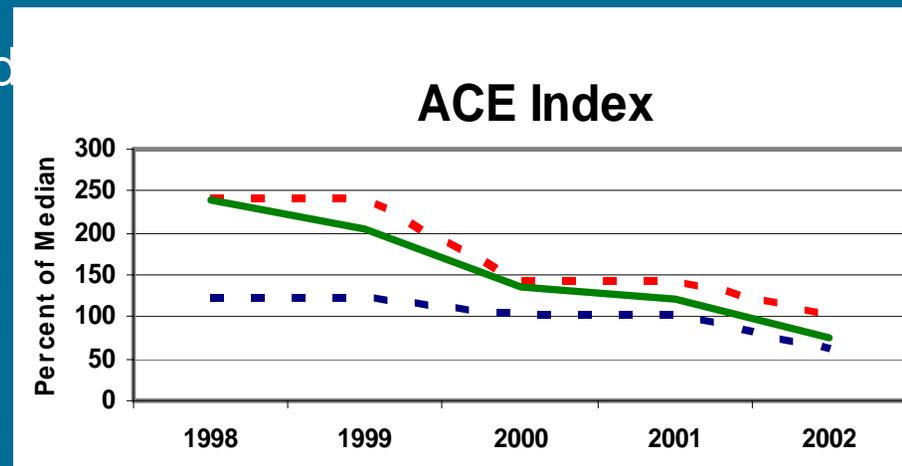
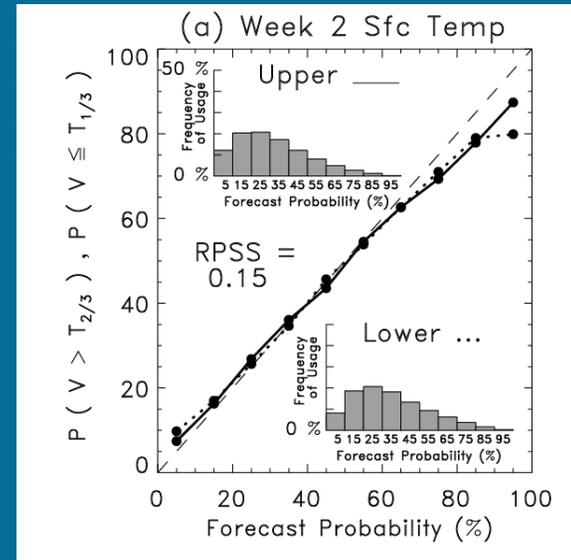
- **Vision:** Provide resources and direction to ensure NWS climate services are easily accessible, understood, optimally used, and satisfy customer needs.

- **Week Two Predictions**

- Big gains made in forecast skill by
- statistically correcting forecasts
- Validations show “corrected” 8-14 d
- forecasts superior to “official” 6-10
- forecasts

- **Hurricane Season Outlooks**

- Sixth straight year of accurate predictions of hurricane activity (above, normal, below)

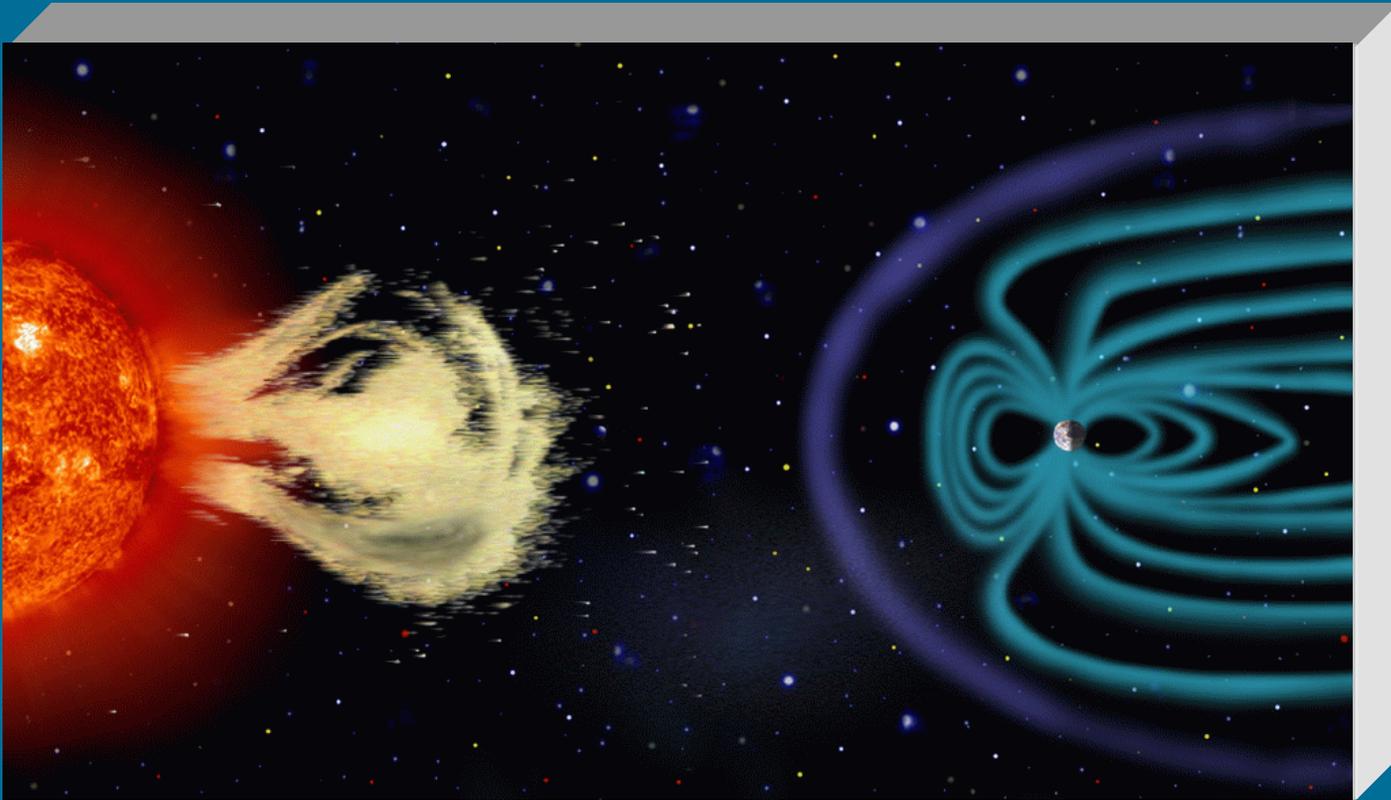


— Observed    - - - Minimum Forecast    - - - Maximum Forecast

# Assess and Predict

*Space Weather*

Research to **Operations** to Action



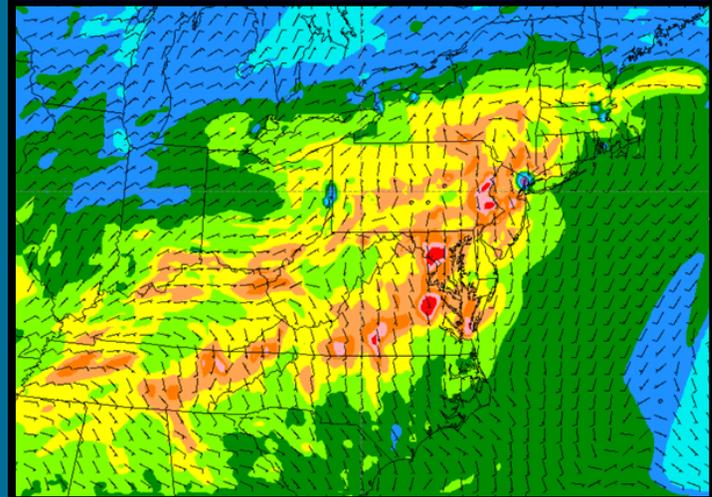
# Assess and Predict

## *National Air Quality (AQ) Forecasting*

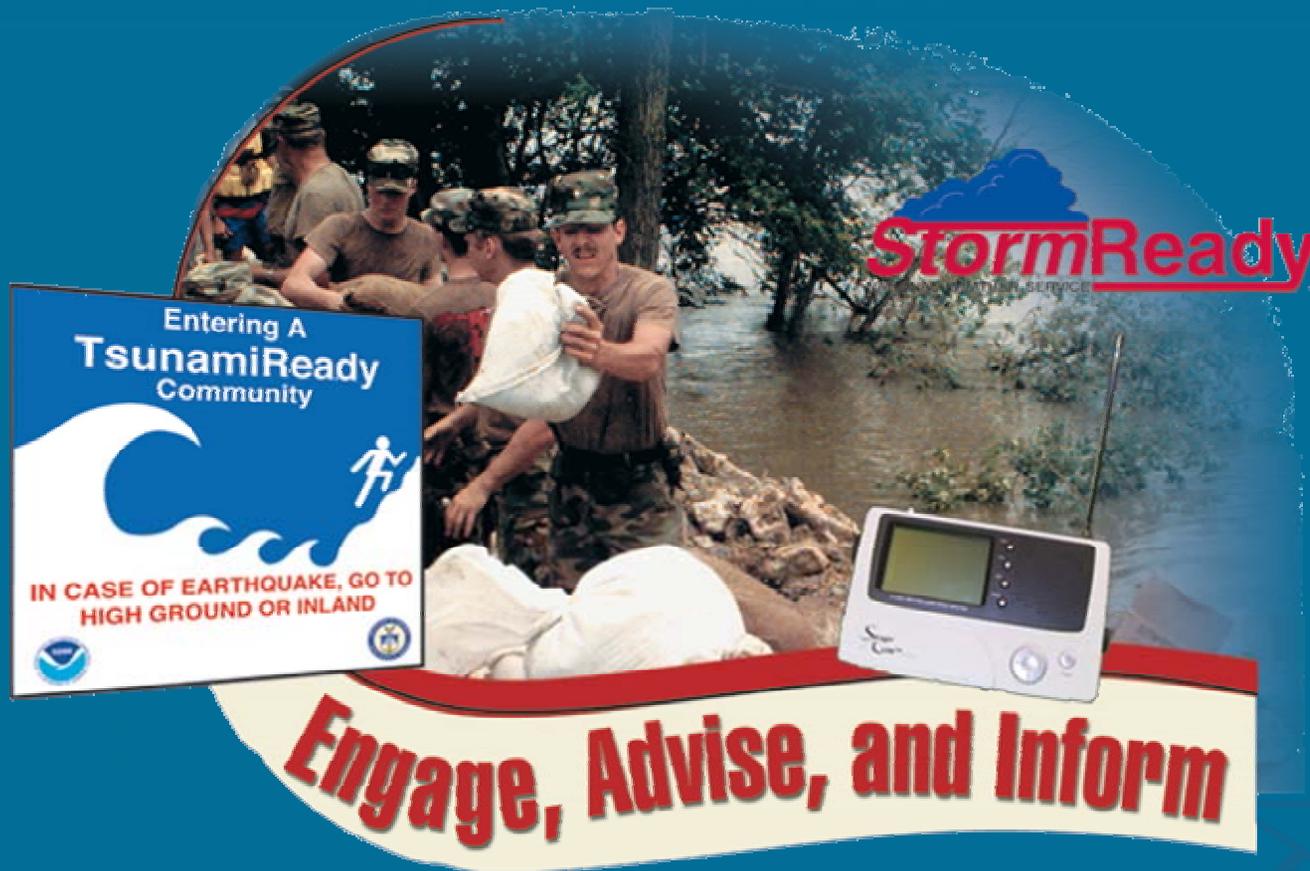
- **Lives and property at risk from poor AQ**
- **AQ Forecast guidance produced 2 times daily**
- **Phased Deployment**
  - *Beginning FY 2005: Northeastern US, next-day, ozone*
  - *Five years: Nationwide coverage;*
  - *Later on...particulates forecasts*



**Test Product: Initial Operational Domain**



**Vision:** Reach each person in the Nation.



**Engage, Advise, and Inform**

# Engage, Advise, and Inform

## *Objectives*

- **Keep pace with need for more data and information**
- **Provide appropriate information when and where needed**
- **Meet customer information and timeliness needs**

# Engage, Advise, and Inform

*Weather, Water, and Climate Team*



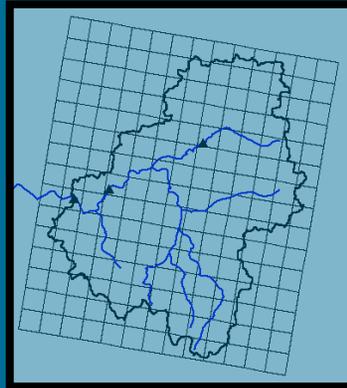
# Engage, Advise, and Inform: *Dissemination*

- **All-Hazards NOAA Weather Radio**
- **Media**
- **Commercial Weather Services**
- **Emergency Management Community**
- **Internet II**

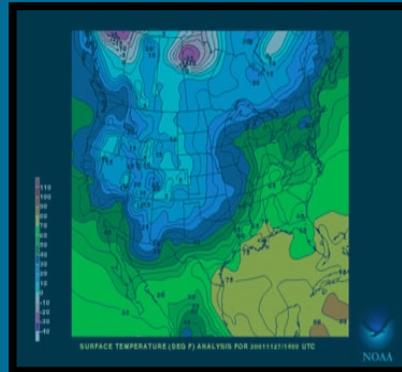


# Engage, Advise, and Inform: National Digital Forecast Database (NDFD) Gives Customers What They Want

Different  
Products for  
Different  
Customers



*Commercial weather companies & emergency managers use grids to generate tailored products*



*The public, emergency managers and city planners use WWW. graphic products for detailed forecasts*

TODAY...RAIN LIKELY.  
SNOW LIKELY ABOVE  
2500 FEET. SNOW  
ACCUMULATION BY LATE  
AFTERNOON 1 TO 2  
INCHES ABOVE 2500  
FEET. COLDER WITH  
HIGHS 35 TO 40.  
SOUTHEAST WIND 5 TO  
10 MPH SHIFTING TO THE  
SOUTHWESTEARLY THIS  
AFTERNOON. CHANCE OF  
PRECIPITATION 70%.

*Radio stations & public read text forecasts*

- ✓ **More weather data**
- ✓ **Higher resolution forecasts**
- ✓ **Visual displays of probability**
- ✓ **User-defined products create business opportunities**

# **Vision:** Advanced Analysis and Prediction of the Earth's Environment

*Understand and Describe*



# **Understand and Describe**

## *Objectives*

- **Conduct and participate in process studies**
- **Develop and leverage new techniques and technologies**
- **Evaluate user needs and socio-economic impact of new products and services**
- **Integrate user needs, operations, and research results into prototypes for new products and services**

# Understand and Describe

*Improve hurricane forecasting*

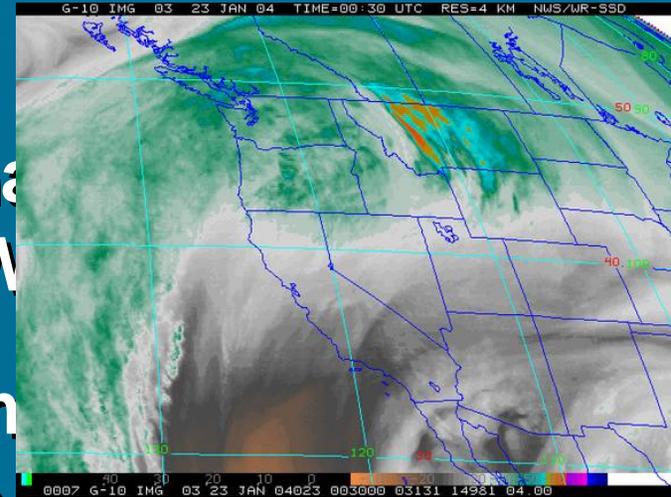
- ***Intensity***
- ***QPF***

# Understand and Describe

*USWRP/ Hemispheric Observing System Research and*

*Predictability Experiment (THORPEX)*

- **THORPEX is a 12-nation international Meteorological Organization (WMO) project**
- **Goal to accelerate improvement in forecast accuracy of 1-14 day at double the rate of improvement seen over the past 20 years; make 10-14 day forecasts as accurate as current 7-10 day forecasts**
- **Partners include WMO, U.S. Navy, NASA and National Science Foundation (NSF)**



**Putting it all together...**



# Event Scenario

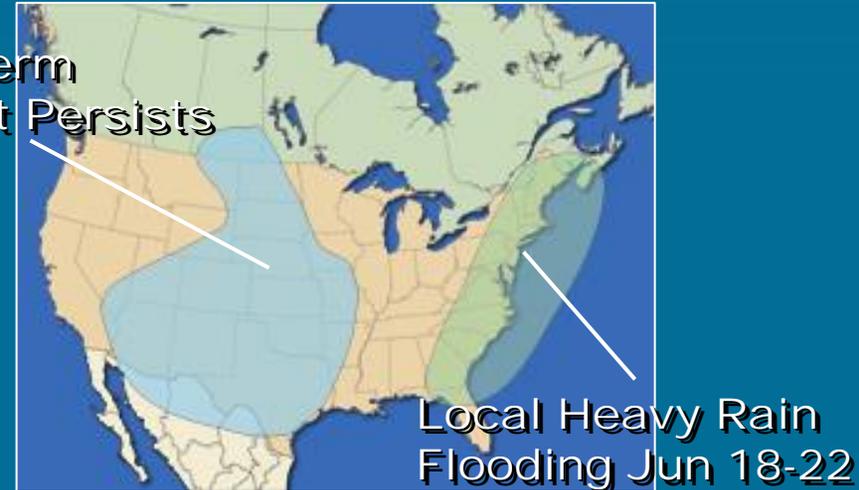
## Seasonal Precipitation



Precipitation Outlook  
 Made Mar 17 200x  
 Valid AMJ 200x

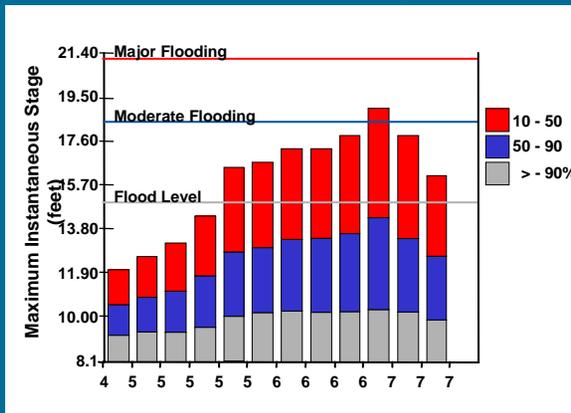
## US Hazard Assessment

Long Term  
 Drought Persists

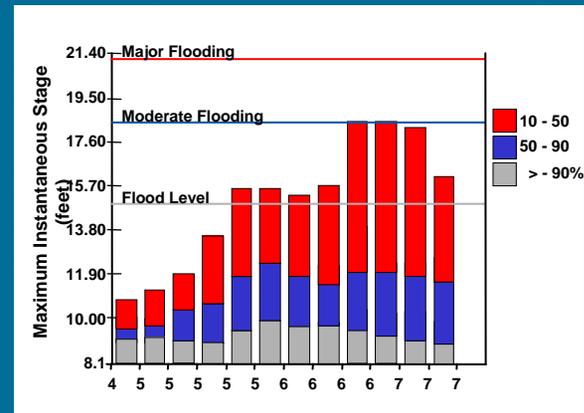


NWS Hazard Assesment  
 Made Jun 10 200x  
 Valid Jun 13-24 200x

## Potomac Stage



## Susquehanna Stage



# Upper Chesapeake Bay Ecology

## Nutrient Loading



## Turbidity



## Salinity



## Oyster Mortality



# Challenges

- **Technology Infusion**
- **Aviation Weather**
- **Water Resource Information**
- **Climate Services**
- **Homeland Security**

## Result

*Safer, stronger,  
healthier America  
through trusted,  
timely, and  
accurate  
environmental  
information*

