



# National Weather Service:

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## Foundation Of America's Weather Services

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*May 2002*

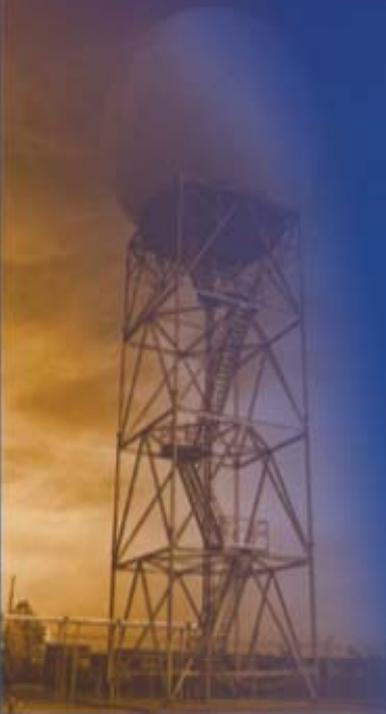


# The National Weather Service



*The Best Weather Service in the World*

- **Where We've Been**
- **Where We Are**
- **Where We're Going**
- **Hot Topics**





# Where We've Been



## Technology

## Past

## Present

### Radar

NWS Network of 3 Kinds of Reflectivity Radars (128 Radars)

National Tri-Agency Network of Doppler Radars (154 Radars, 120 NWS)

### Observations

Manually read instruments (FAA, DOD, NWS)

Automated Surface Observing System (ASOS)  
991 Tri-Agency systems (313 NWS)

### Forecaster Workstations

Multiple systems with limited computing capability

Single integrated system with expandable computing capability

### Computing

Vector Processor

Massively Parallel Processor

### Satellites

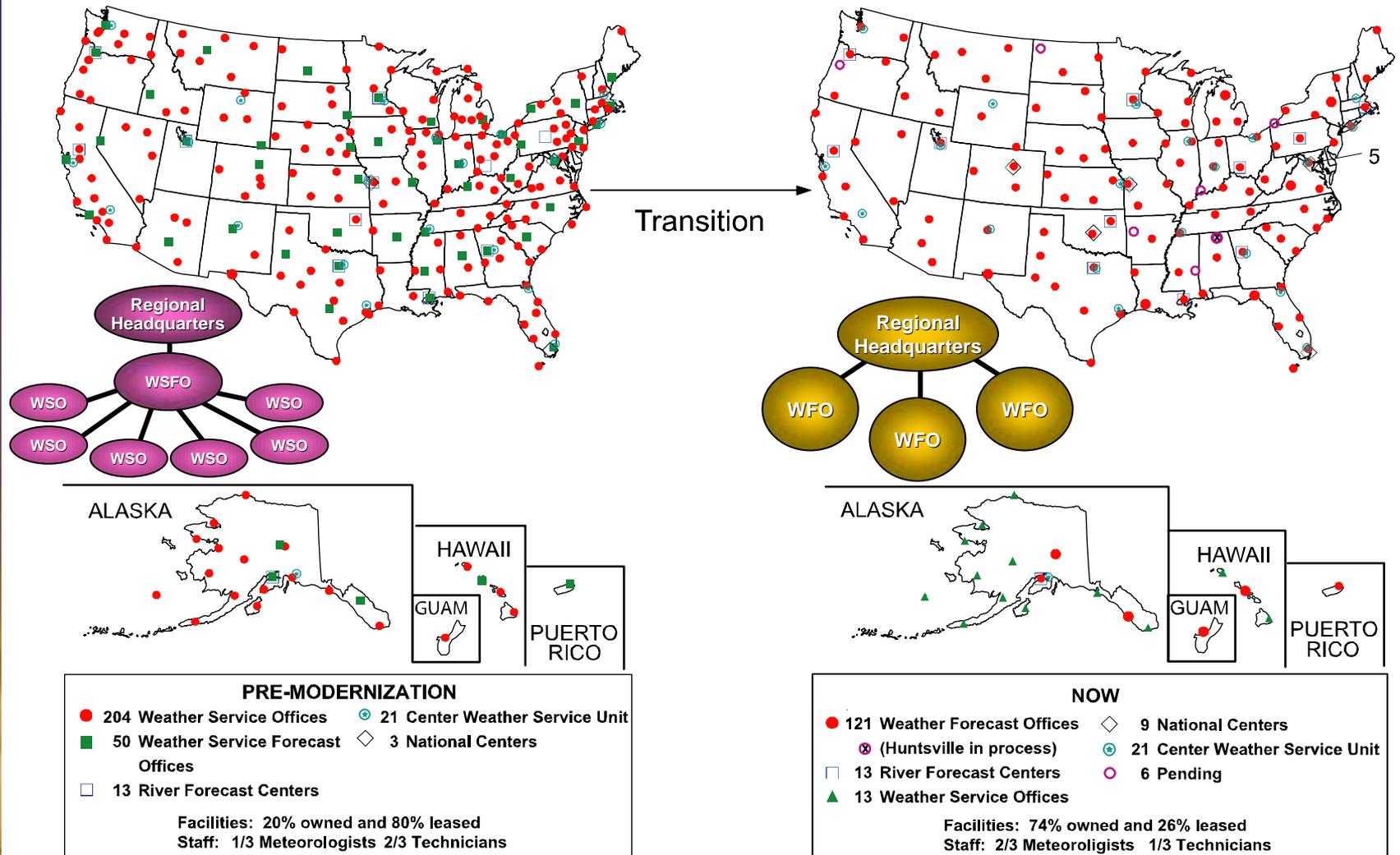
Geostationary Satellites (GOES)  
Polar Orbiting Satellites (POES)

GOES - higher resolution, additional sensors, more frequent observations.  
POES – some higher resolution instruments



# Where We've Been

## Modernization and Restructuring





# Where We Are



- **Produce Weather, Water and Climate Forecasts and Warnings**

- *For All Americans*
- *To Protect Life and Property*
- *To Enhance the National Economy*

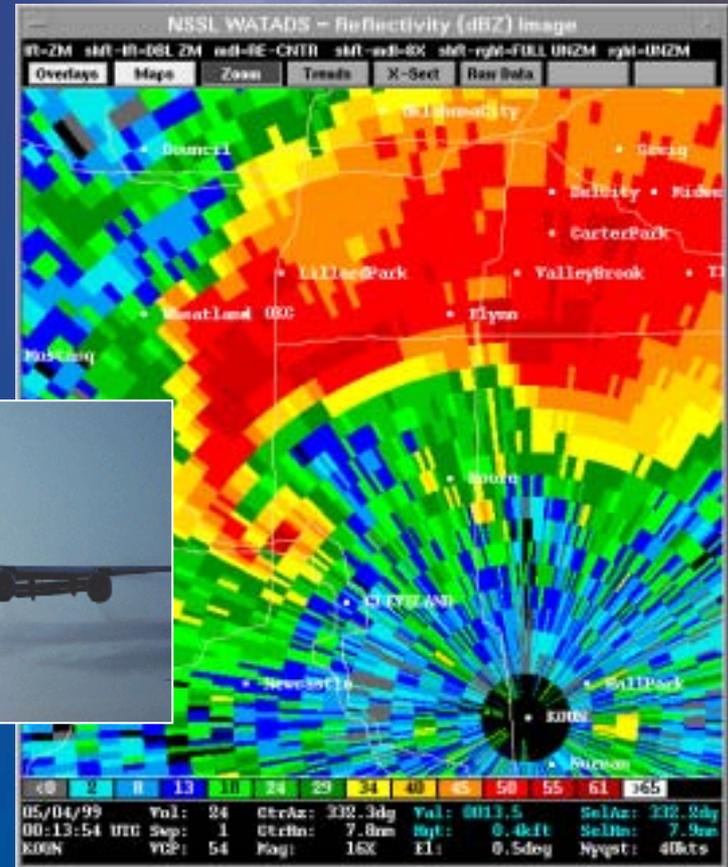
- **Data and Products:**

- *Government Agencies*
- *Private Sector*
- *The Public*
- *Global Communities*



- **Weather and data are becoming more important to economy and business decisions**

- *“The annual cost of electricity could decrease by at least \$1 billion if the accuracy of weather forecasts improved 1 degree Fahrenheit.”*  
USA Today, 6/19/01

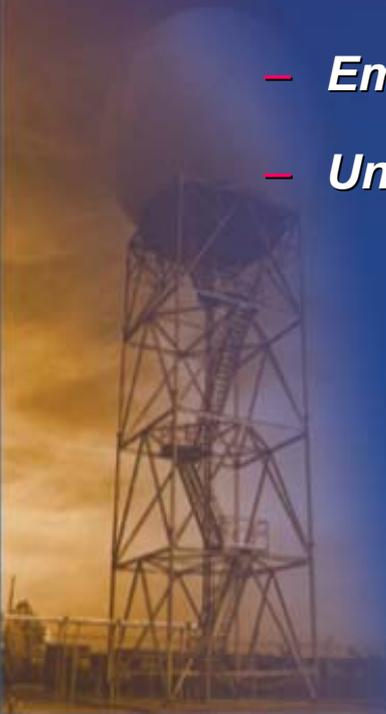




# Where We Are



- Citizen Centric, Scientific Organization
- Working Together to Save Lives
  - Private Sector
  - Emergency Management
  - Universities





# Where We Are



## *Weather Forecast Office (WFO) Team: Community Weather Experts*

- Issues all Local Forecasts & Warnings
- Builds and Maintains Relationships With Local and State Governments
- Provides Expert Advice to Emergency Operations Centers
- Solicits Customer Feedback on Products and Services
- Conducts Community Awareness and Education Programs
- Trains Volunteer Observers and Storm Spotters

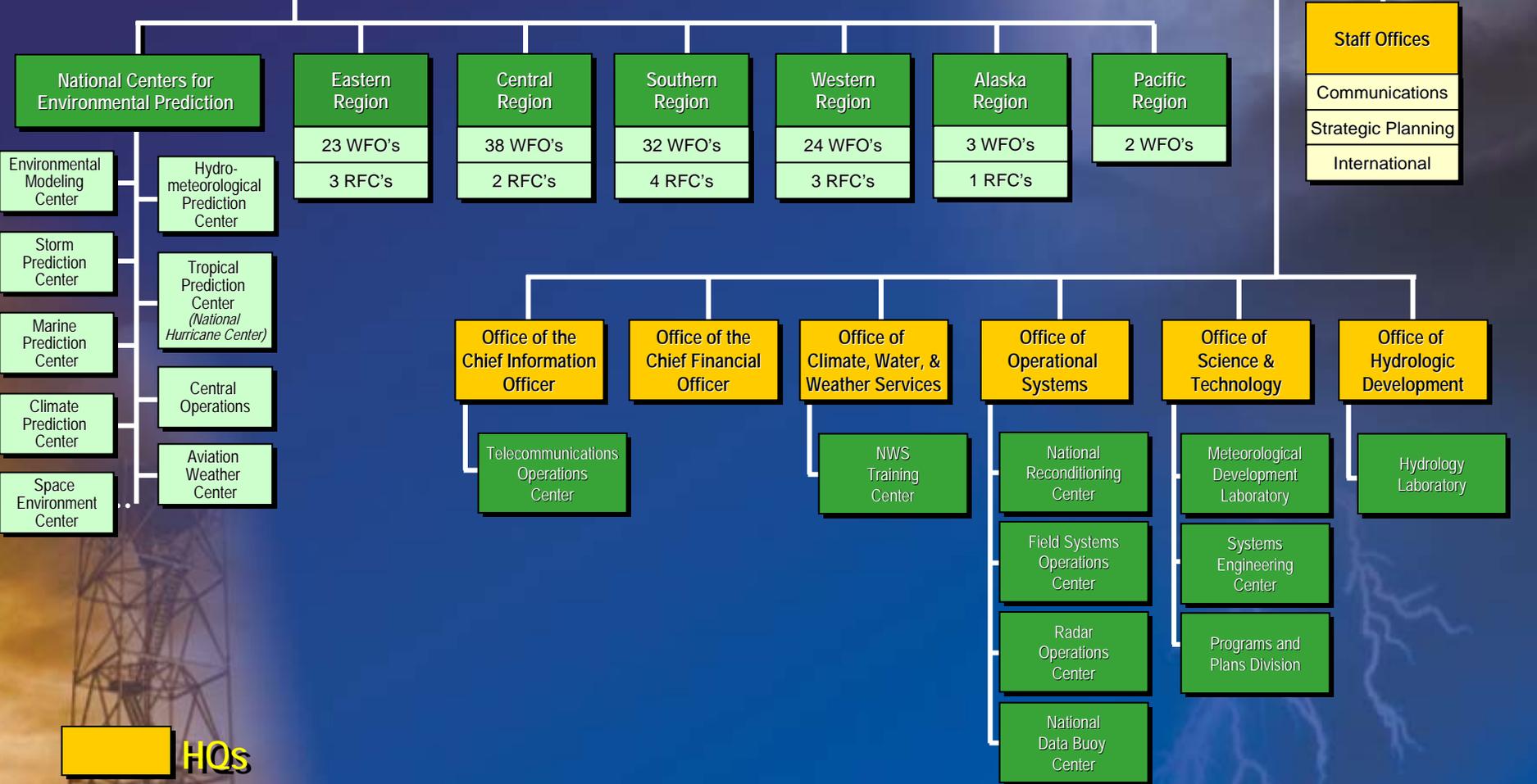




# Where We Are



**Office of the Assistant Administrator For Weather Services**

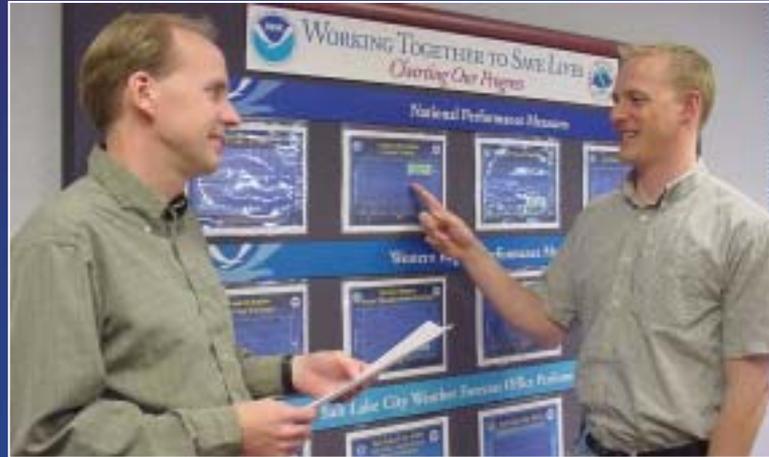


**HQs**

**Field**

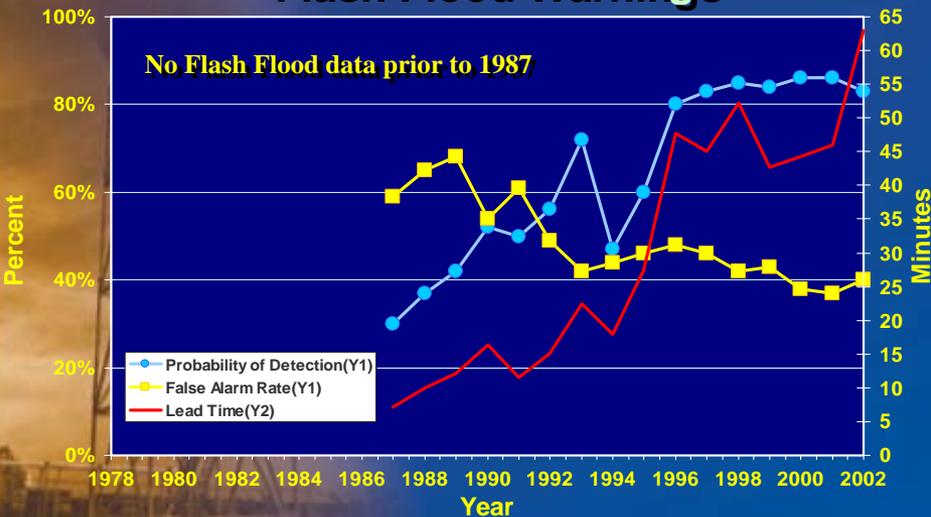


# Where We Are



### Performance Measures Display

## Flash Flood Warnings



## Tornado Warnings

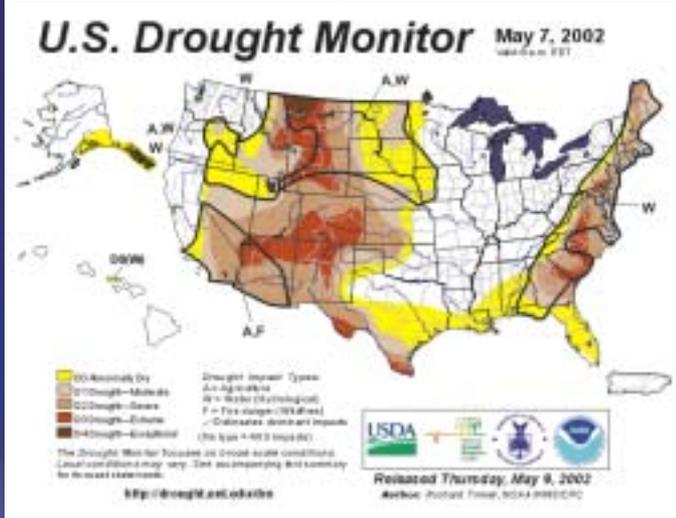




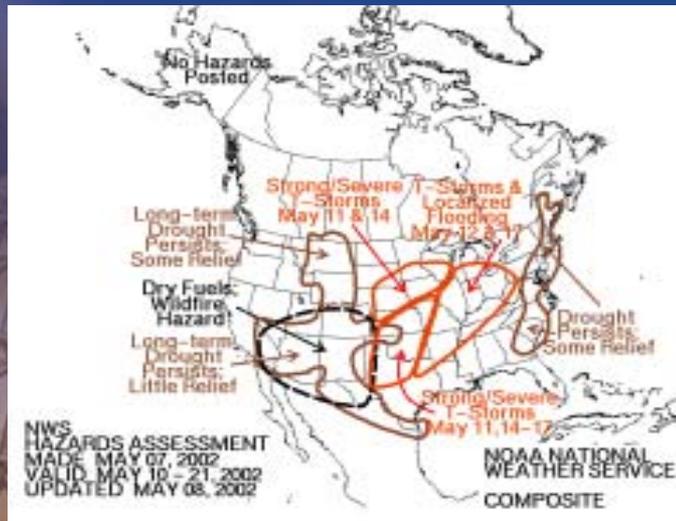
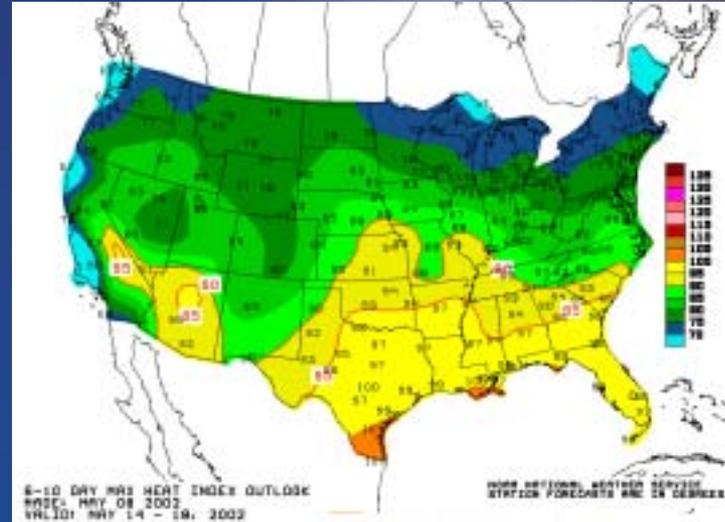
# Where We Are



## U.S. Drought Monitor



## Excessive Heat Products



## Threats Assessments

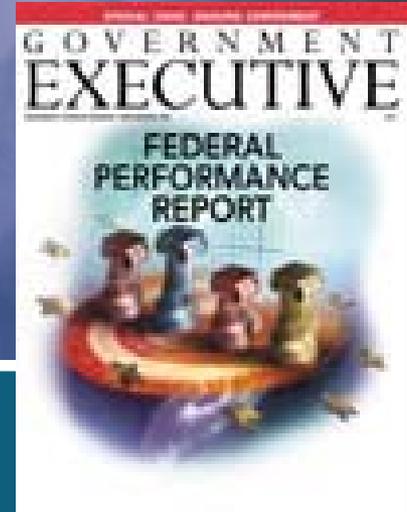
## 5 Day Flood Outlook



# Where We Are



***NWS is the only agency of 27 federal agencies evaluated by the Government Performance Project to get straight A's.***



2001 REPORT CARD	Agency Grade						Physical Assets Management	Description
	Managing for Results	Financial Management	Human Resources Management	Information Management	Agency Grade			
National Weather Service	A	A	A	A	A	A	Results-focused management coordinated throughout agency and across functions to achieve mission success.	
Postal Service	A-	A	A	C	B	A	Management is focused on results and coordinated throughout agency, but hampered by serious problems with human resources and communications.	
Administration for Children and Families	B	B	B	B	B	N/A	Agency with strong service ethos rising to the challenge of managing for results in a devolved, welfare reform environment.	
NASA	B	B	C	B	B	B	Strong "cando" culture aimed at technical excellence is marred by weakness in mission definition and measurement of outcomes.	
Bureau of Consular Affairs	C	C	C	C	B	N/A	Agency benefited from inspired leadership and increased funding, but lacks systematic practices needed to sustain momentum.	
Forest Service	C	C	D	B	C	C	Conflicting missions and decentralized systems have created systemic weaknesses that management is committed to addressing.	
Bureau of Indian Affairs	D	D	C	C	D	D	Long-standing management deficiencies acknowledged, but improvements difficult and slow in high pressure/low resource environment.	

***Government Executive - April 2001***





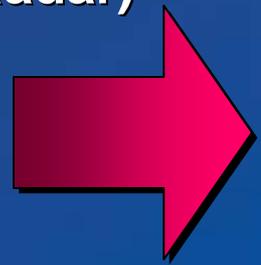
# Where We're Going

## *Technology Infusion*



### Science Advances

- Observations (More Frequent, More Detailed)
- Data Assimilation (Satellites, Radar)
- Computing Capability (Advanced Physics, Finer Resolution Models)
- Dissemination Methods
- Forecaster Techniques
- New Products



### Results

- Hurricane Track, Intensity and Precipitation Forecasts**
- Tornado and Flash Flood Forecasts**
- Aviation, Fire, and Marine Forecasts**
- Flood and River Predictions**
- Seasonal Climate Forecasts for Energy, Agriculture, Etc.**



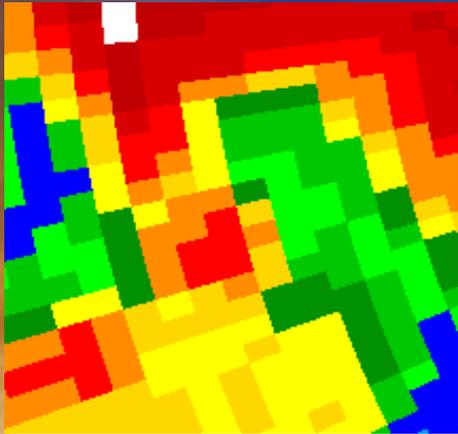
# Where We're Going

## Observations and Data Assimilation

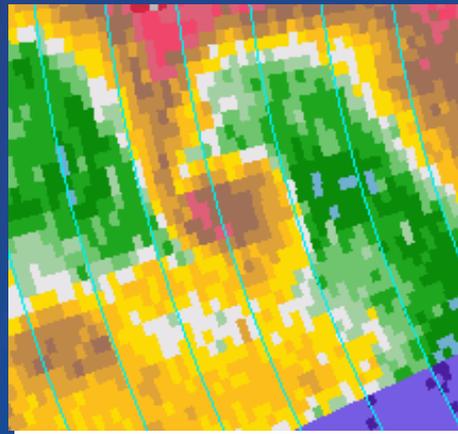
*(More Frequent, More Detailed)*

- Radar, surface observations, satellites, radiosondes, aircraft, cooperative observers, etc.

### Upgraded Radar

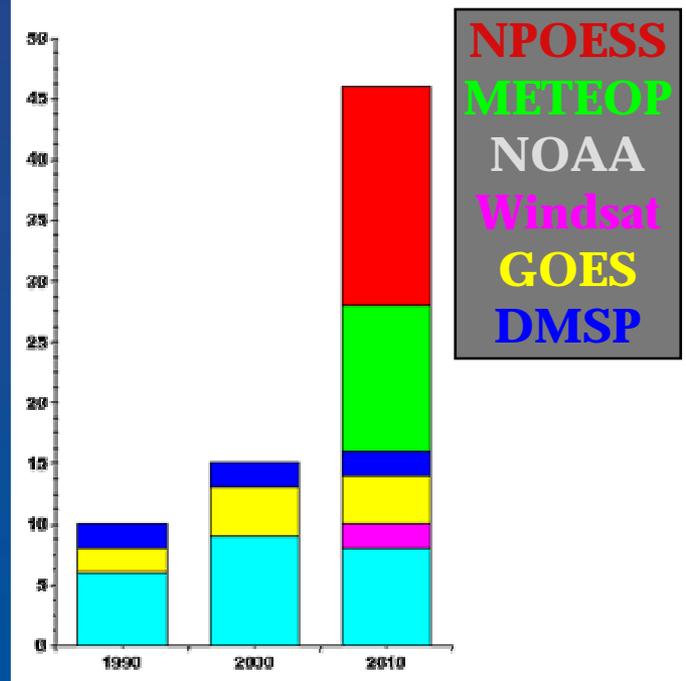


*Current Radar*



*Upgraded Radar*

### Satellite Instruments by Platform



### Increased Observations



# Where We're Going



## *Computing NCEP Improvements*

- **State of the Art Computing**
  - *1000 Times 1993 Peak Computing Performance*
  - *Enables finer resolution models, greater detail, longer term forecasts*
    - 1993 ran national model at 80 km resolution and global model run at 105 km resolution
    - 2001 national model run at 12 km and global model run at 75 km resolution
  - *Operational Climate Forecast System*
    - First Coupled Ocean/Atmospheric Modeling System for Climate Prediction

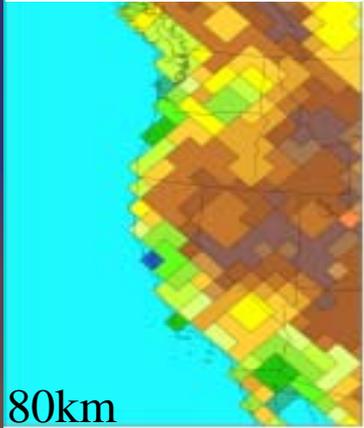


# Where We're Going

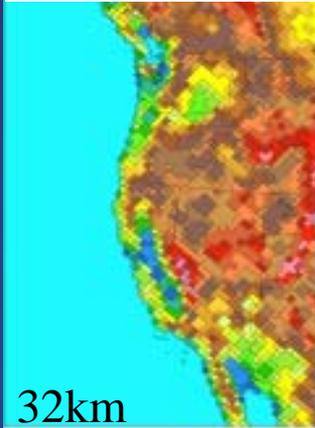
## Computing Capability & Modeling



1993



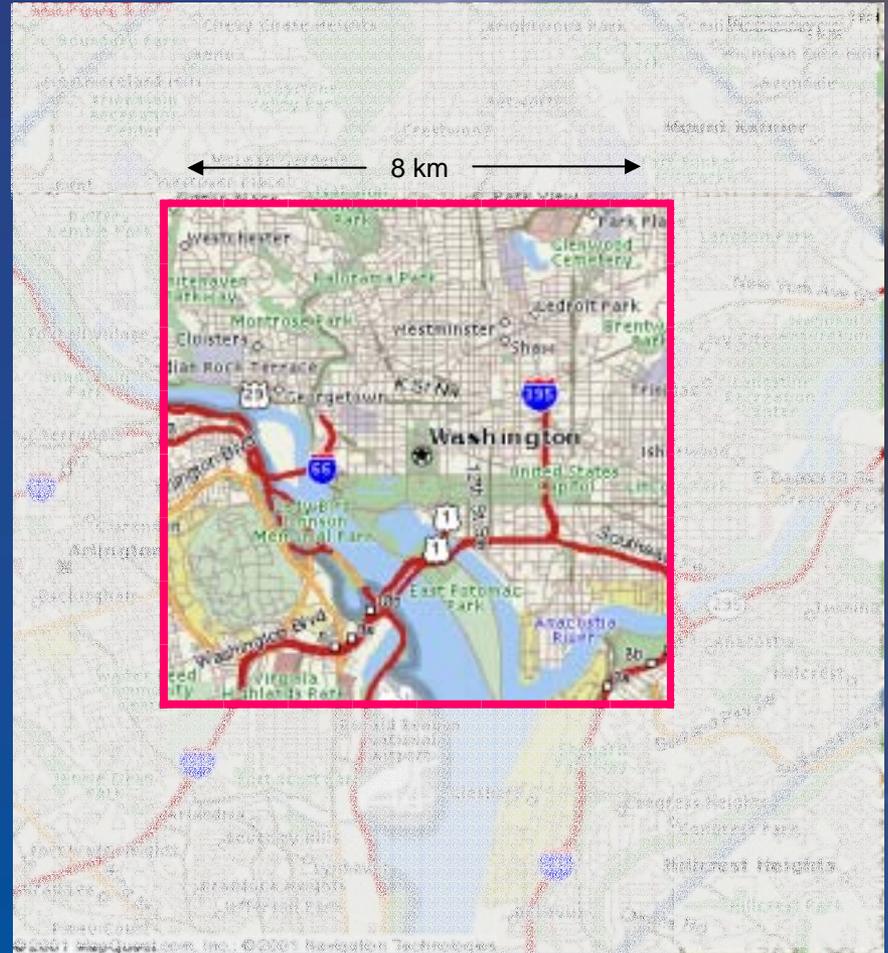
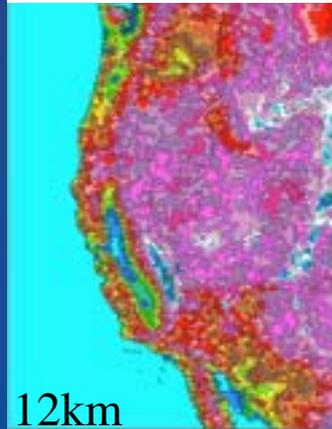
1998



2000



2002



Sample coverage of an 8 km grid point

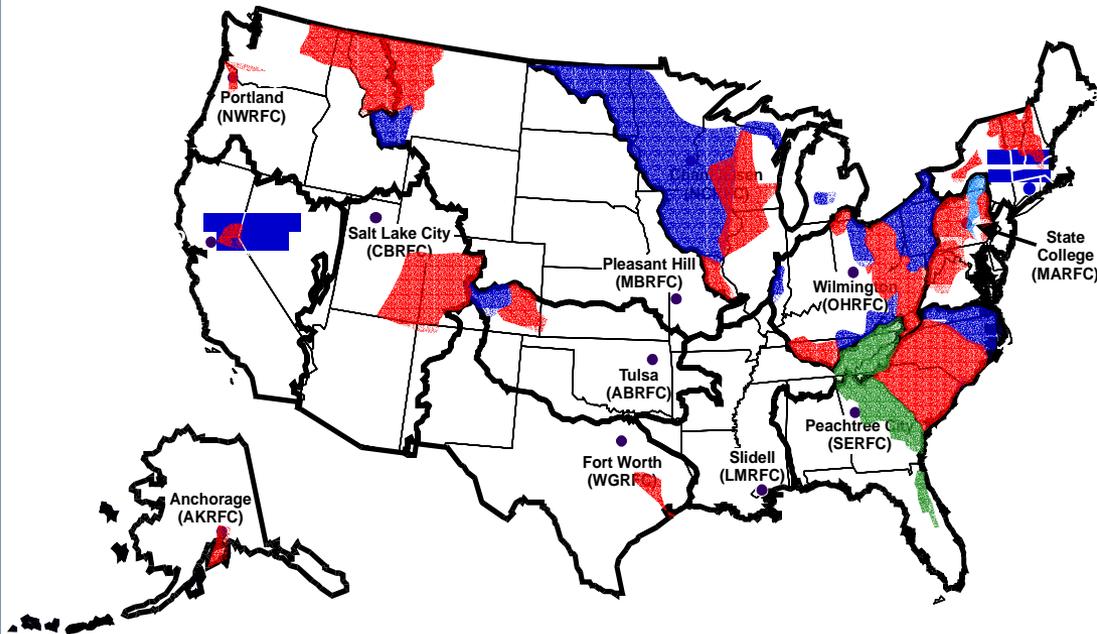


# Where We're Going

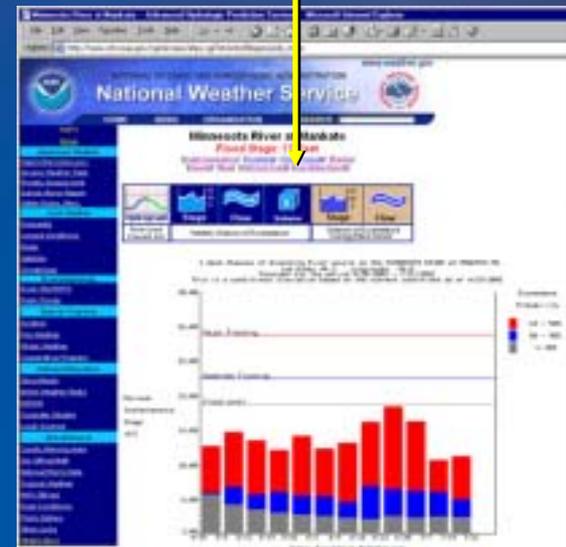
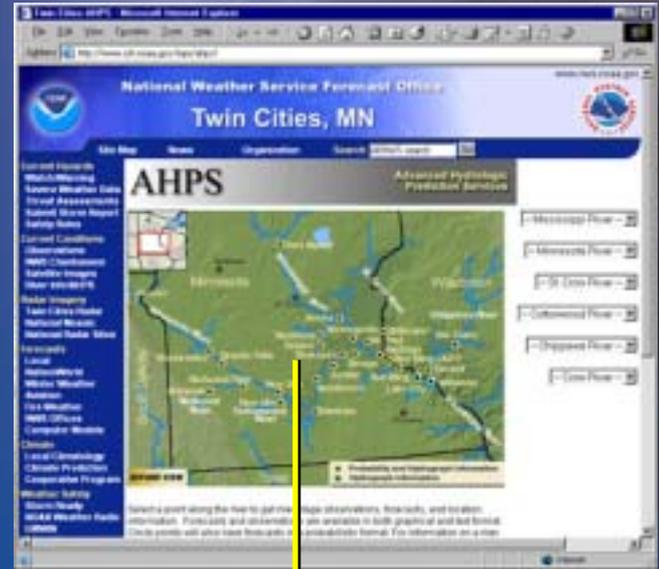
## Models Advanced Hydrologic Prediction Service



### AHPS Base and Energy Expansion Areas



-  Areas Completed Through FY 2002
-  Areas Covered by FY 2003 National AHPS (110 New Forecast Points)
-  Areas Covered by FY 2003 Energy Initiative (56 New Forecast Points)





# Where We're Going

## *Dissemination*

- **NWR (New Voice)**
- **New/Evolving Technologies**
  - *Internet*
  - *Wireless Communications*
    - **Pagers**
    - **Personal Digital Assistants**
    - **Cell Phones**
    - **Satellite Radio**





# Where We're Going

## *Forecaster Techniques and New Products*



### *AWIPS Improvements*

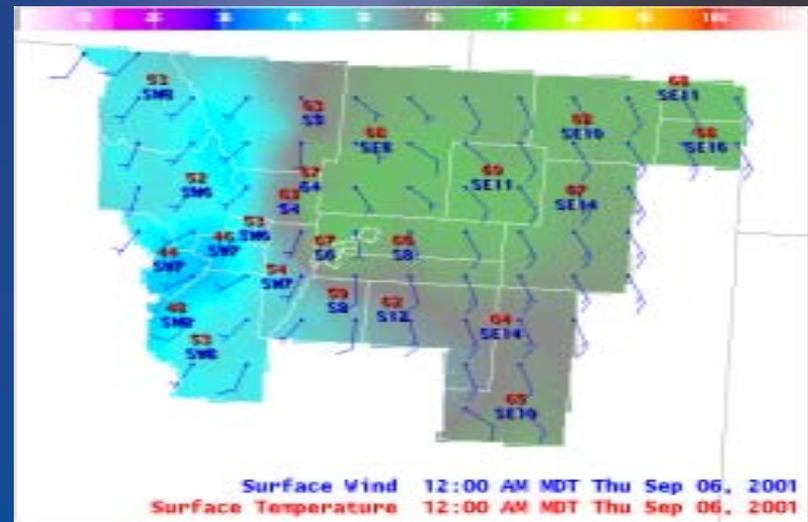
- Ability to Use Increased Data and Finer Resolution Information (e.g. radar, models)

- *More Accurate and Timely Forecasts and Warnings*

- Deliver Improved Products to Users

- *More Detailed in Time and Space*

- *More Usable Format*





# Where We're Going

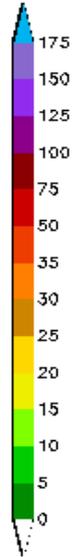
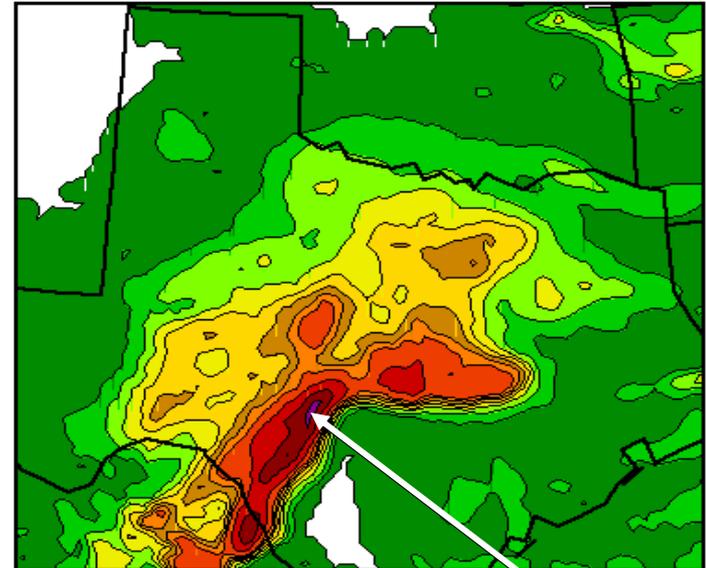
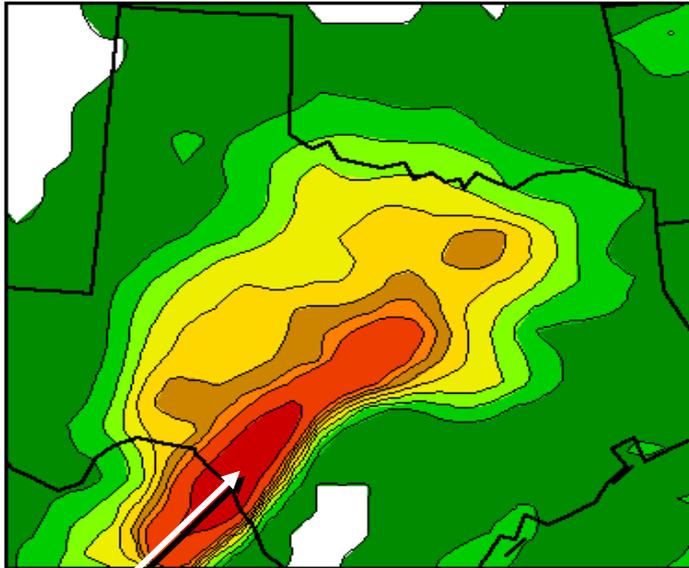
## Impact of Resolution on Model Precipitation Forecast



**Eta (22 km)**

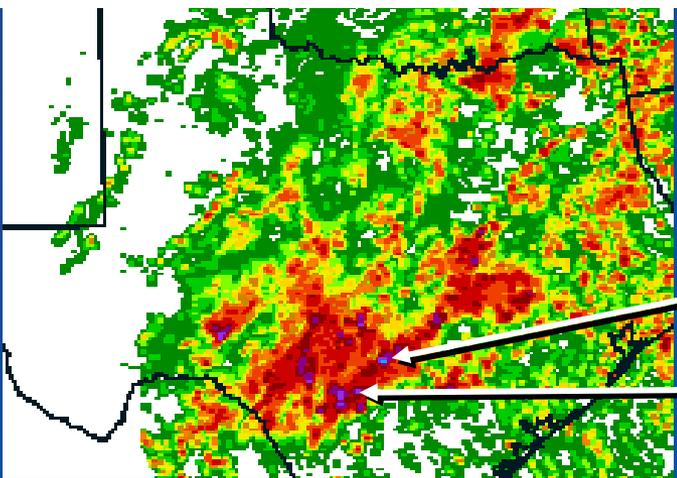
**Eta (10 km)**

0-24 H APCP ETA 24H FCST VALID 12Z 27 AUG 2001 0-24 H APCP CENTRAL10 24H FCST VALID 12Z 27 AUG 2001



2.2"

**Observed**



6.5"

5.7"

4.3"

**Better location  
Better intensity**



# Where We're Going

## *From Text to 3D: Digital, Detailed, and Displayable*

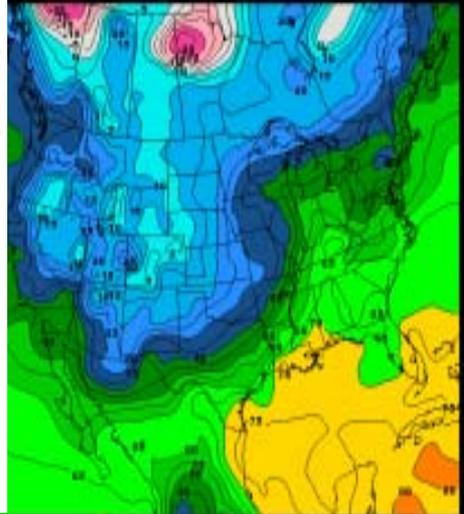
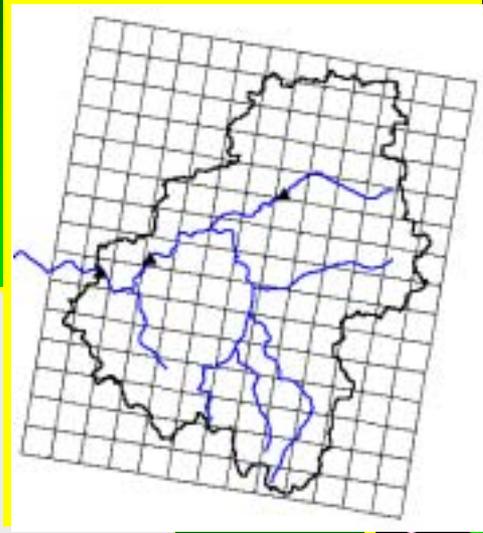
### Traditional Process

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%.



### New Forecast Process

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



MARYLAND EASTERN SHORE

EASTON

PTCLDY	CLOUDY	PTCLDY	PTCLDY	SUNNY
60/52	63/54	65/47	55/40	55/37
POP 20	POP 20	POP 20	POP 20	POP 10

SURFACE TEMPERATURE (DEG F) ANALYSIS FOR 200711271400 UTC

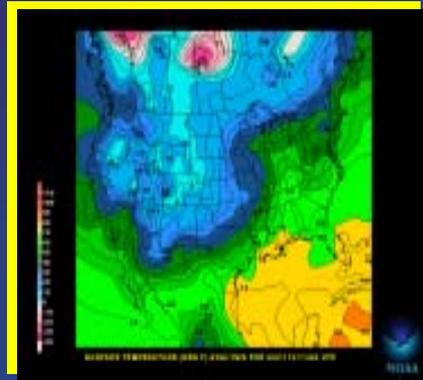




# Where We're Going



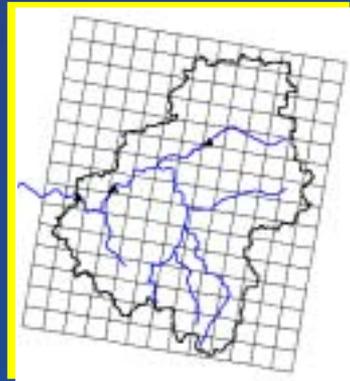
## Giving Customers What They Want



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

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

## Different Products for Different Customers



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

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*



# Hot Topics



- **Technology Infusion: Keeping Up With Advances in Science and Technology**
- **International Data Policy**
- **Office Closures**
- **Role of Government & Private Sector**
- **Climate Services: Demand for Data and Prediction Services Has Dramatically Increased**
  - *Drought*
  - *El Niño/La Niña*
- **Homeland Security**
- **CAMS**



**THE FORECASTERS LAMENT**

**HERE AMONG THE DYING EMBERS  
THESE IN THE MAIN ARE MY REGRETS  
WHEN I'M RIGHT, NO ONE REMEMBERS  
WHEN I'M WRONG, NO ONE FORGETS**

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