

Climate Monitoring & Services at NOAA's National Climatic Data Center

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NOAA's National Climatic Data Center

- NCDC is the steward of the Nation's in-situ and satellite data and information.

NCDC's Federal presence extends to:

Asheville, NC

Boulder, CO

Honolulu, HI and

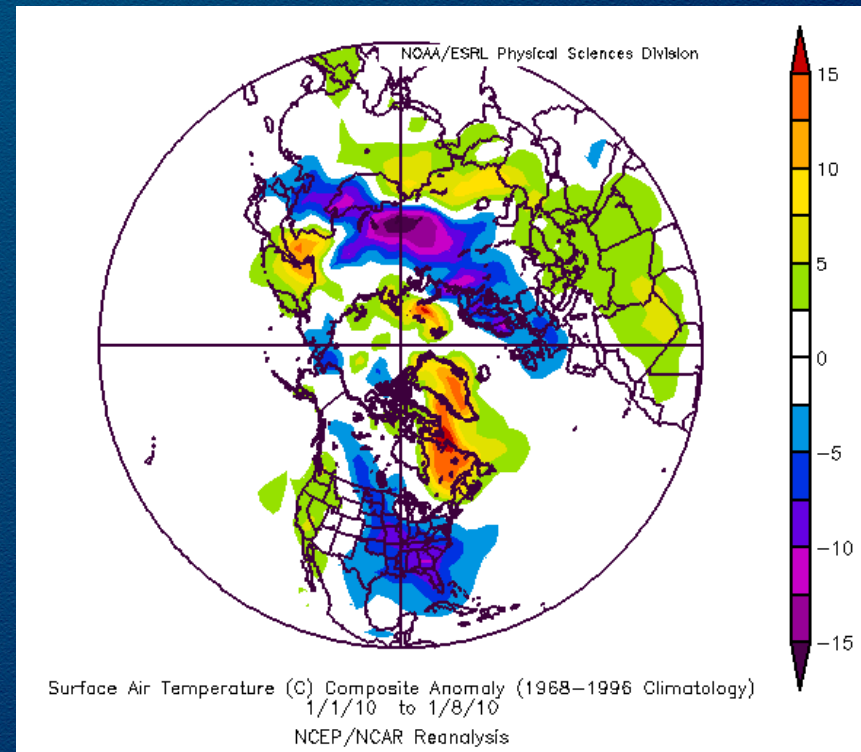
Silver Spring, MD



Why Monitor Climate?

To assess the state of the climate and our capacity to observe it

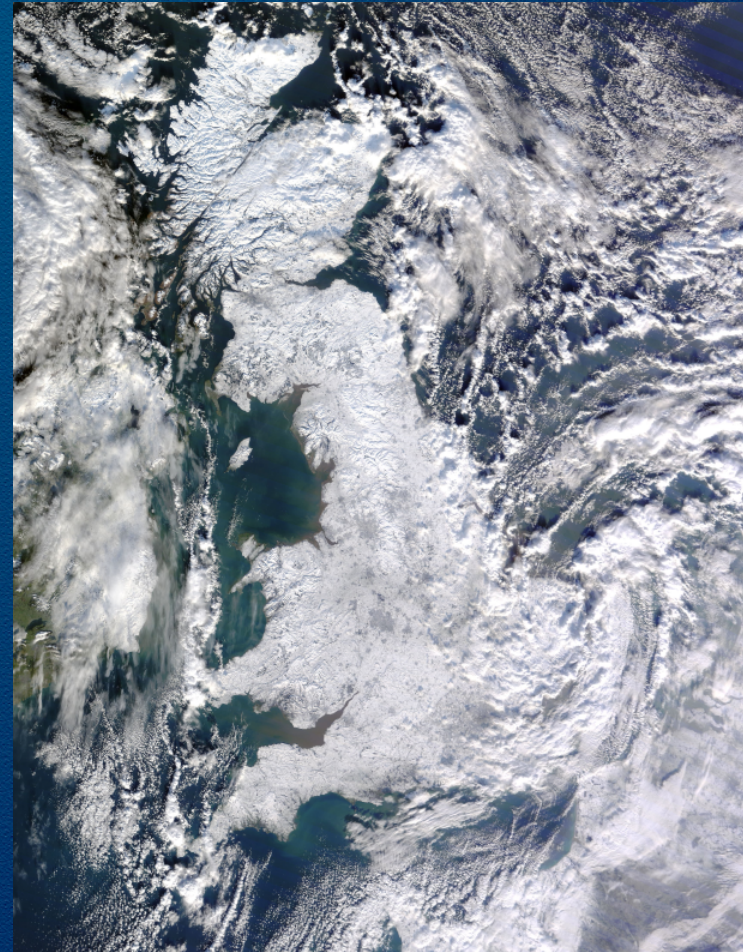
- Insight into the climate system and emerging climate events
 - “When and where is it happening?”
 - “How big is it?”



Why Monitor Climate?

To assess the state of the climate and our capacity to observe it

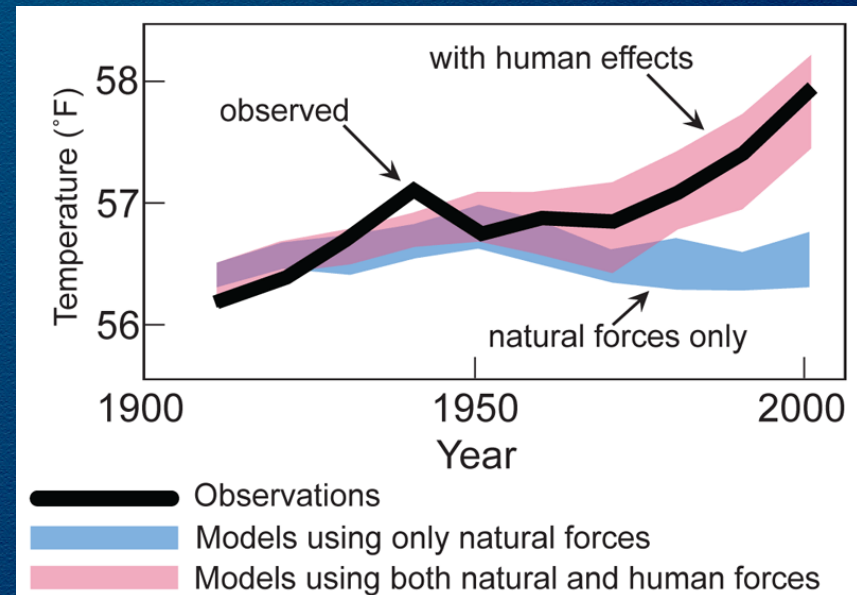
- Understanding Climate Variability
 - “How often does this happen?”
 - “What is ‘normal’?”



Why Monitor Climate?

To assess the state of the climate and our capacity to observe it

- Enable pursuit of Attribution
 - “What is the chance [some piece of] this is related to climate change?”



Monitoring Climate at NCDC

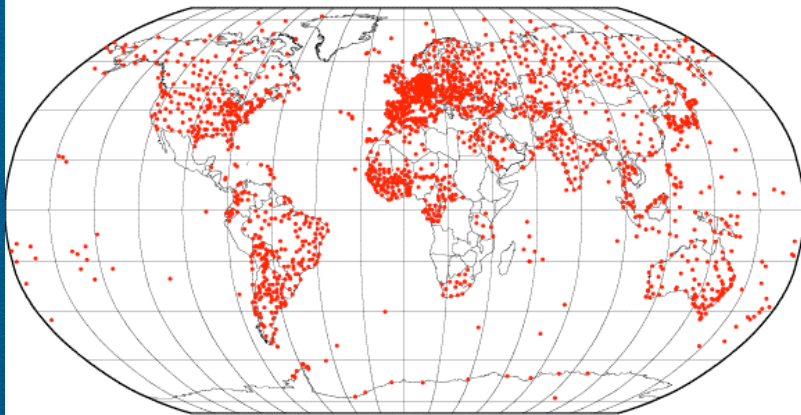
It begins and ends with the needs of the public.

- Climate Monitoring Branch established late 1990s
 - A very warm year (very strong El Niño)
 - Lots of interest in “Climate”
- Mission: to monitor and assess
- Dependent on upstream pros at NCDC and beyond:
 - Observing systems
 - Dataset builders
 - Quality Assurance
 - Engagement with communities and sectors

Foundation: Data Sets and Care

Global Land Data: GHCN

1852 CLIMAT Stns Rcvd at NCDC



Global Sea Data: ERSST



Lots of Product

<http://www.ncdc.noaa.gov/climate-monitoring/inventory.php>

Climate Monitoring Inventory - Mozilla Firefox
http://www.ncdc.noaa.gov/climate-monitoring/inventory.php

NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service
National Climatic Data Center

DOC > NOAA > NESDIS > NCDC

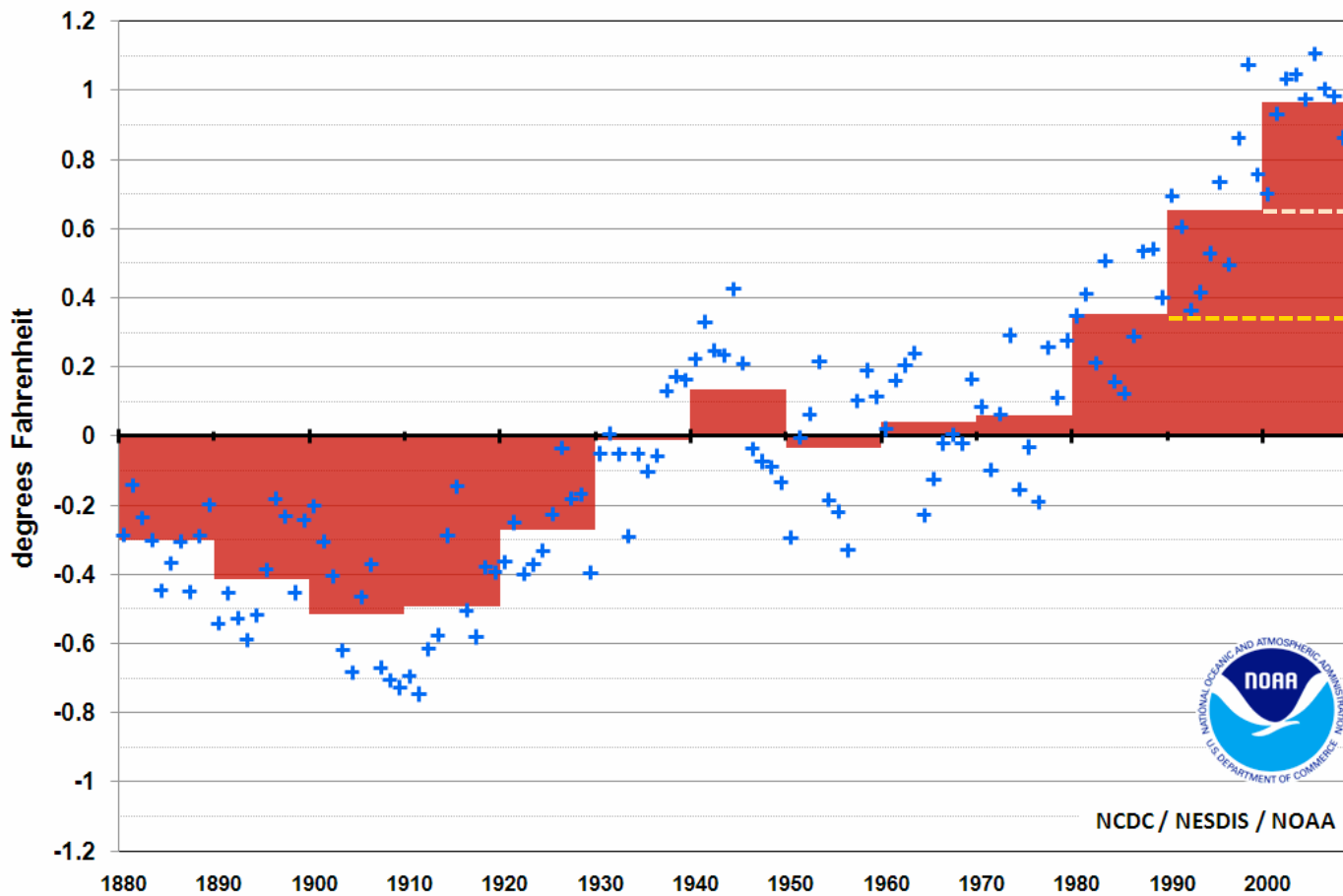
Climate Monitoring
National Oceanic and Atmospheric Administration
National Climate Data Center

Products: 1-5 / 70

Suite	Product Name	Product Description
[All]		
Extremes		... related to extreme
FAQ		... ological/dimatological events
Offsite		
Severe Weather		
Snow and Ice		
Societal Impacts		... ed Cities extremes in the US
Special Report		
State of the Climate		
Teleconnections		... gation reports on
Temperature, Precipitation and Drought		... ological/dimatological
Reports		records
Extremes	NCEC - National Climate Extremes Committee	Committee to assess the scientific merit of extreme meteorological/dimatological events.
Extremes	U.S. Records	Archive of daily U.S. temperature, precipitation, and snowfall records

1880-2009 Global Temperature

Annual Global (Land & Ocean) Temperature Anomaly
relative to 1901-2000 base period



1990s warmest decade at the time. Every year of 2000s warmer than 1990s average.

1980s warmest decade at the time. Every year of 1990s warmer than 1980s average.

Essential Climate Variables

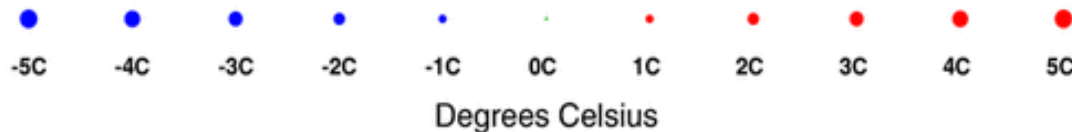
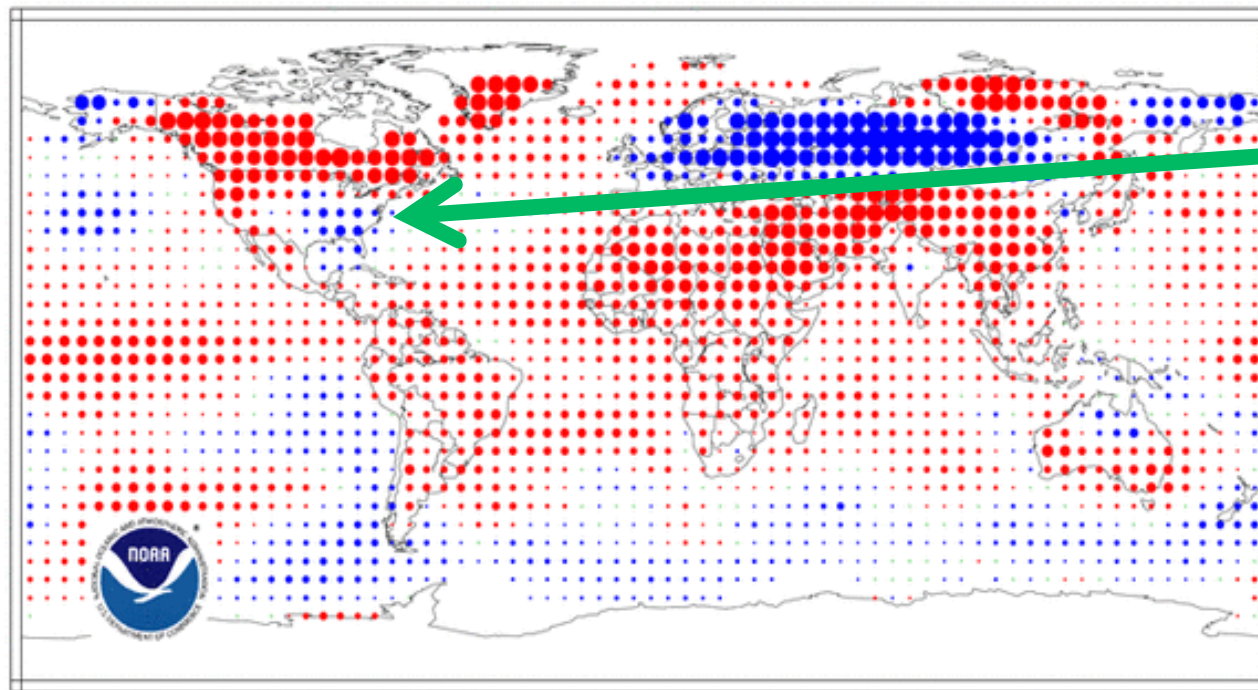
Atmosphere: Surface	Atmosphere: Upper-Air	Atmosphere: Composition	Ocean: Surface	Ocean: Subsurface	Terrestrial
Air Temperature	Earth Rad'n Budget	Carbon Dioxide	Temperature	Temperature	Soil Moisture
Precipitation	Temperature	Methane	Salinity	Salinity	Snow Cover
Air Pressure	Wind Speed & Dir	Ozone	Sea Level	Current	Permafrost + Seasonally Frozen
Sfc Rad'n Budget	Water Vapor	Nitrous Oxide	Sea State	Nutrients	Glaciers + Ice Caps
Wind Speed & Dir	Cloud Properties	CFCs	Sea Ice	Carbon	River Discharge
Water Vapor		Hydro CFCs	Current	Ocean Tracers	Water Use
		Hydrofluorocarbs	Ocean Color	Phytoplankton	Ground Water
		Sulfur Hexafluorides	CO ₂ Partial Pressure		Lake Levels
		Perfluorocarbons			Albedo
		Aerosol Properties			Land Cover
					Percent Absorbed Photosynthetically Active Radiation
					Leaf Area Index
					Biomass
					Fire Disturbance

Climate is Big: even in one variable

Temperature Anomalies January 2010

(with respect to a 1971-2000 base period)

National Climatic Data Center/NESDIS/NOAA



Wx Still Throws the Punches

Literature Review: Stallone et al. (1976)

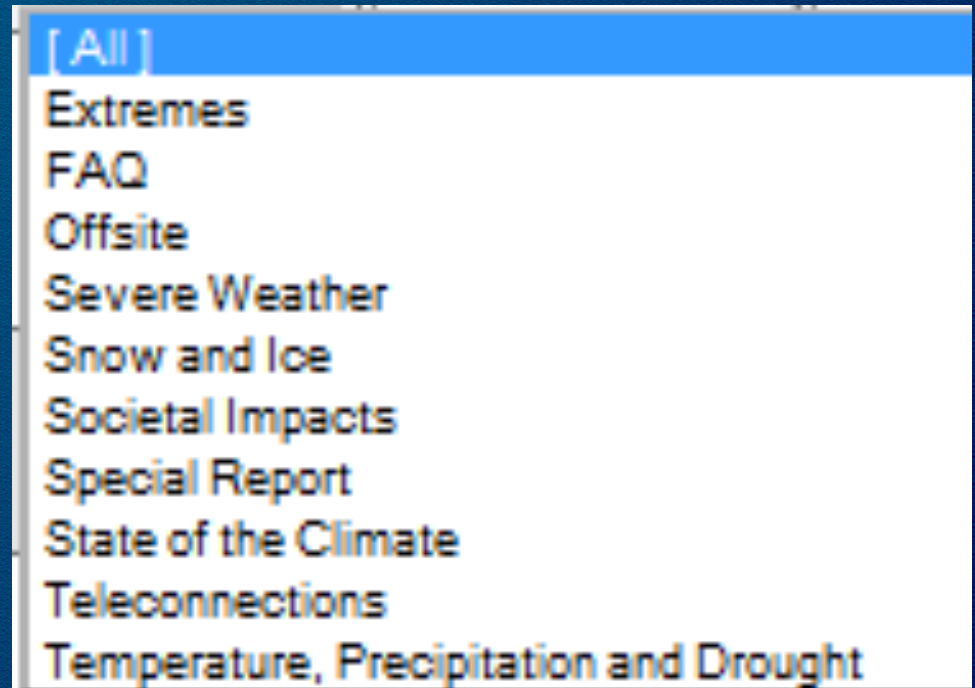


Weather

Climate

Monitor Extreme Behavior at the Wx/ Cx Interface

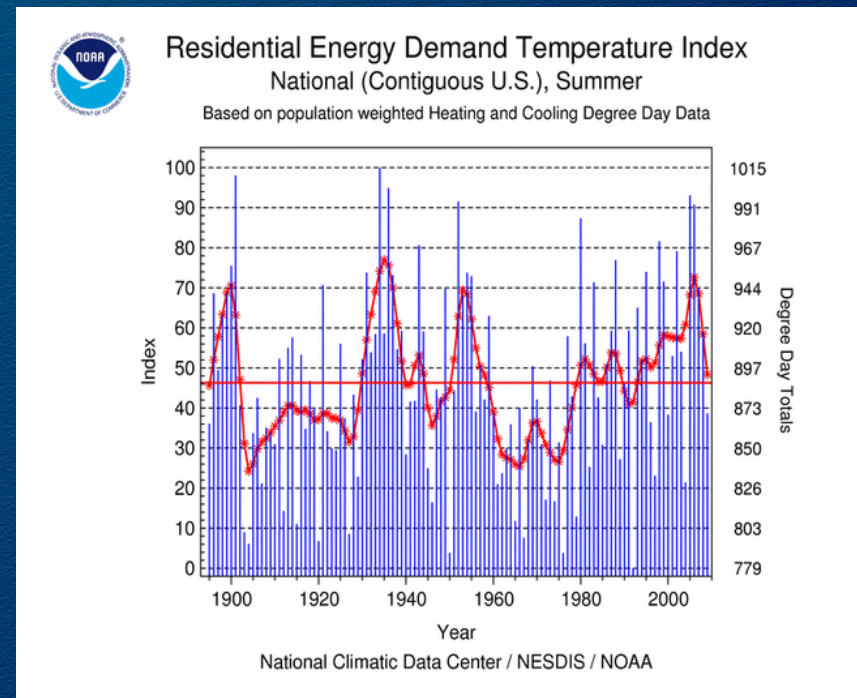
- Climate Extremes Index
- North American Climate Extremes
- Records
- Event Climatologies
- Etc.

A screenshot of a website navigation menu with a blue header bar containing the text "[All]". Below the header, a list of menu items is displayed in a white box with a thin border. The items are: Extremes, FAQ, Offsite, Severe Weather, Snow and Ice, Societal Impacts, Special Report, State of the Climate, Teleconnections, and Temperature, Precipitation and Drought.

[All]
Extremes
FAQ
Offsite
Severe Weather
Snow and Ice
Societal Impacts
Special Report
State of the Climate
Teleconnections
Temperature, Precipitation and Drought

“Societal Impact” measures

- Crop Moisture Stress Index
- Residential Energy Demand Temperature Index
- Air Stagnation Index
- Convective Sigmets
- Northeast Index of Potential Ozone Exposure (from NE Regional Climate Center)
- West Nile Virus Mosquito Crossover Dates
- Billion Dollar Disasters
- Northeast Snow Impact Scale (NESIS)



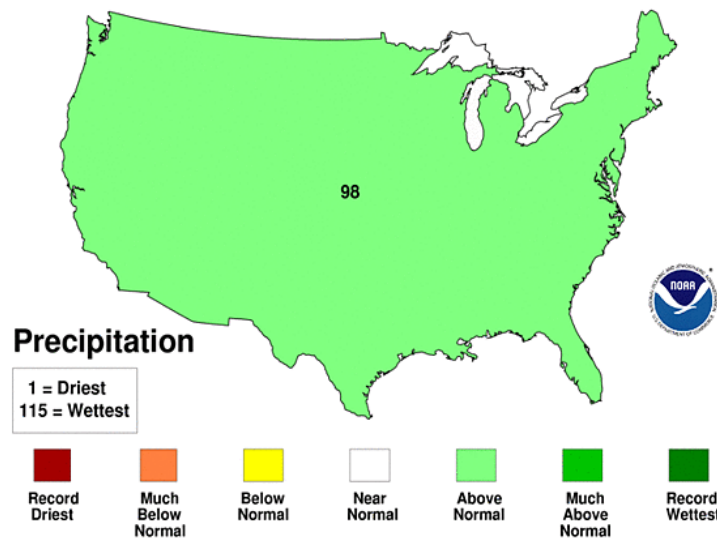
Climate Impacts are Local

Was it a wet year for the U.S.?

Depends on who/when you ask

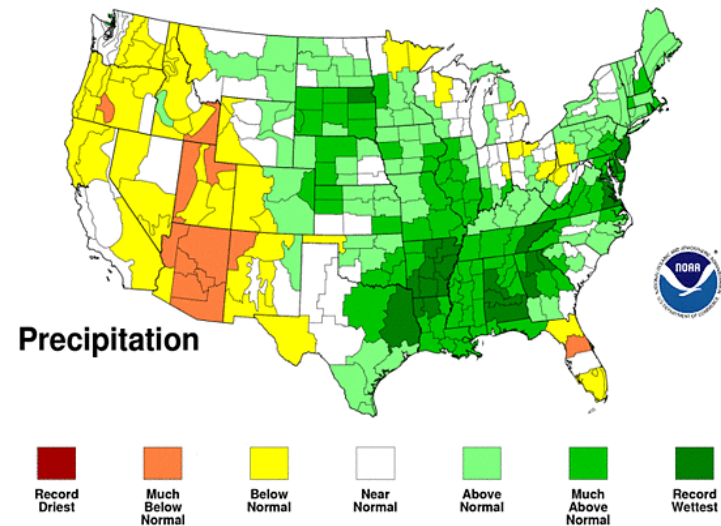
January-December 2009 National Rank

National Climatic Data Center/NESDIS/NOAA



Jul - Dec 2009

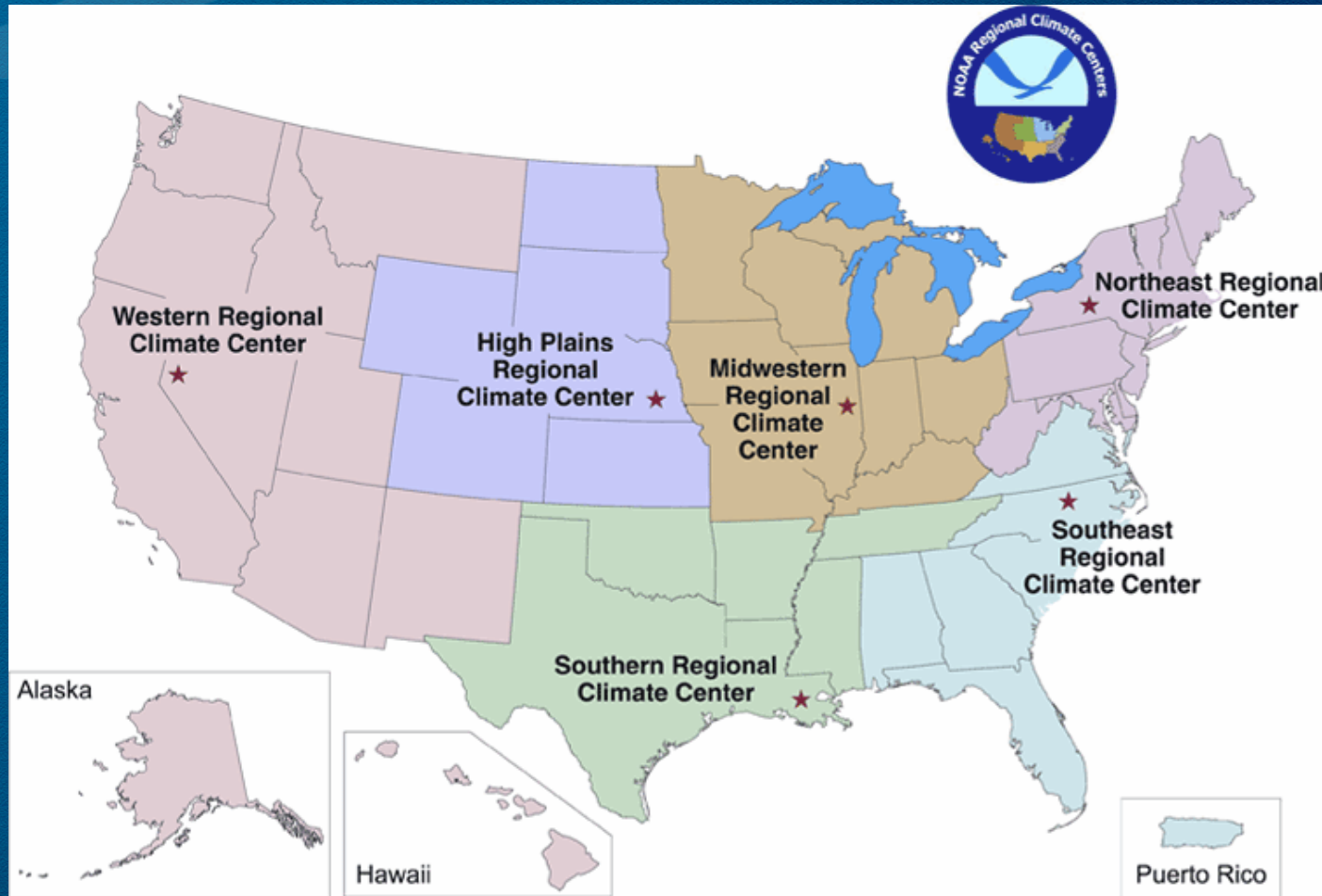
National Climatic Data Center/NESDIS/NOAA



Regional Climate Partnerships

- NOAA's climate services (including monitoring) partner with many local and regional resources:
 - Regional Climate Centers
 - State Climate Offices
 - National Weather Service: Climate Prediction Center, Climate Services Division, Weather Forecast Offices
 - Regional Integrated Service Assessments
 - Other Federal partners
 - etc.

Example: Regional Climate Centers



Example: Regional Contribution

State of the Climate: <http://www.ncdc.noaa.gov/sotc>

The screenshot shows the NOAA State of the Climate National Overview page for December 2009. The page includes navigation links for NOAA Satellite and Information Service, National Climatic Data Center, and various reports. A search field is present, and the page is titled "State of the Climate National Overview December 2009 National Oceanic and Atmospheric Administration National Climatic Data Center". Below the title, there are options to view reports for different years and months, and a "Get Report" button. A "Maps and Graphics" section contains a table with links to various data visualizations.

December	Most Recent 3 Months	Most Recent 6 Months
Most Recent 12 Months	Year-to-Date	US Percent Area Very Wet/Dry /Warm/Cold

The screenshot shows the "Regional Highlights" section of the NOAA State of the Climate National Overview page. The section is highlighted with a red border and contains text explaining that regional summaries are provided by six Regional Climate Centers. It lists the regions: Northeast, Midwest, Southeast, High Plains, Southern, and Western. The "Northeast Region" section is highlighted with a red border and contains a bullet point describing the weather conditions in the Northeast for December 2009.

Regional Highlights:
These regional summaries were provided by the six Regional Climate Centers and reflect conditions in their respective regions. These six regions differ spatially from the nine climatic regions of the National Climatic Data Center.

Northeast | Midwest | Southeast | High Plains | Southern | Western

Northeast Region: *(Information provided by the Northeast Regional Climate Center)*

- The warmth of November continued into early December, peaking around the 3rd, when many stations posted new maximum temperature records for the day. The next day, a cold air mass moved into the region, sending temperatures to near or below normal levels and that pattern persisted in most of the Northeast for the rest of the month. Overall, the region's average temperature was 27.8 degrees F (-2.3 degrees C), which was 0.6 degrees F (0.3 degrees C) below normal. This was 1.1 degrees F (0.6 degrees C) cooler than December 2008 and the coolest December since 2005. Maine was the only state posting above normal temperatures (+2.4 degrees F, +1.3 degrees C) and New Hampshire's temperatures for December were exactly normal. The remaining states had departures that ranged from 2.2 degrees F (1.2 degrees C) below normal in Maryland to 0.1 degrees F (0.1 degrees C) below normal in Vermont. The 2009 annual average temperature in the Northeast was 48.0 degrees F (8.3 degrees C), which was

Why? Because regional offices know what's relevant and important regionally.

“Research to Operations”

- Research (Development): We can do this
- Operations: We are doing this

Again, reference the literature

Farrelly and Farrelly (1994)



“Research to Operations”

- What is operations?
 - Execution (it works)?
 - Access (someone can see it)?
 - Adoption (someone is using it)?
 - Understanding (someone informs their decisions)?
 - Refinement (someone is improving it)?
 - Transformation (someone redefines it)?

Speaking of Operations

- Which scenario portends success?
 - We know someone is using it
 - Someone we know is using it

Drought Gets It, and has for a while

NIDIS National Integrated Drought Information System

U.S. Drought Portal

www.drought.gov

HOME | WHAT IS NIDIS? | CURRENT DROUGHT | FORECASTING | IMPACTS | PLANNING | EDUCATION | RESEARCH | RECOVERY

Contact Us | Log In | Text-Only

Search:

Area Drought Information

Select State...

Select Region...

Maps & Tools

- Map Viewer - **updated!**
- GIS Resources
- Geodata Portal
- Drought Monitor Graphics
- Data Visualizations

Events & Announcements

- NADM Workshop - April 19-23, 2010
- Scoping workshop ACF Basin - Lake Blackshear, GA - December 2009
- Map Viewer now includes US Drought Outlook - **New!**
- CRN Soil Data - **New!**
- Drought Monitor Forum - Austin 2009
- Drought Index Evaluation Workshop - Boulder, CO - August 2009
- ESA Millenium Conf - November 2009

[View Archive](#) | [Portal Release Notes](#)

Featured Products

[Where are Drought Conditions Now?](#) | [How is the Drought Affecting Me?](#) | [Will the Drought Continue?](#)

U.S. Drought Monitor

February 2, 2010
Valid 7 a.m. EST

Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

Released Thursday, February 4, 2010
Author: Matthew Rosenkrans, NOAA/NWS/NCEP/PCPC
<http://drought.unl.edu/dm>

Drought Conditions

% Area for U.S., including AK, HI & PR (As of 2.2.2010)

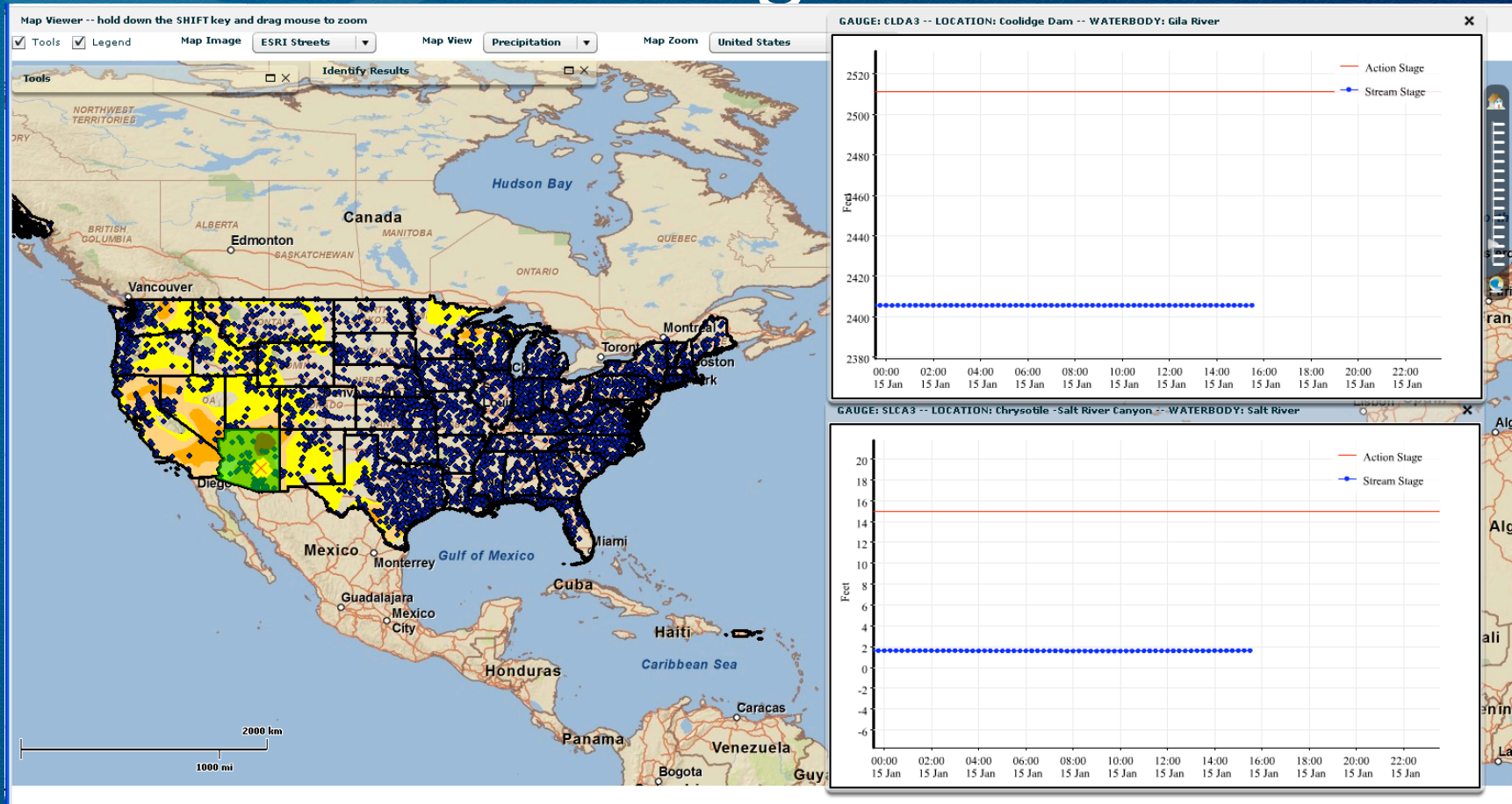
Info Source: National Drought Mitigation Center

Drought Classification	% Area
None	70.89%
D0	0.02%
D1	1.21%
D2	5.98%
D3	21.9%

Drought Classifications | [View Time Series](#) - **updated!**

Drought Information Statements

U.S. Drought Portal



The USDP is leading the development and implementation of new technologies for decision makers. How?

Moving Forward, Learning from the Drought Community

The US Drought Portal is looking for partners to contribute the following types of information (in priority order):

- Web Mapping Services (WMS) meeting or exceeding Open Geospatial Consortium (OGC) 1.0 standards.
- Regularly-updated drought-related maps and web sites that can be rendered in a USDP portlet.
- Regularly-updated drought-related maps or web sites that can be made available only as a stand-alone page.
- Episodic, occasional or one-time reports related to drought, of a durable nature.

Level of interoperability



Summary: what was that all about?

- Climate is big
- Monitoring it more ...
 - Accurately – in-stream relationships
 - Completely – distributed relationships
 - Effectively – external relationships
 - Meaningfully – embedded relationships
- Sharing stuff:
 - Seems to pay off for all
 - Takes some effort and prep work

Thank you

- More info:
 - Climate Monitoring:
 - <http://www.ncdc.noaa.gov/climate-monitoring>
 - US Drought Portal:
 - <http://www.drought.gov/>
 - NOAA Climate Services Portal:
 - <http://www.climate.gov/>
- Deke Arndt
NOAA's National Climatic Data Center
Asheville, NC
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