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

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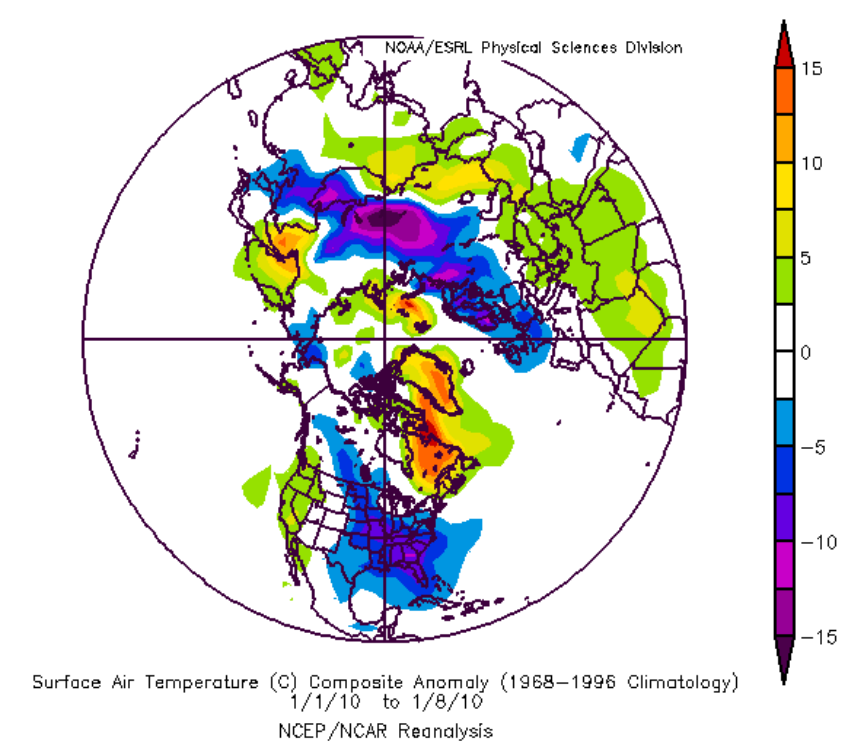
Why Monitor Climate?

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?"



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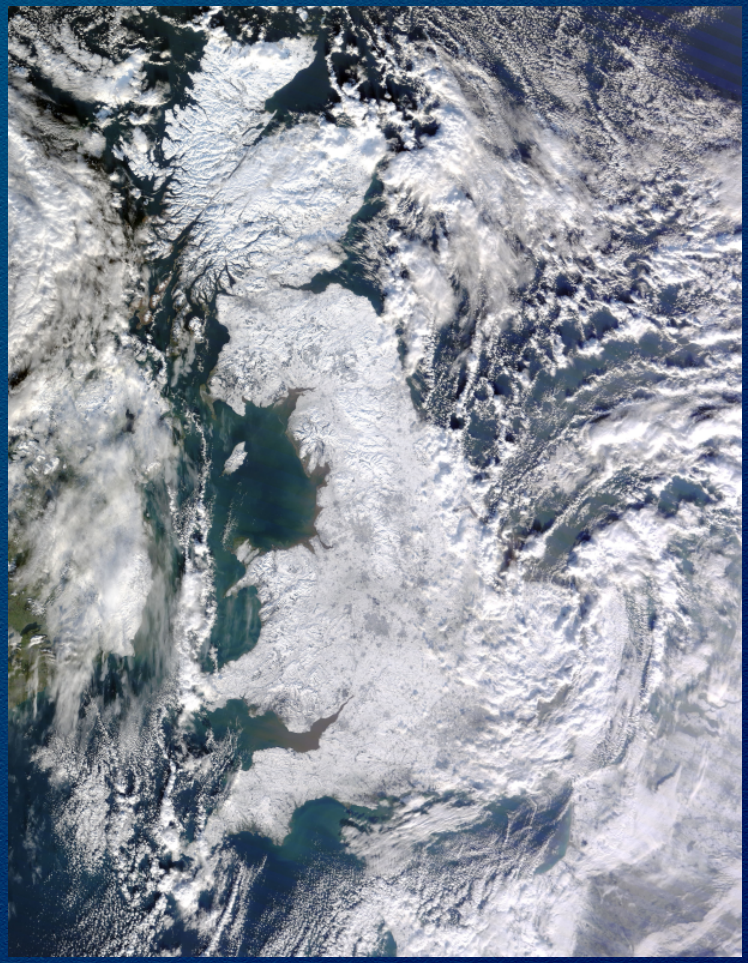
Why Monitor Climate?

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

- Understanding Climate Variability
  - "How often does this happen?"
  - "What is 'normal'?"



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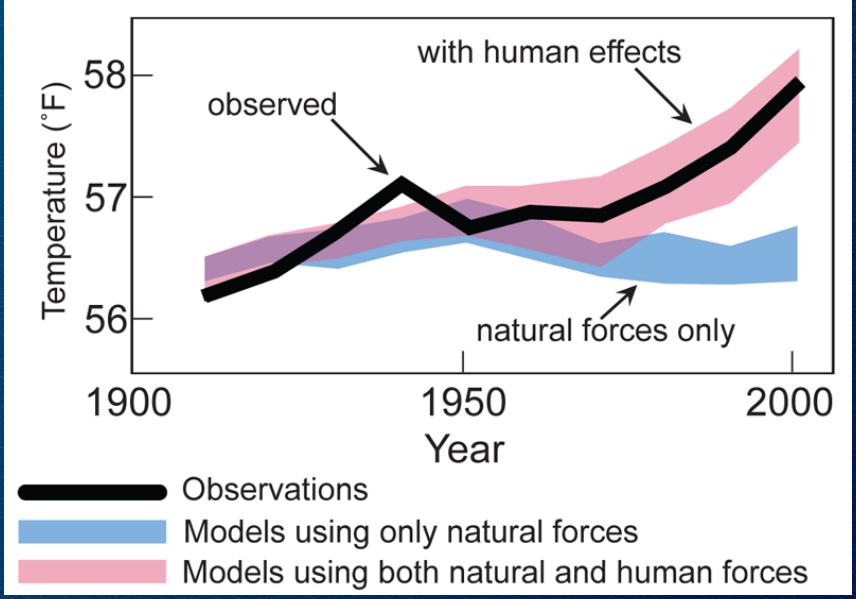
Why Monitor Climate?

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?"



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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

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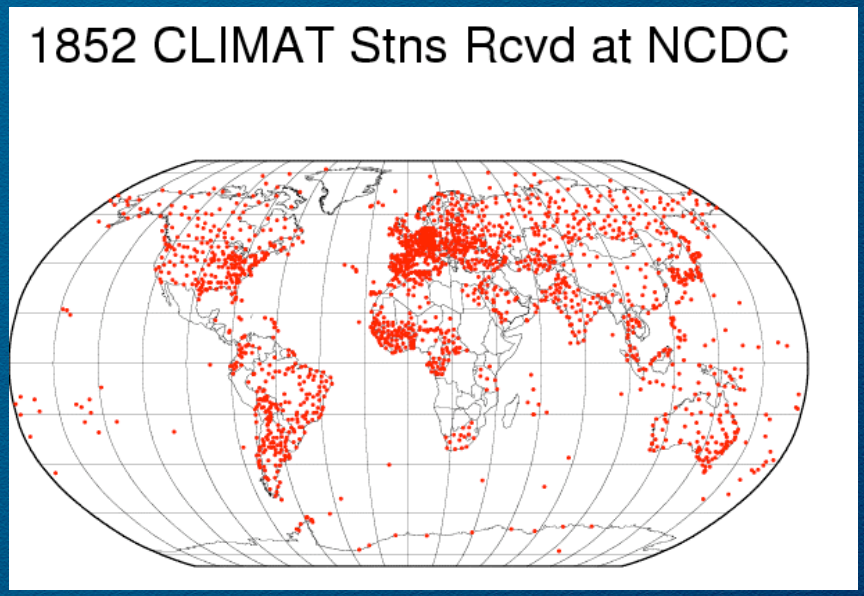
Foundation: Data Sets and Care

Global Land Data: GHCN



Global Sea Data: ERSST

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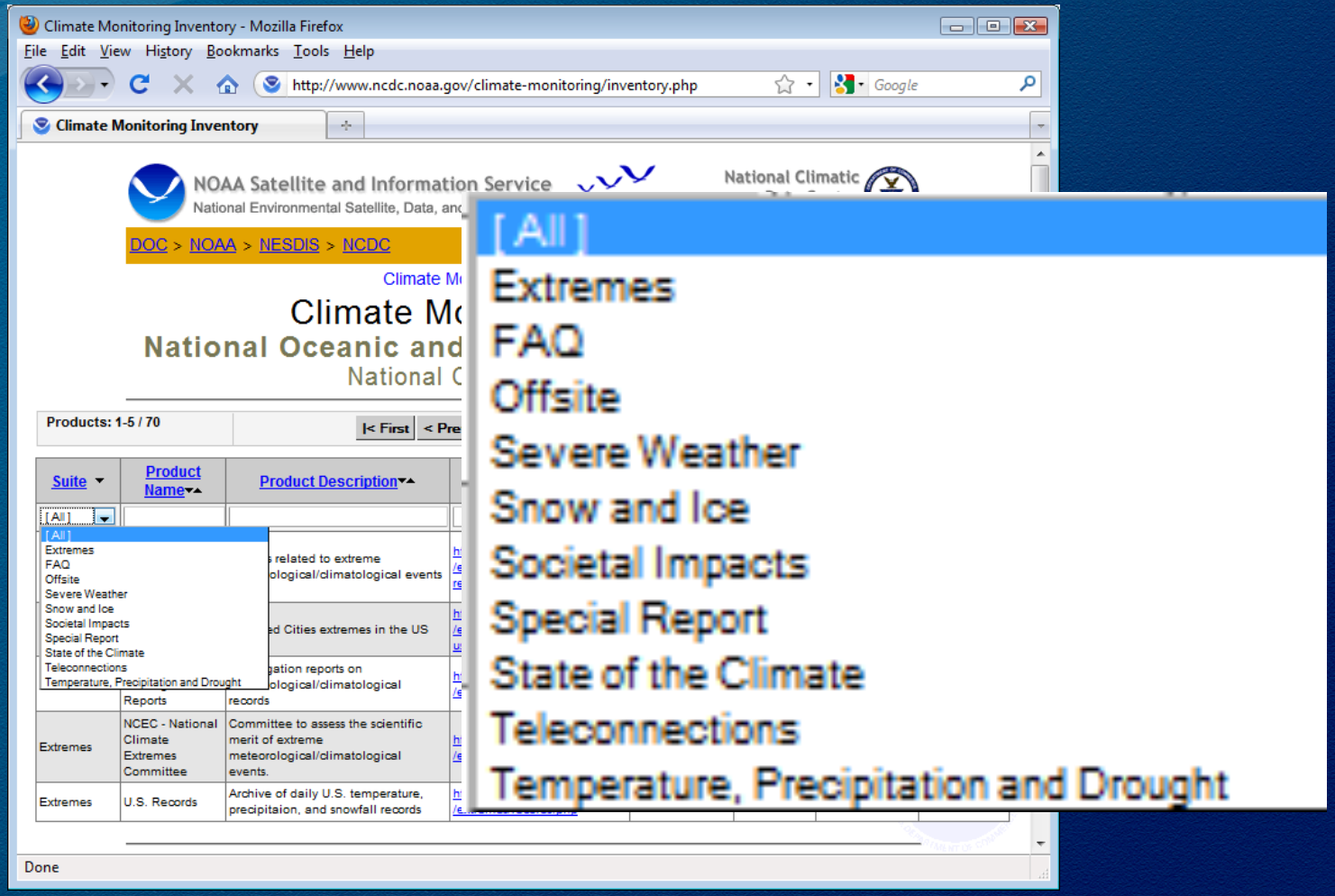
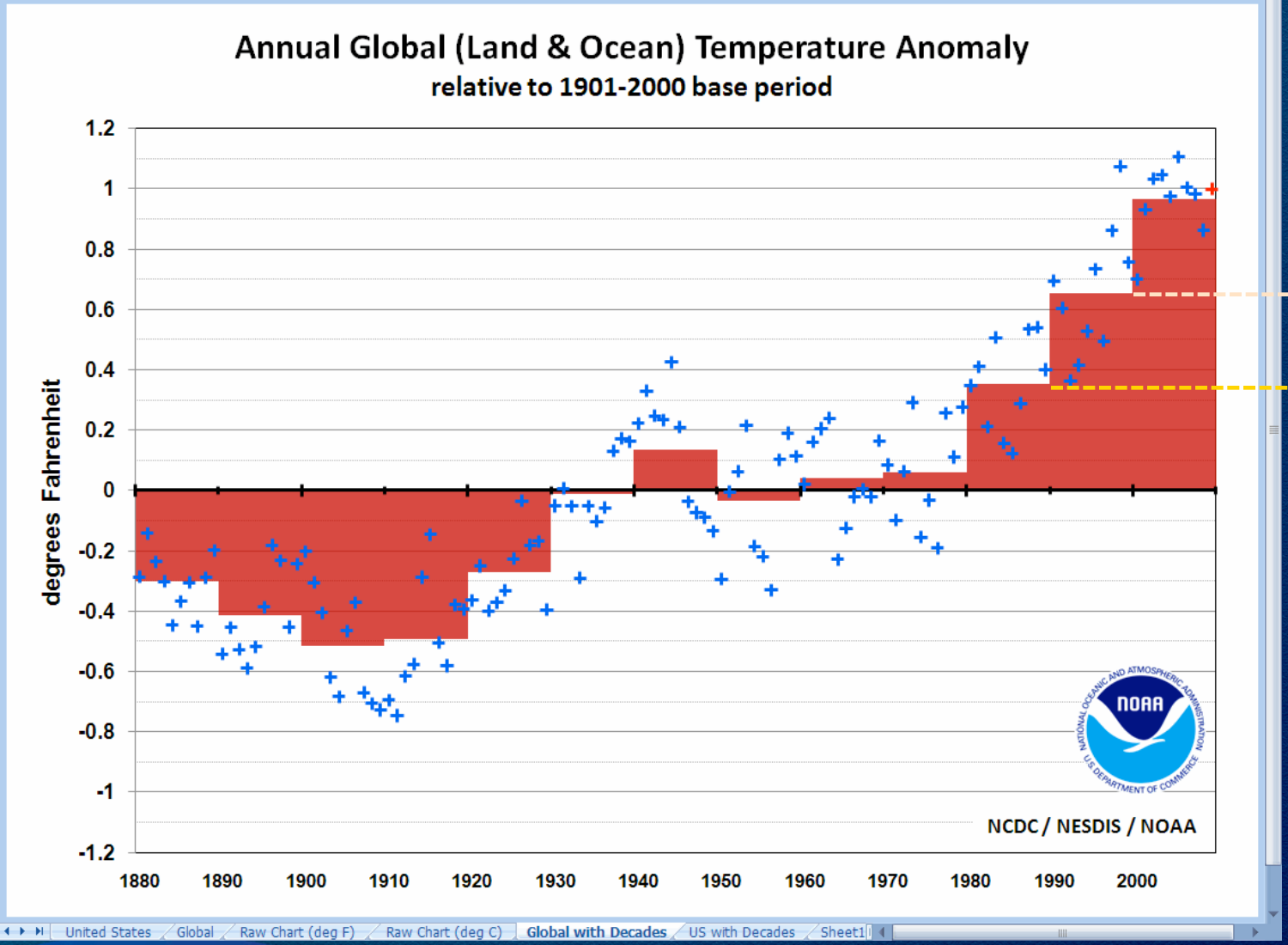
Lots of Product

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



1880-2009 Global Temperature



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

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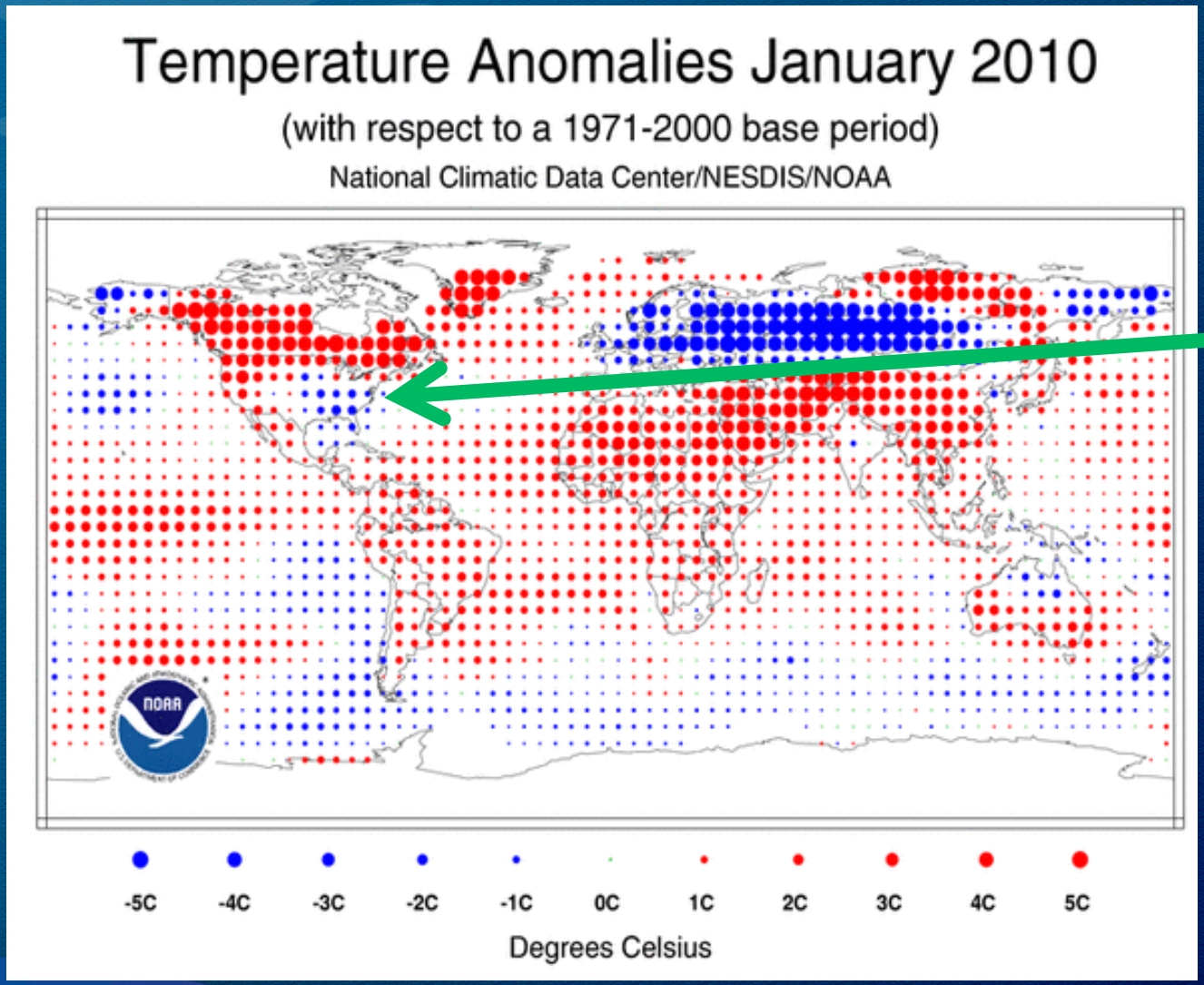
Essential Climate Variables

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



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Wx Still Throws the Punches

Literature Review: Stallone et al. (1976)

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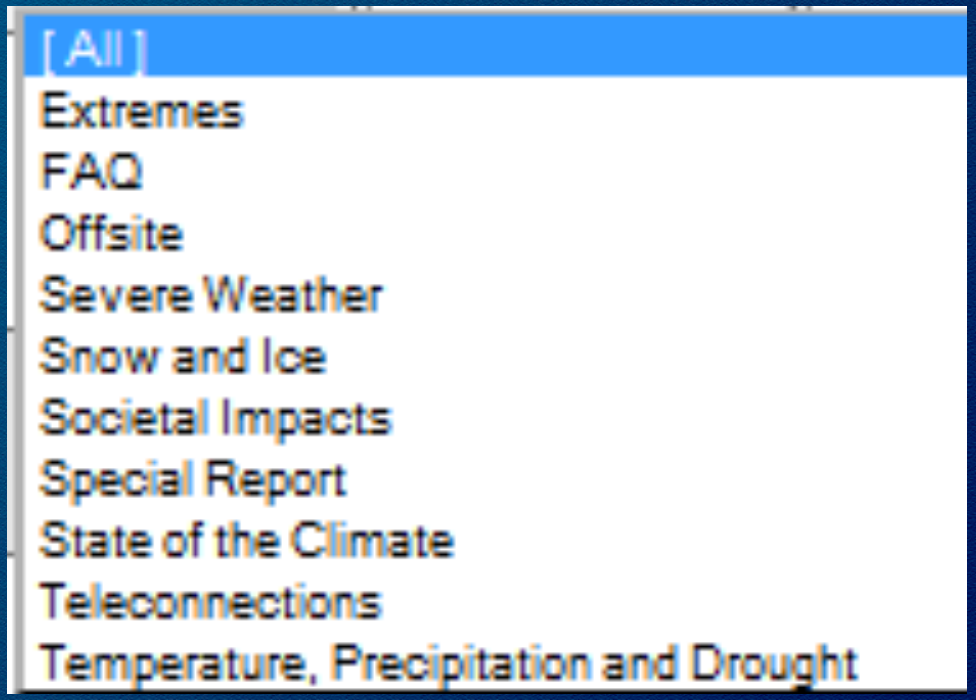
Monitor Extreme Behavior at the Wx/ Cx Interface

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



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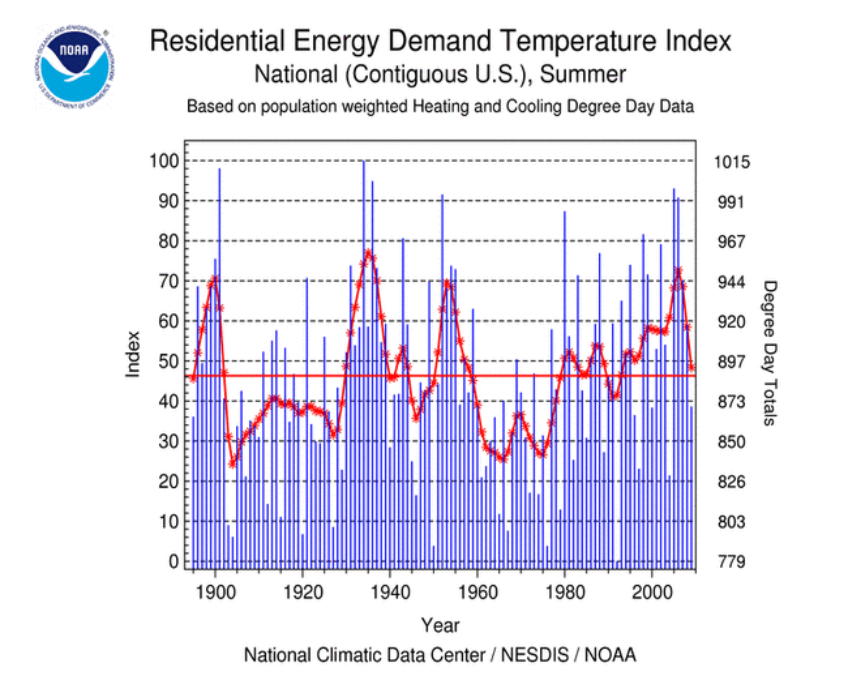
“Societal Impact” measures

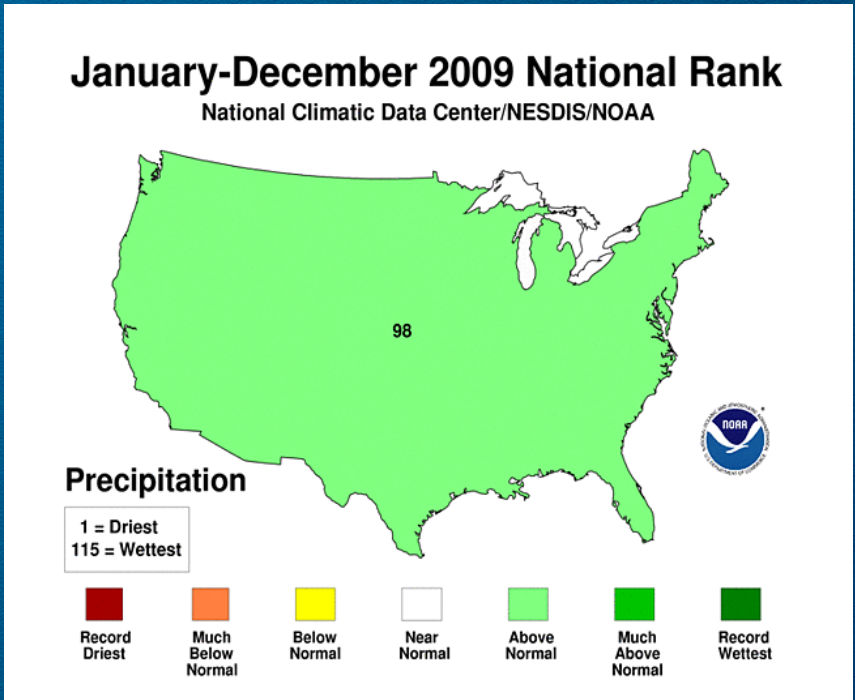
- Crop Moisture Stress Index
- Residential Energy Demand Temperature Index
- Air Stagnation Index
- Convective Sigmets
- Northeast Index of Potential Ozone Exposure (from NE Regional Climate Center)
- West Nile Virus Mosquito Crossover Dates
- Billion Dollar Disasters
- Northeast Snow Impact Scale (NESIS)

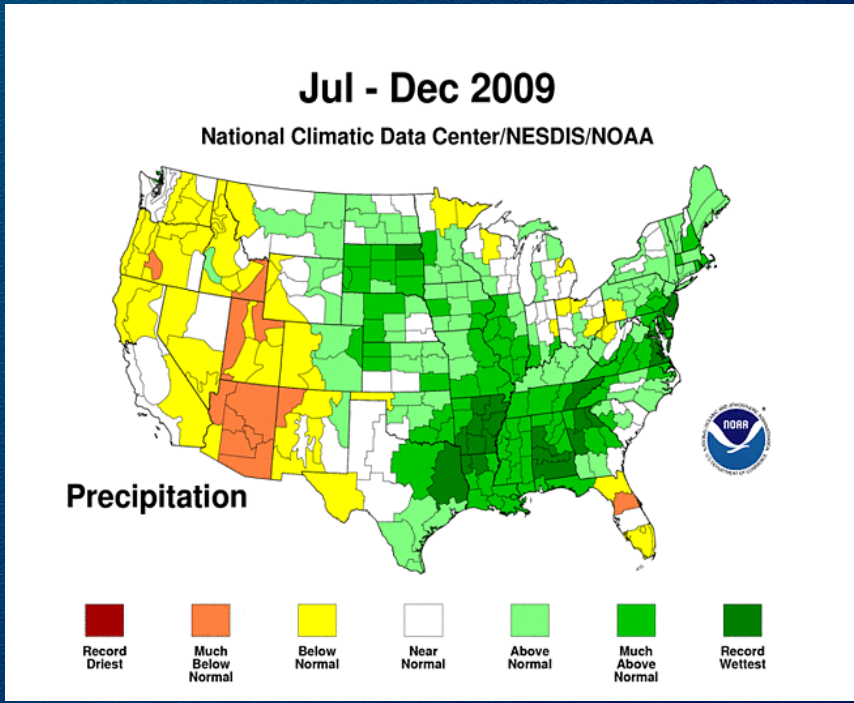


Climate Impacts are Local

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

Depends on who/when you ask





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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.

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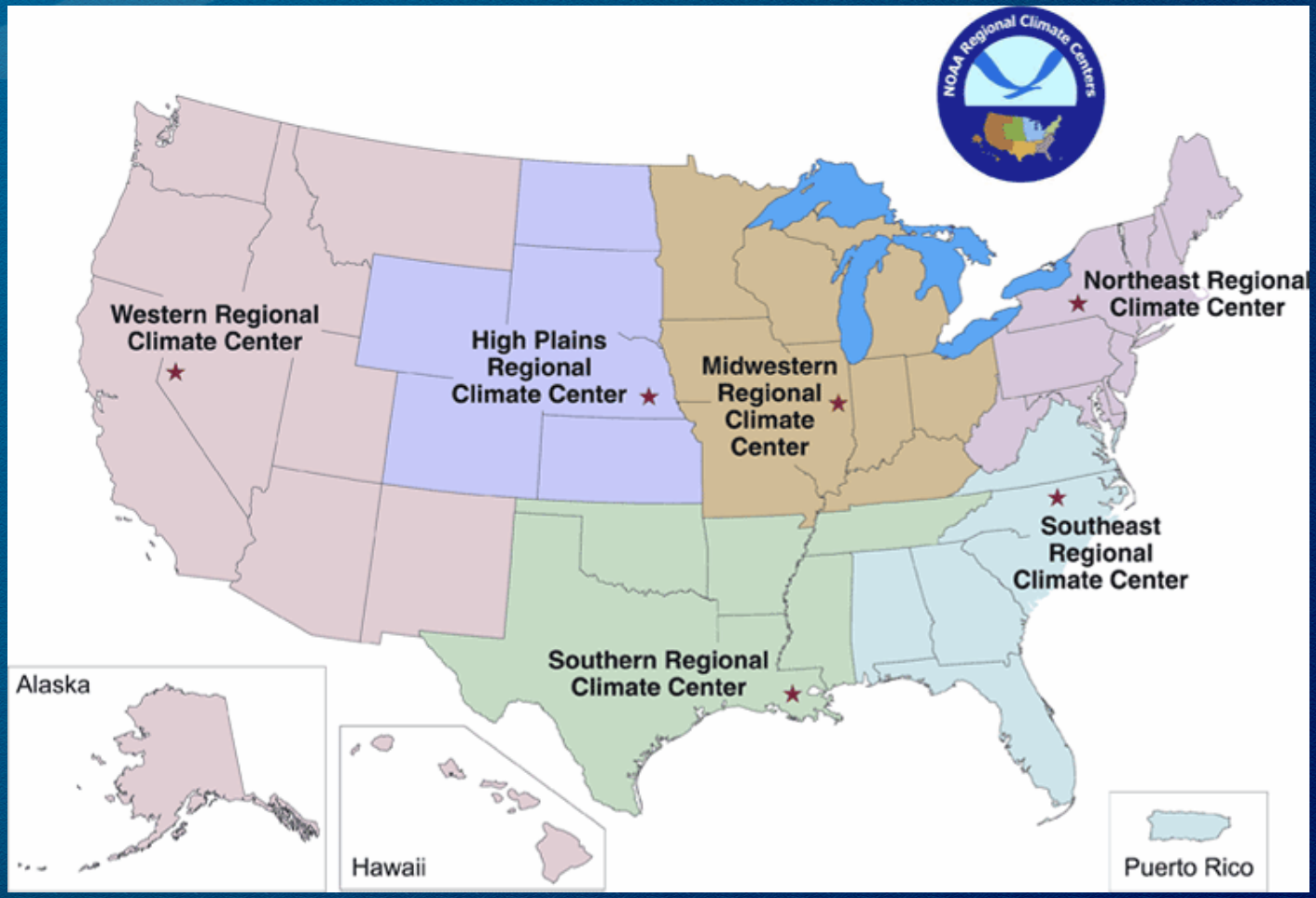
Example: Regional Climate Centers



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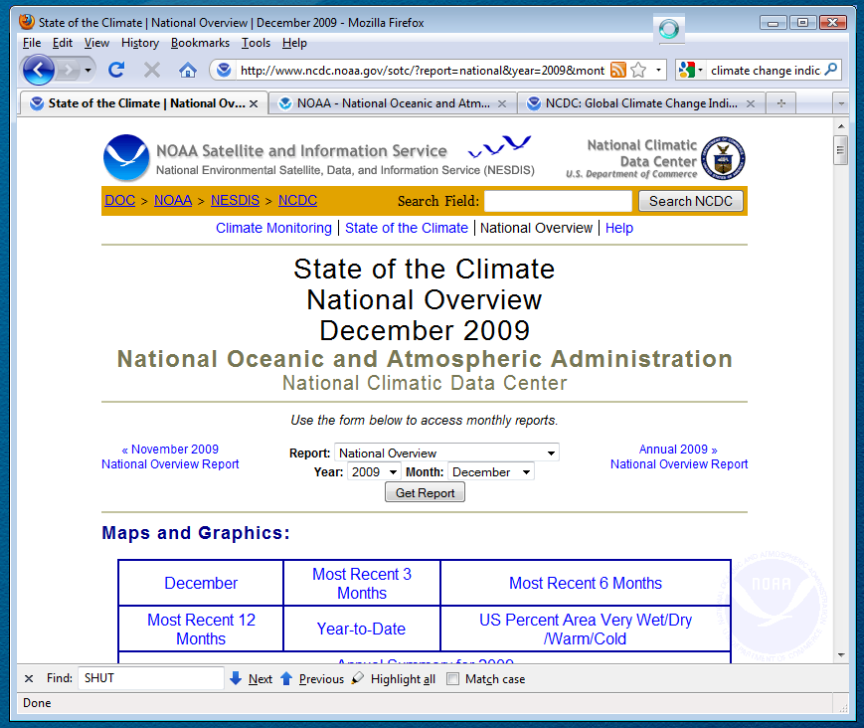
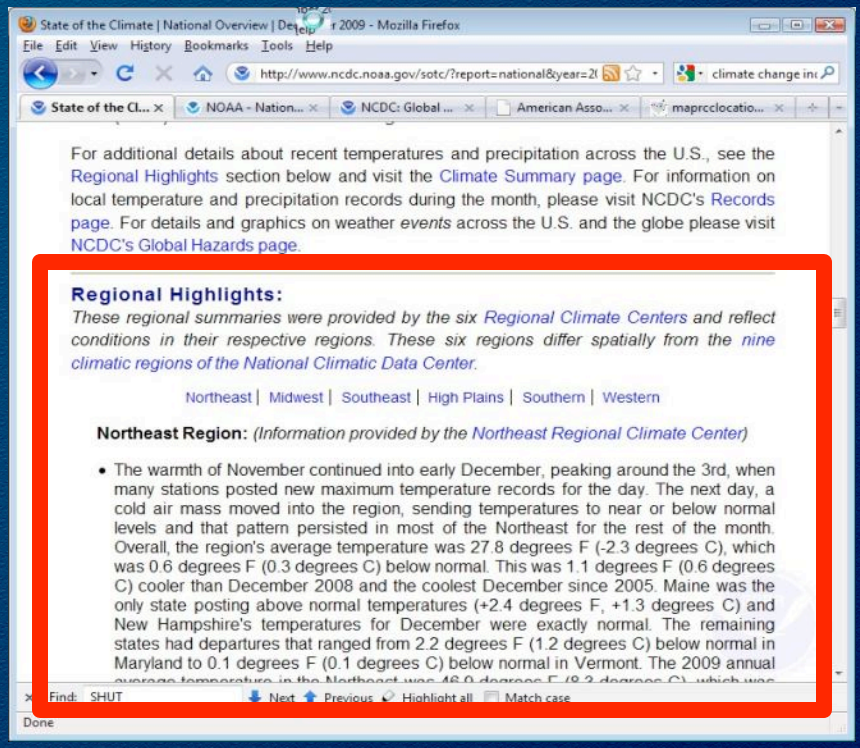
Example: Regional Contribution

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





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

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“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)?

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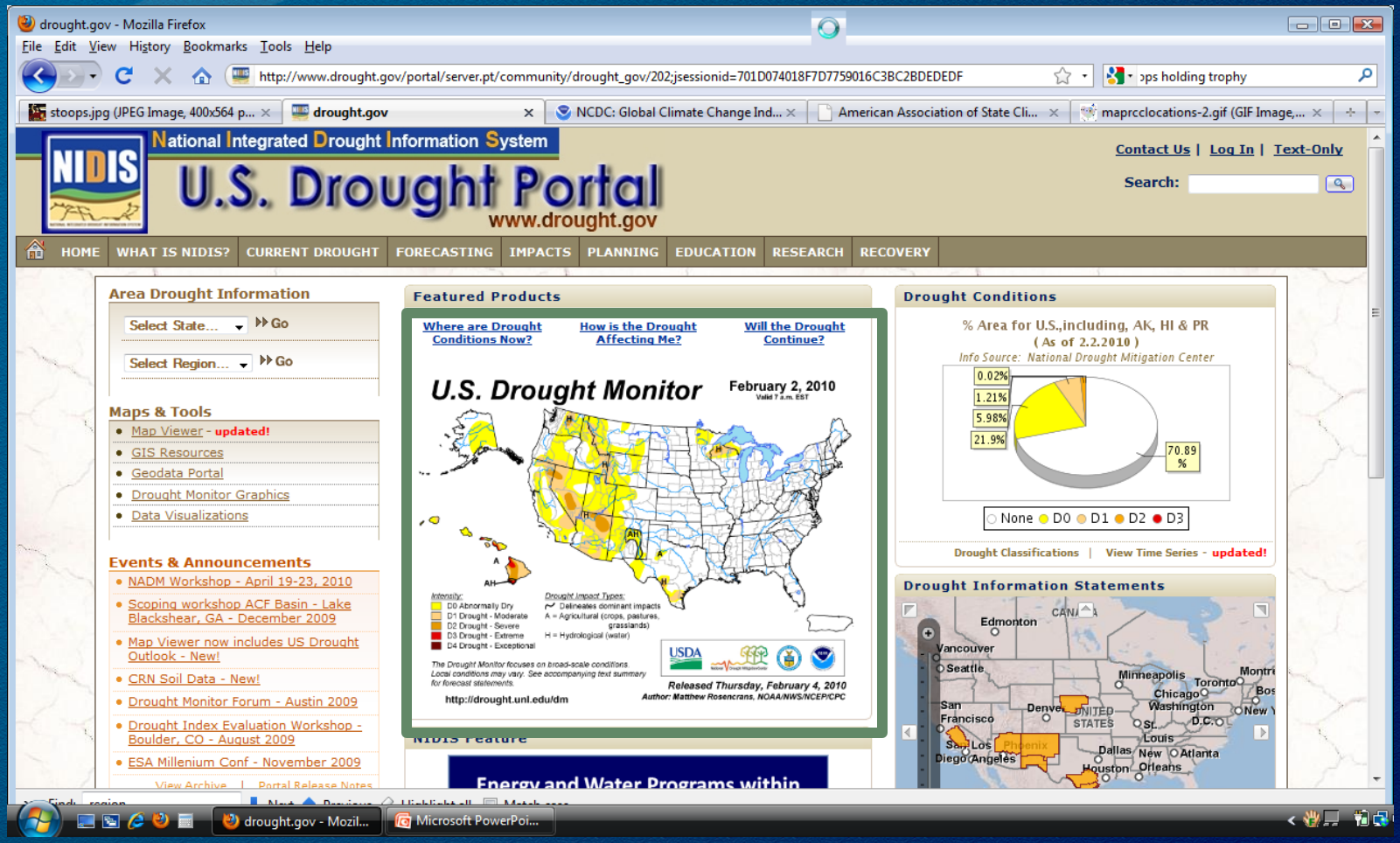
Speaking of Operations

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

Drought Gets It, and has for a while



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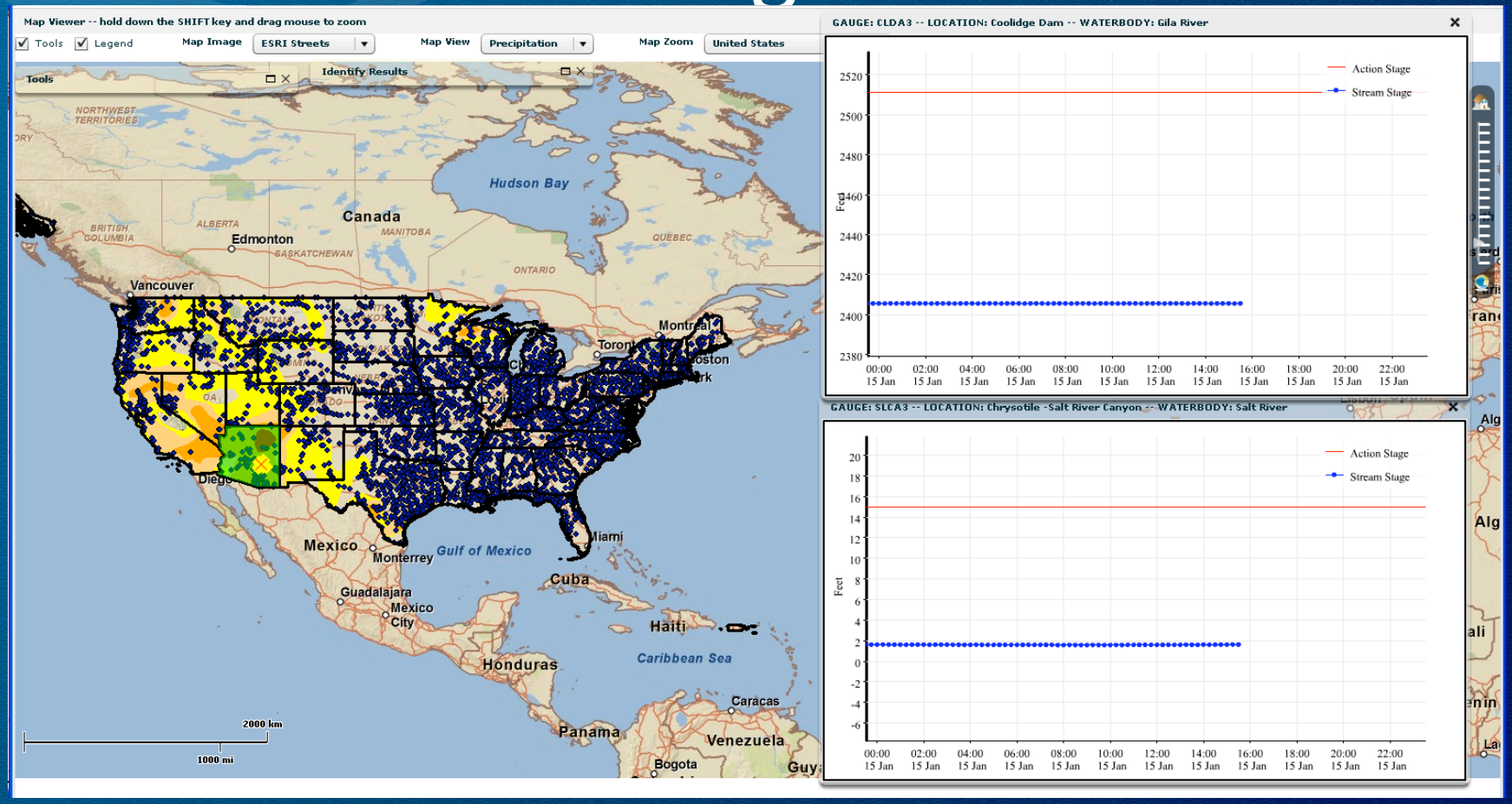
U.S. Drought Portal



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

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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.

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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/

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