



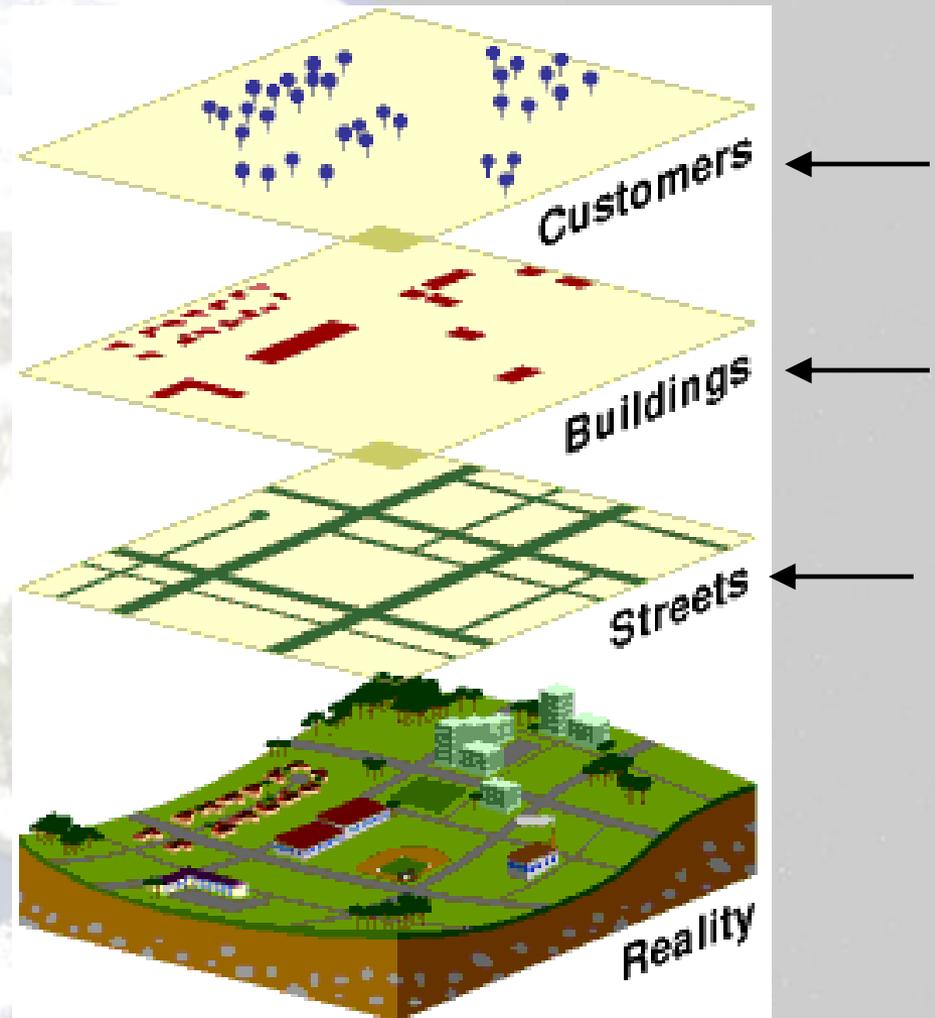
GIS and Decision Support Services
All-Hazards Workshop – Memphis, TN

Keith Stellman
Warning Coordination Meteorologist
NWS Shreveport



Enter GIS

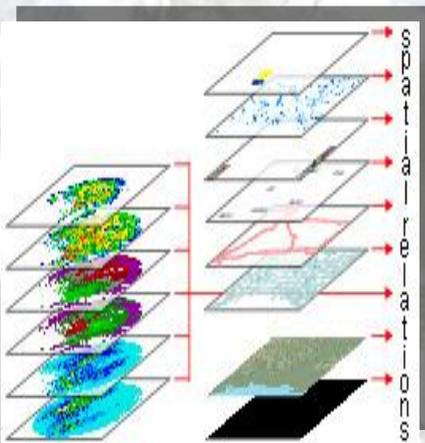
- A computer-based tool for holding, displaying, and manipulating huge amounts of spatial data.





GIS and Weather

- In a GIS, different types of information are represented as separate map layers
- Each layer is linked to descriptive information
- Layers are combined to make a map



National Weather Service Forecast Office - WFO, Ft. Worth, Texas - Microsoft Internet Explorer

Address: <http://www.srh.noaa.gov/fwd/gwarn/example/gwarnexample.html>

North Texas Graphical Warning Information (Experimental)

Tornado Warning

Counties: **Parker Tarrant**

Issued: Saturday 4/5/2003 6:53:00 PM Expires: Saturday 4/5/2003 7:45:00 PM

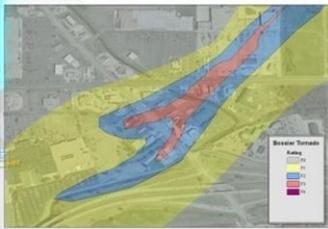
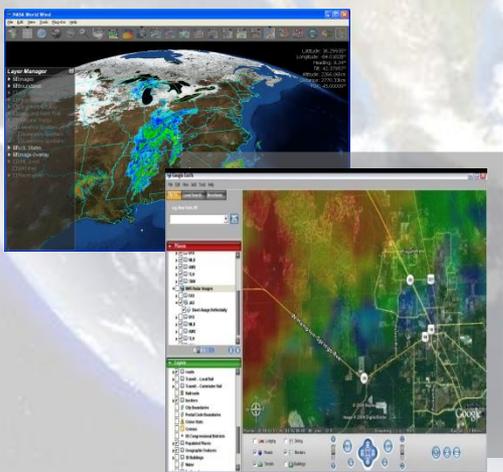
4/5/2003 12:52:01 AM UTC

Status	WARNING
Event	Warning
Area	657 Sq. Miles
Storm Motion	East At 35 Mph.
Impacted Population	349,306
In Homes	84.04%
In Multi-Family Units	8.25%
In Mobile Homes	7.71%
English Spoken Well	96.27%
English Not Spoken	3.73%
Urban	87.39%
Rural	12.61%
Not Living in Texas in 1995	7.09%
Housing Units	118,390
Source	2000 Census

Tornado Warning - WFOUS4 KFWO 060052 200304 - 6:53 PM

Bossier City Tornado - Airline Drive Closeup

Producing Tornadoes Was 17 Miles West Of Springtown...
Of Tarrant County After 715 PM CST



Data Manipulation

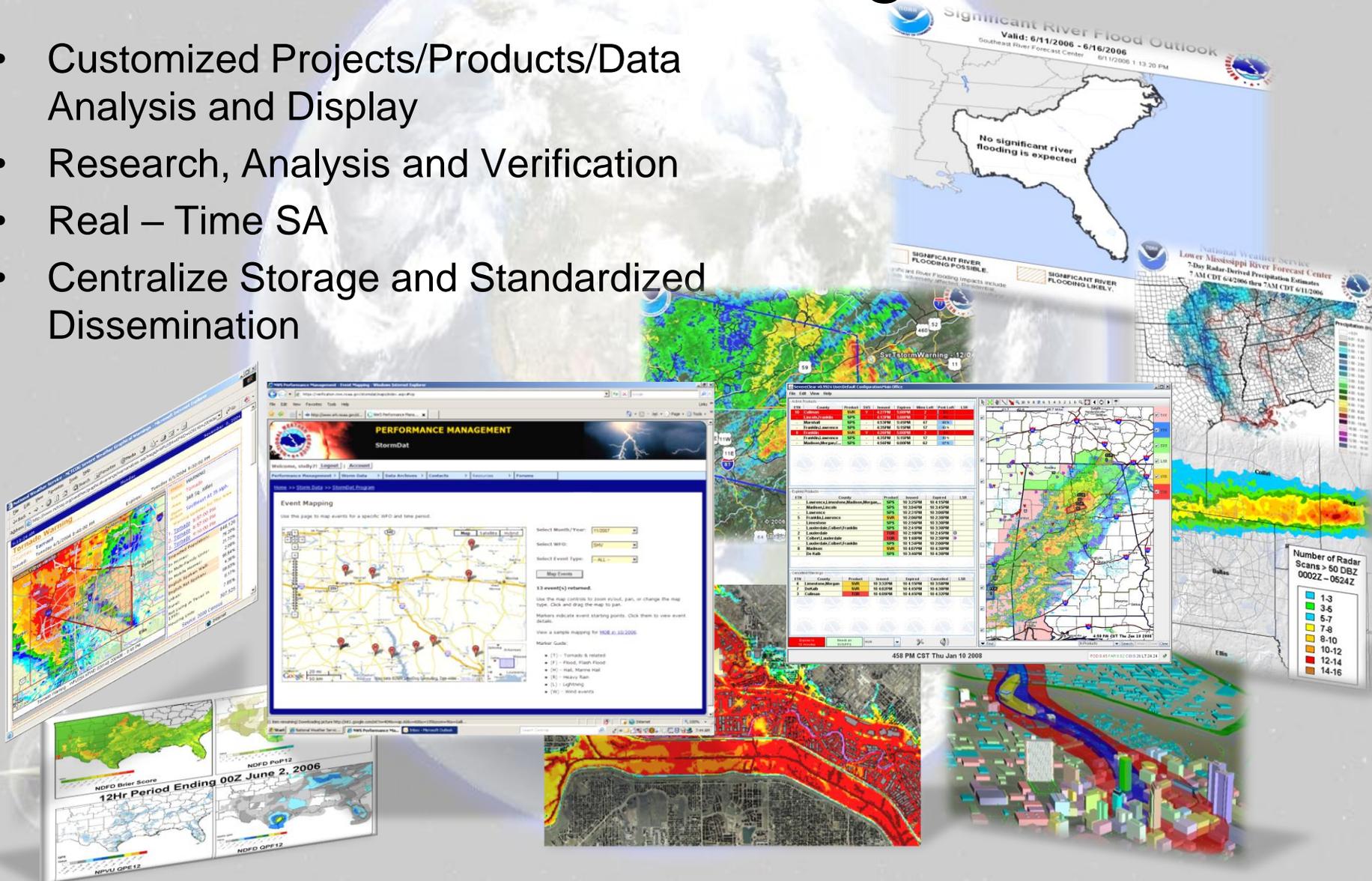
Data Visualization

Data Analysis

Data Query

What is the NWS doing with GIS?

- Customized Projects/Products/Data Analysis and Display
- Research, Analysis and Verification
- Real – Time SA
- Centralize Storage and Standardized Dissemination



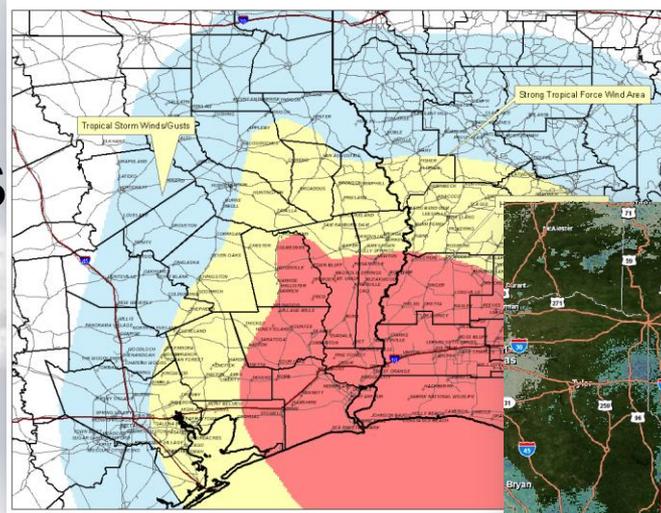
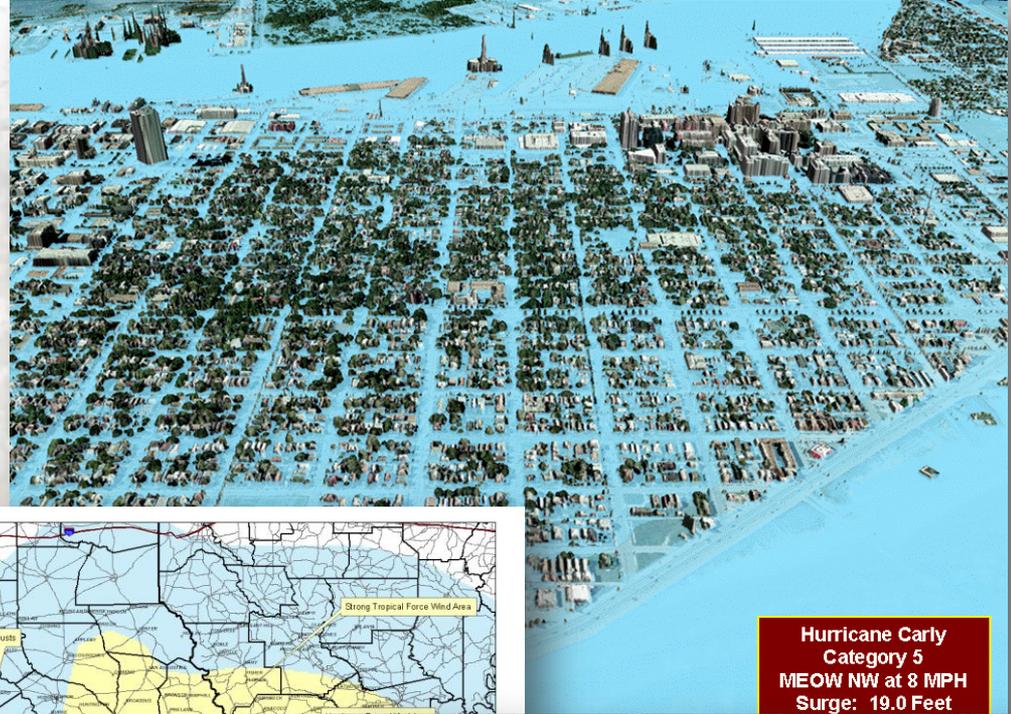


Addressing Partner Needs...

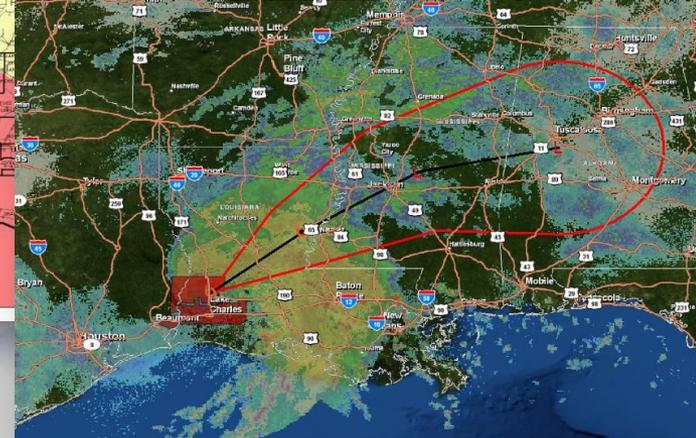


Hurricanes and Evacuation

- Use GIS to convey important decision making information
- Decision makers can allocate resources accordingly

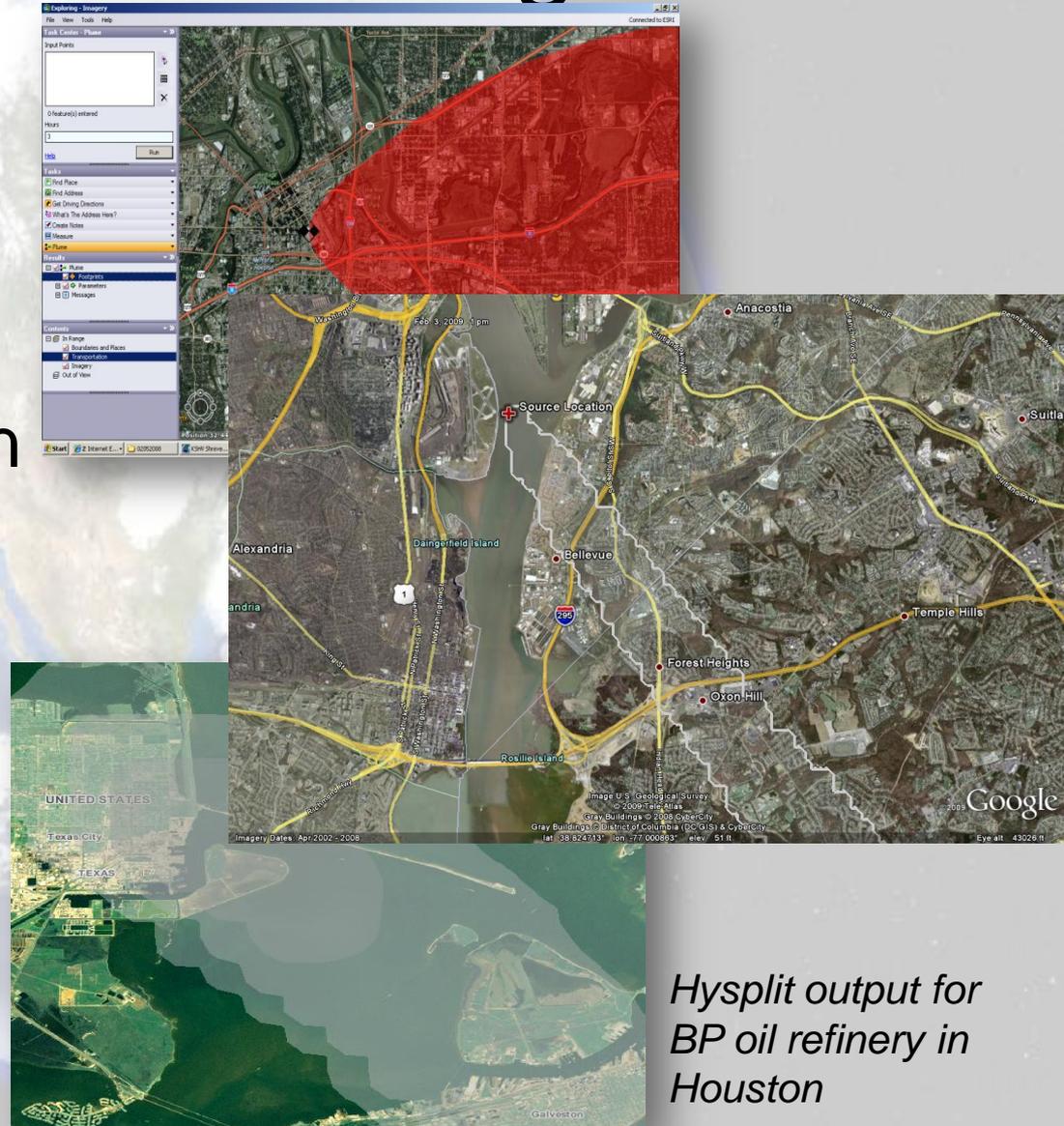


**Hurricane Charley
Category 5
MEO NW at 8 MPH
Surge: 19.0 Feet**



Plume Modeling

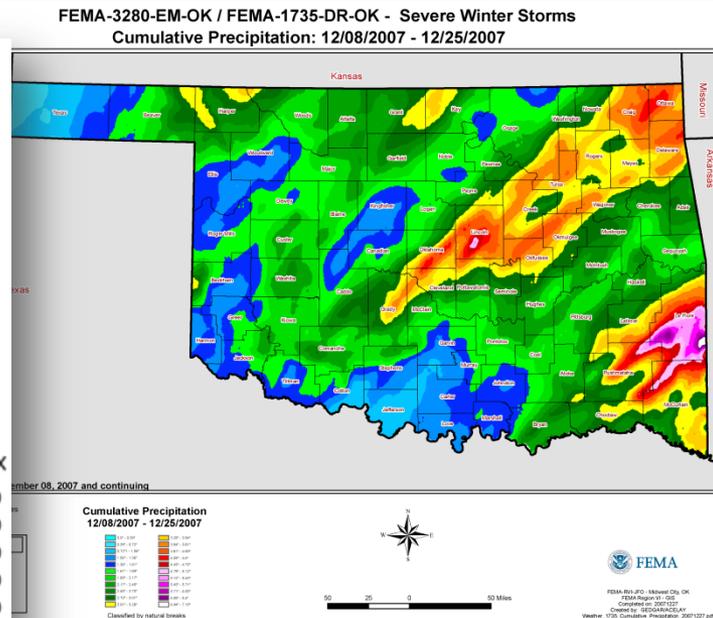
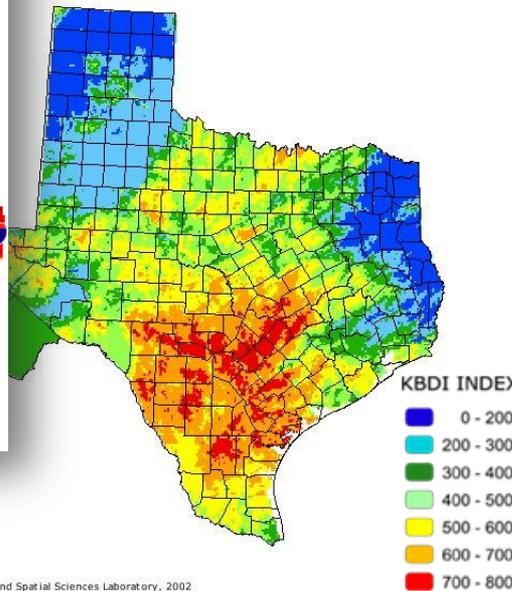
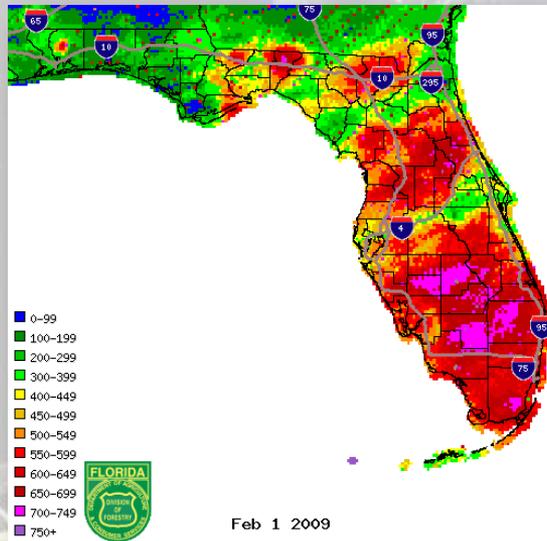
- Output to GIS
- NOAA has an internal GIS solution
 - Output kml or shp
- ESRI has a simple model working now through ArcGIS Explorer



Hysplit output for BP oil refinery in Houston

Analysis and Assessment

- Reports
- Detailed analysis
- Disaster Declarations



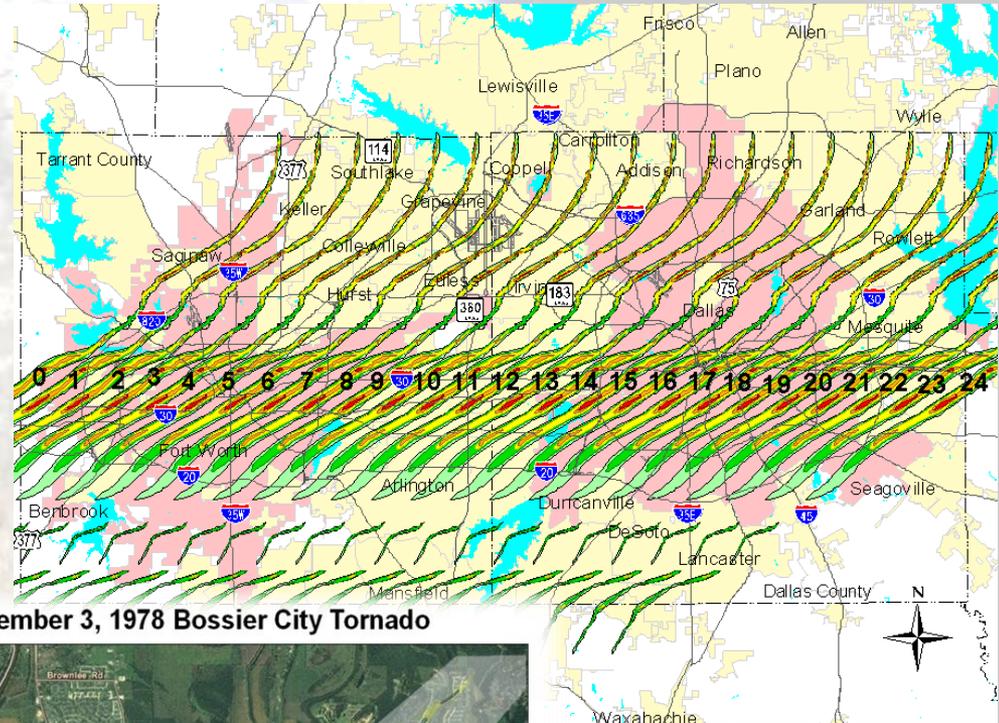
Scenarios using GIS

- NCTCOG ran scenarios from the Moore OK F5 data for the metroplex

- 135,000 Employees in Path
- 66,000 Residents in Path
- 8,000 Vehicles (Traffic Jam)
- Buildings Lose Outer Membrane
- Falling Debris for Days

SHV ran a similar scenario for 1978 F4 tornado.

- 21,000 residents in damage path



Tools

- ESRI
- Google
- Nasa Worldwind
- Grass GIS
- Mapserver
- Java Geotools
- OpenGIS
- Many more.....

- Shapefile
- KML

The key is in the formats we make available and their accessibility





FX-Collaborate

- AWIPS like tool
- New beta version exports to KML

<http://fxc.noaa.gov/>

- Enables easy collaboration

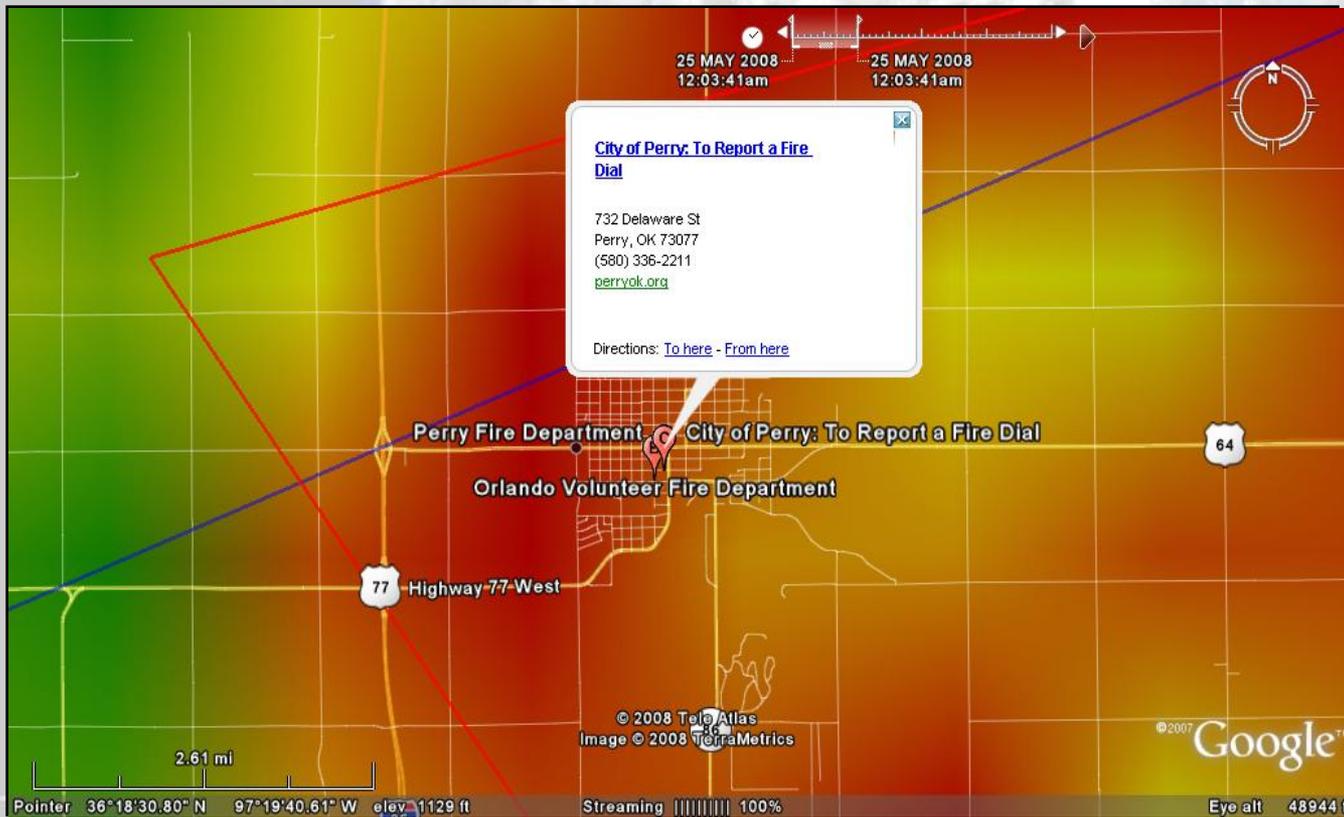




Using Google

❖ Warning Verification

- Search businesses, agencies, etc
- Call to get a better idea of the storm intensity



Google Earth Pro

File Edit View Tools Add Help

Search

Fly To Find Businesses Directions

What e.g., Museums

gas station

Where e.g., Houston, Texas

Current view

gas station (1 - 10)

- A Exxon Filling Station #17
711 E Reed Rd, Greenville, MS 38701
- B Exxon Filling Station #16
1625 Highway 1 S, Greenville MS 38701
- C Shell West Services Station
1902 Jackson Ave W, Oxford MS 38655
- D Shell Go
Highway 7 & Carrollton Ave, Greenwood, MS 38930
- E Kum & Go



Using Google – Warning Verification

■ '07 Total Warnings (SVR/TOR)

■ 419

■ % Verified/POD

■ 49%/84% (Goal 50%/90%)

• '08 Total Warnings (SVR/TOR)

– 495

• % Verified/POD

– 60%/90% (Goal 50%/90%)

– **50%/81% (if Google subtracted)**

FFW

■ Total Warnings

■ 94

■ % Verified/POD

■ 59%/81% (Goal
50%/90%)

FFW

• Total Warnings

– 56

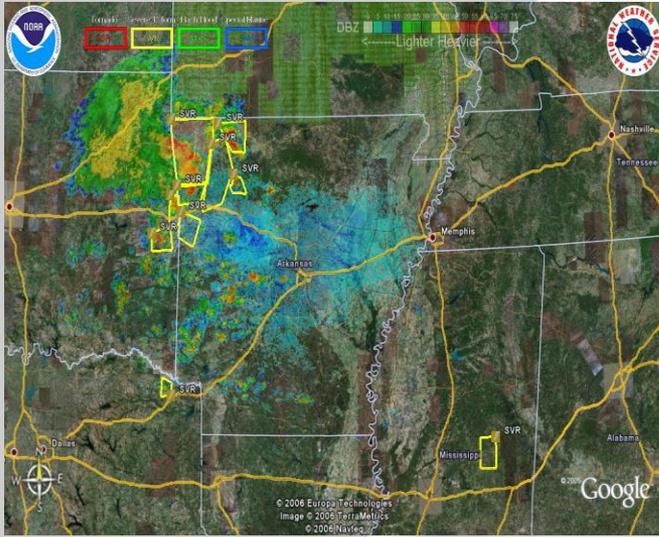
• % Verified/POD

– 77%/88% (Goal 50%/90%)

~40 warnings verified solely on the use of Google Earth



Google Earth and NWS RIDGE



- Import RIDGE and NWS Warnings into programs like Google Earth
- Southern Region developed and has implemented “RIDGE” radar images as a Google Earth overlay with ***Real-Time*** 2 minute updates.

<http://radar.weather.gov/ridge/kmzgenerator.php>

<http://www.srh.noaa.gov/jax/polygons/TOR26.shtml>

The NWS will use Google Maps to integrate products and services for better mapping solutions in the web browser. This example shows a NWS Tornado Warning for users to determine if they fall within the warned area.

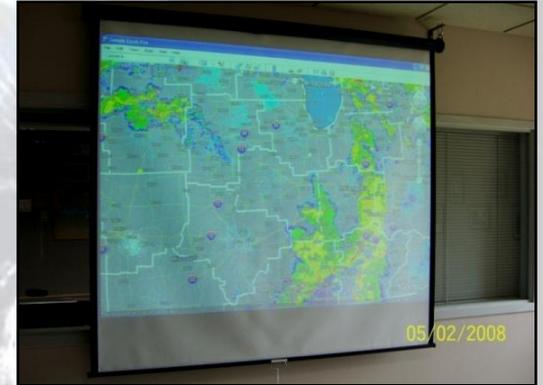


Short List of available data



❖ **Google Earth** can be utilized to enhance internal operations and situational awareness

- Single image radar & satellite
- Animate RIDGE Radar
- Watch & Warning Polygons
- Storm Reports
- Spotter calls / Verification
- Risk & Impact Analysis / Decision Tool
- Flood & Flash Flood (AHPS, QPF, FFG, etc.)
- Model Guidance
- Equipment Status (radar, METAR)
- Storm Surveys



Big screen in Operations Center at Central Region HQ

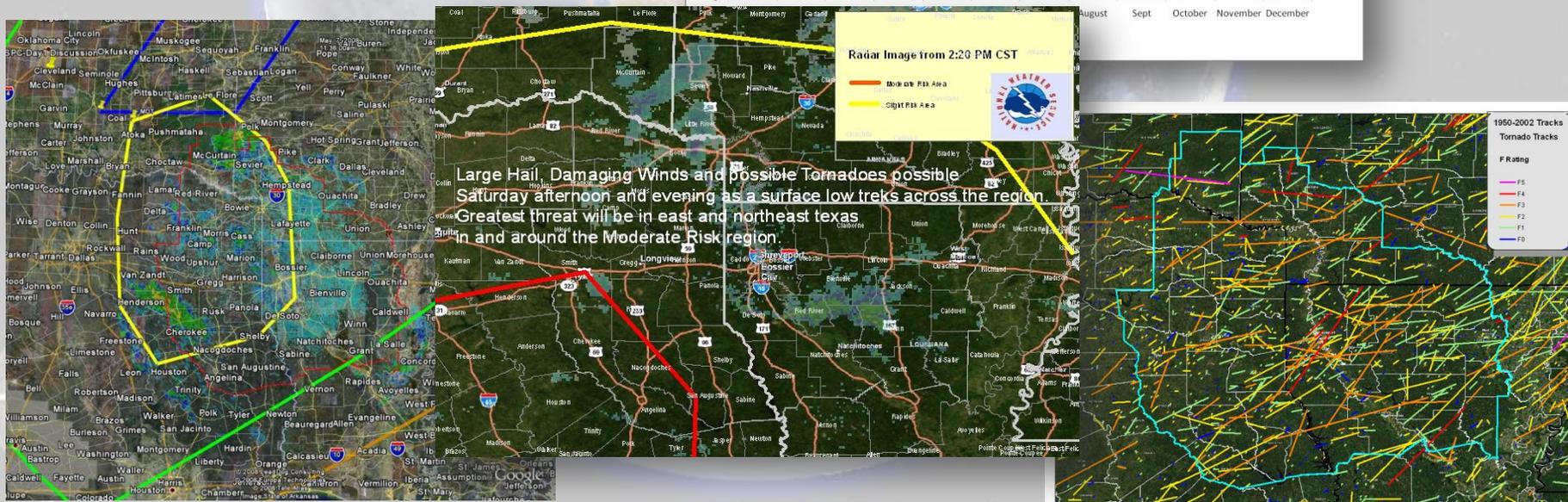
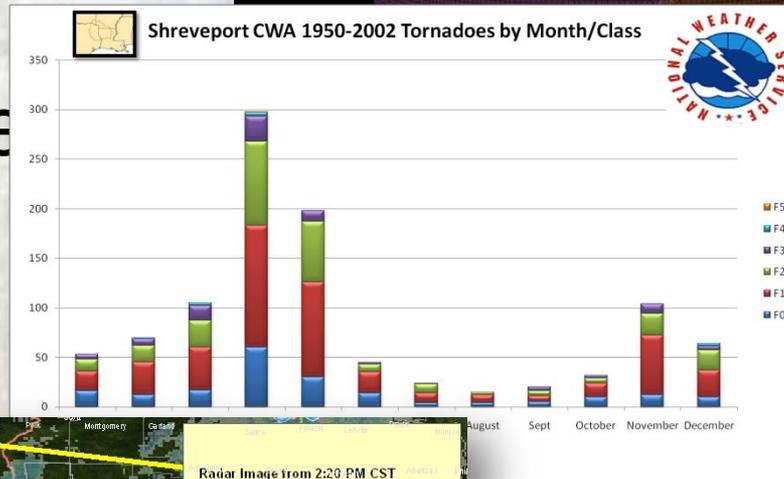
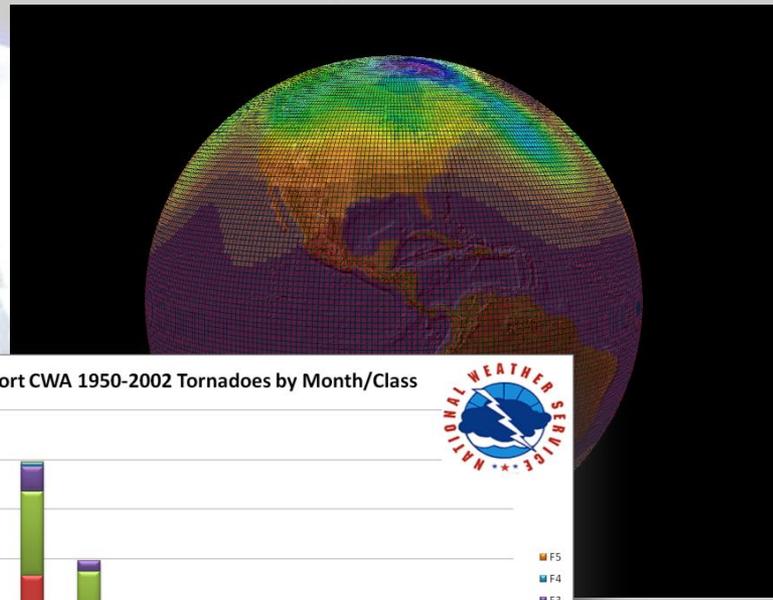


Big screen in front of operations at WFO Shreveport



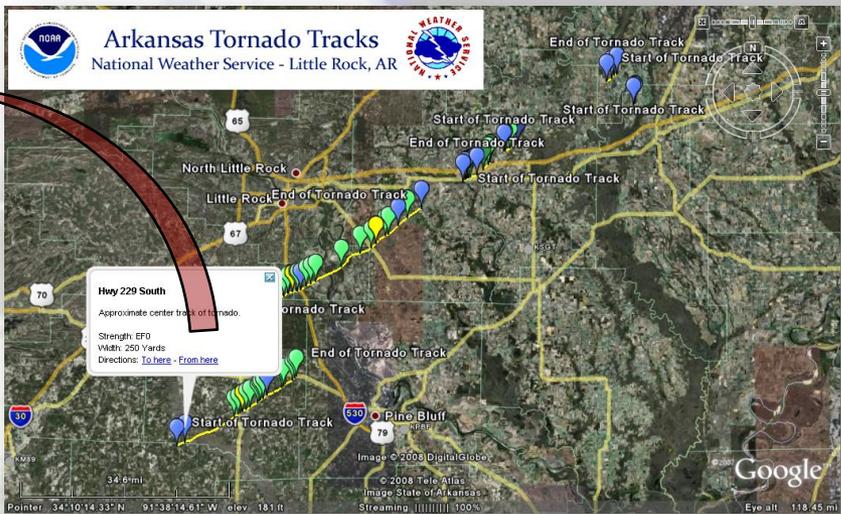
Datasets and tools

- Model Data
- Tornado/Hurricane tracks
- Real time data





Google Maps – Web Integration



Weather Service Forecast Office
Shreveport, LA

SRI Home Organization Search Enter Search Here Search



Rusk and Panola Counties EF1 Tornadoes on May 2, 2008

Local weather forecast by City, ST or zip code

Current Hazards
Local Hazards
Radar
Current Conditions
Observations
Satellite Imagery
Rivers & Lakes AOP
Flood Forecasts
Hydrology
Storm Reports
Satellite Imagery
Shreveport
Nationwide
Forecasts
Local
National
Local Aviation
Aviation Center
Tropical
Fire Weather
National
Activity Planner

Large Trees uprooted from the EF1 tornado

2 very large trees were uprooted and stacked in front of a home. 2 people were inside the home when the tornado hit.

Full Size

Interactive Map of the 2 EF1 tornado tracks

National

Local forecast by City, ST or zip code

[Composite Reflectivity] [Base Reflectivity] [Storm Relative Motion] [Base Velocity] [1-hour Precip] [Storm Total Precip] 08:12:0008 09:25 UTC

Map Satellite Hybrid Terrain All Warn/Adv

- *What if we could plot the data in web browser?*
- The Maps API allows us to do that.
 - Javascript
 - Flash

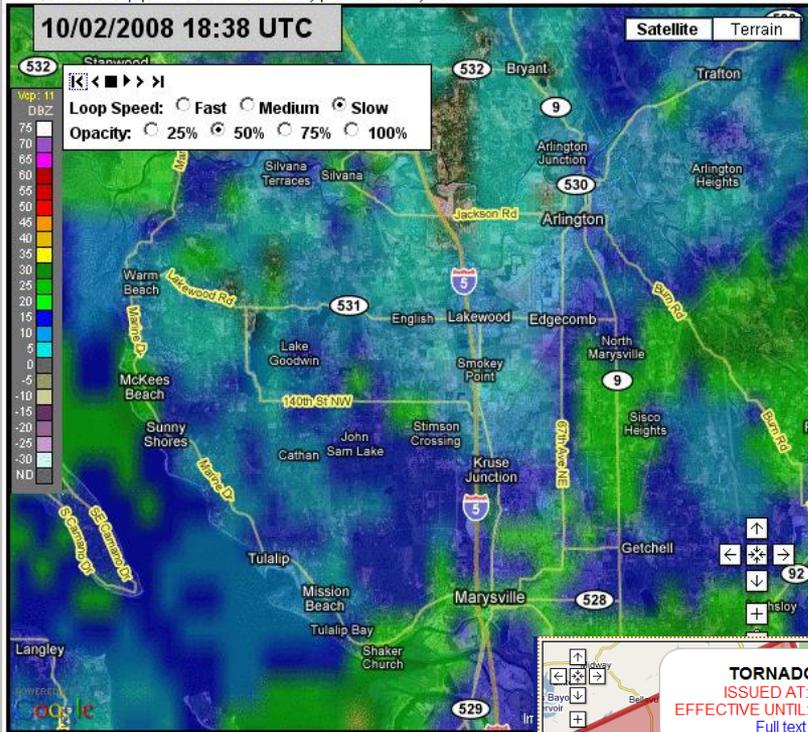


Google Maps – Web Integration

Composite Reflectivity

EXPERIMENTAL/ NON-OPERATIONAL PRODUCT

Composite Reflectivity | Base Reflectivity | Storm-Total Precip
1-hour Precip | Storm-Relative Velocity | Base Velocity



So Now What?

- Integrating RIDGE radar into Maps for a much greater zoom with search capabilities.
- Integrating the MAPS API to do address lookups for a forecast or warning
- Better disseminate warning information

TORNADO WARNING
ISSUED AT: 1025 AM CDT
EFFECTIVE UNTIL: WATCH REMAINS IN
Full text of warning

Event	Warning
Area	330.08 Sq. Miles
Storm Motion	North at 20 MPH

Impacted Population:	27,628
Males:	14,353
Females:	13,275
Households:	11,328
Schools:	5
Age - Under 5 :	1,720
Age - 5 to 17:	5,119
Age - 18 to 21:	1,407
Age - 22 to 29:	2,724
Age - 30 to 39:	3,925
Age - 40 to 49:	4,059
Age - 50 to 64:	4,256
Age - 65 and up:	4,418

Source: 2000 Census

Radars Transparency:
 NWS Warnings NWS Radar

NWS Pocatello, ID
Point Forecast 5 Miles SE Pocatello ID
42.81N 112.44W
Forecast Valid 3pm MDT Oct 2, 2008
Last Update: 2:22 pm MDT Oct 2, 2008

Forecast at a Glance

Time	Forecast	Chance	Temp	Wind
This Afternoon	Mostly Sunny	10%	Hi 80°F	W 10-17
Tonight	Partly Cloudy	20%	Lo 65°F	W 10-17
Friday	Chance Showers	30%	Hi 71°F	W 10-17
Friday Night	Chance Showers	30%	Lo 44°F	W 10-17
Saturday	Shower Likely	70%	Hi 50°F	W 10-17
Saturday Night	Shower Likely	60%	Lo 37°F	W 10-17
Sunday	Chance Showers	40%	Hi 50°F	W 10-17
Sunday Night	Mostly Cloudy	10%	Lo 35°F	W 10-17
Monday	Mostly Sunny	10%	Hi 50°F	W 10-17

Detailed Tornado Forecast
Hazardous weather conditions:
Hazardous Weather Outlook
This Afternoon: Mostly sunny, with a high near 80. Southwest wind between 14 and 14 mph, with gusts as high as 22 mph.
Tonight: Partly cloudy, with a low around 46. South southwest wind between 8 and 14 mph, with gusts as high as 22 mph.
Friday: A 30 percent chance of showers after noon. Mostly cloudy, with a high near 71. South southeast wind 6 to 8 mph becoming southwest between 15 and 19 mph. Winds could gust as high as 26 mph.
Friday Night: A chance of showers before 6pm, then a chance of rain. Mostly cloudy, with a low around 44. Breezy, with a southwest wind 20 to 23 mph becoming south 9 to 12 mph. Winds could gust as high as 33 mph. Chance of precipitation is 30%.
Saturday: Showers likely. Mostly cloudy, with a high near 60. Breezy, with a south southwest wind between 14 and 24 mph, with gusts as high as 34 mph. Chance of precipitation is 70%.
Saturday Night: Showers likely. Mostly cloudy, with a low around 37. Chance of precipitation is 60%.
Sunday: A 40 percent chance of showers. Mostly cloudy, with a high near 57.
Sunday Night: Mostly cloudy, with a low around 35.
Monday: Mostly sunny, with a high near 59.
Monday Night: Partly cloudy, with a low around 34.
Tuesday: Mostly sunny, with a high near 64.
Tuesday Night: Partly cloudy, with a low around 35.
Wednesday: Mostly sunny, with a high near 64.

Current Conditions
Pocatello Regional Airport
Last Update on 10 Oct 13:53 MDT

Humidity	56%
Wind Speed	WSW 31.0 3.5 mph
Barometer	29.73 in (1006.00 mb)
Dewpoint	30°F (-1°C)
Wind Chill	35°F (2°C)
Visibility	10.00 Miles

More Local Wx: 3 Day History

Radars and Satellite Images

GIS Data Availability

- <http://www.weather.gov/gis> - Links to NWS Data
 - Shapefiles
 - Hurricane information
 - Warnings
 - Many more
 - Kml
 - Radar
 - Warnings
 - Current obs
 - Many many more
- <http://www.srh.noaa.gov/gis/kml> - KML output/links
- <http://www.nowcoast.noaa.gov> – NOS GIS Server
- <http://gis.srh.noaa.gov> – SRH Experimental GIS Server
- <http://water.weather.gov> – Daily precipitation data available in shp



Questions

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