NCDC Drought Monitoring Activities: NIDIS and The USCRN

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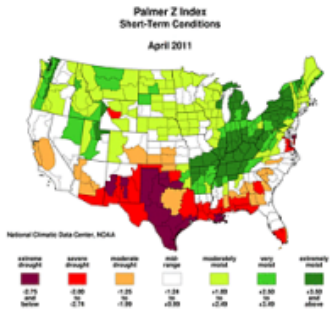
NCDC Drought Monitoring

- Expert monthly and annual assessment in the *State of the Climate*

Issued 16 May 2011

Contents Of This Report:

- National Drought Overview
- Detailed Drought Discussion
  - Overview
  - Synoptic Discussion
  - Palmer Drought Index
  - Standardized Precipitation Index
  - Agricultural Indices
  - Hydrological Indices
  - Regional Discussion
    - Regional Climate Center Reports
    - Pacific Island Drought
- State/Regional/National Moisture Status
- Drought Indicators
- Contacts & Questions

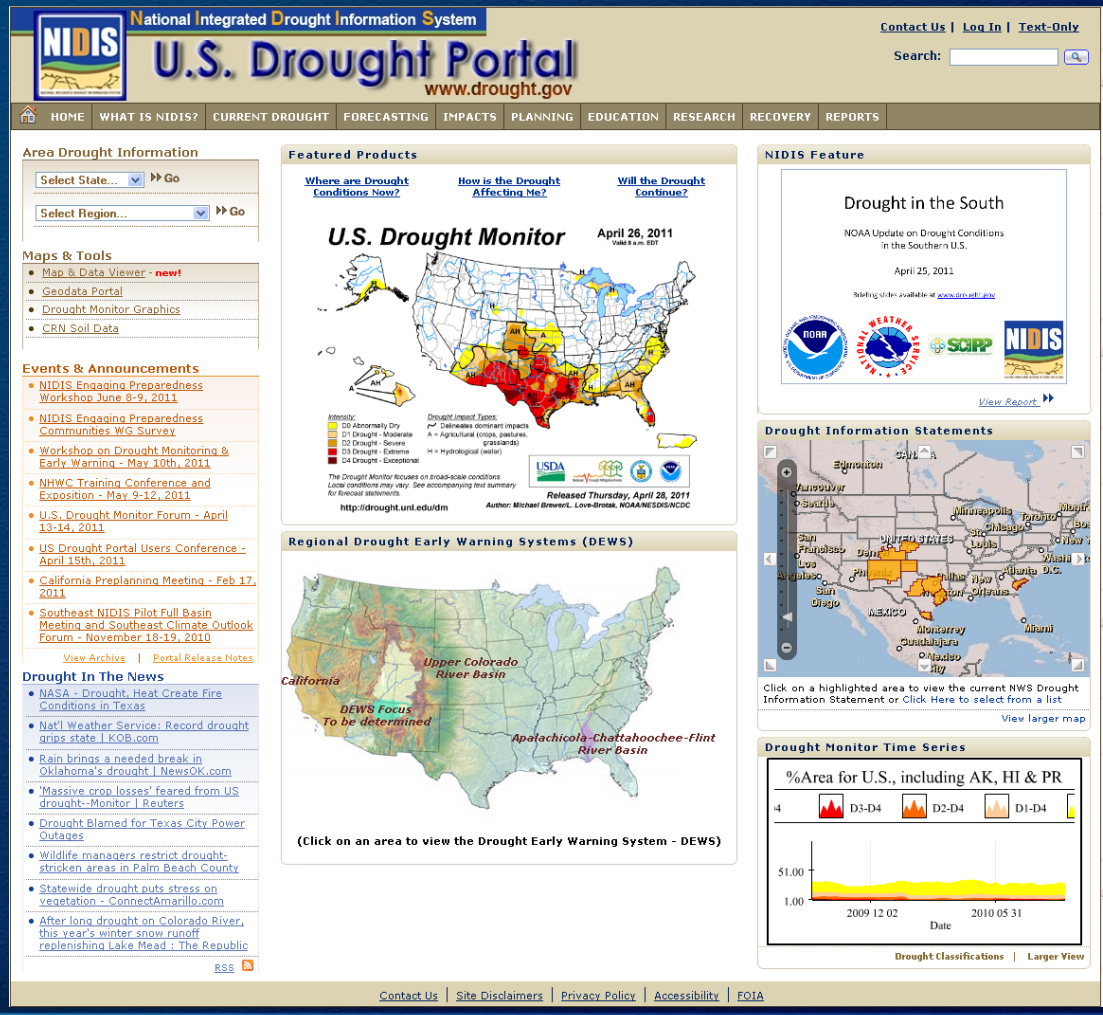


National Drought Overview

- Based on the Palmer Drought Index, *severe to extreme* drought affected about 11 percent of the contiguous United States as of the end of April 2011, an increase of about 3 percent from last month. About 28 percent of the contiguous U.S. fell in the severely to extremely wet categories.
- About 25 percent of the contiguous U.S. fell in the *moderate to extreme* drought categories (based on the Palmer Drought Index) at the end of April.
- On a broad scale, the 1980s and 1990s were characterized by unusual wetness with short periods of extensive droughts, whereas the 1930s and 1950s were characterized by prolonged periods of extensive droughts with little wetness (moderate to extreme drought graphic, severe to extreme drought graphic).
- A file containing the national monthly percent area severely dry and wet from 1900 to present is available for the severe to extreme and moderate to extreme categories.
- Historical temperature, precipitation, and Palmer drought data from 1895 to present for climate divisions, states, and regions in the contiguous U.S. are available at the Climate Division: Temperature-Precipitation-Drought Data page. These filenames begin with "drd964x" and end with "txt".
- According to the weekly U.S. Drought Monitor, about 26 percent of the contiguous U.S. (about 22 percent of the U.S. including Alaska, Hawaii, and Puerto Rico) was classified as experiencing moderate to exceptional (D1-D4) drought at the end of April.

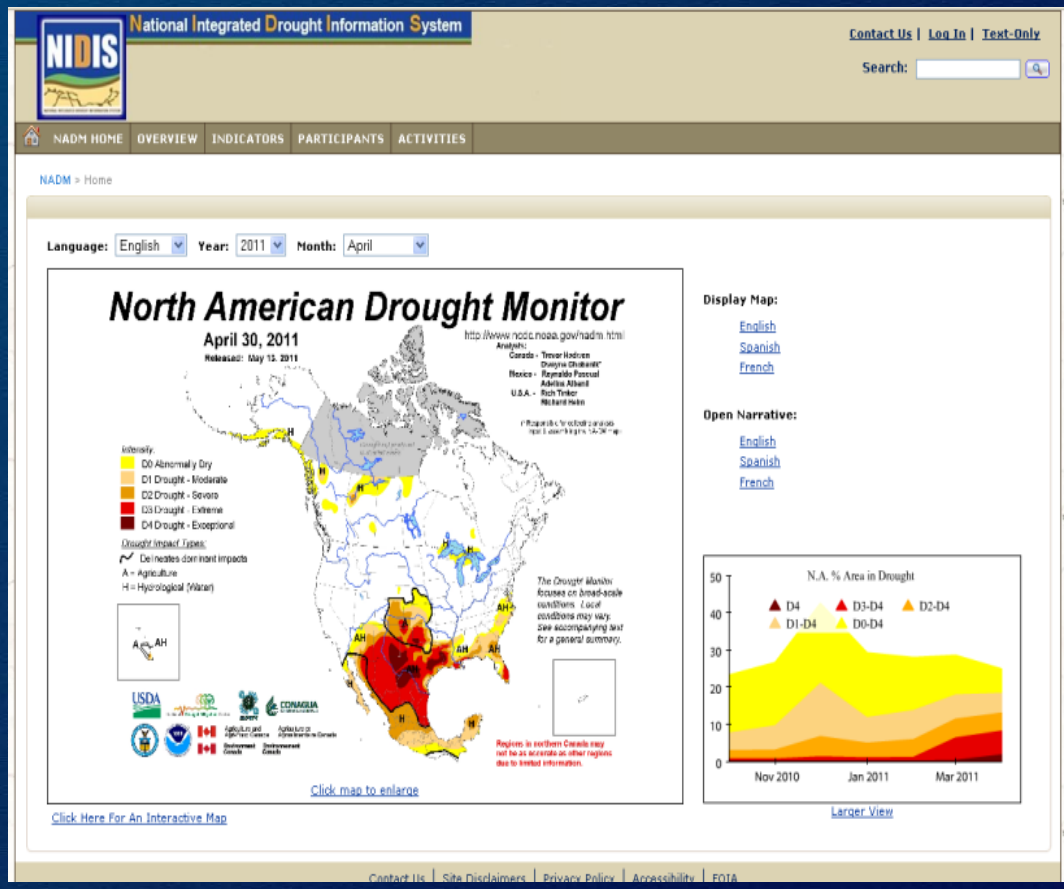
NCDC Drought Monitoring

- Operational infrastructure for interagency NIDIS for decision support
- Rotating authorship of US Drought Monitor



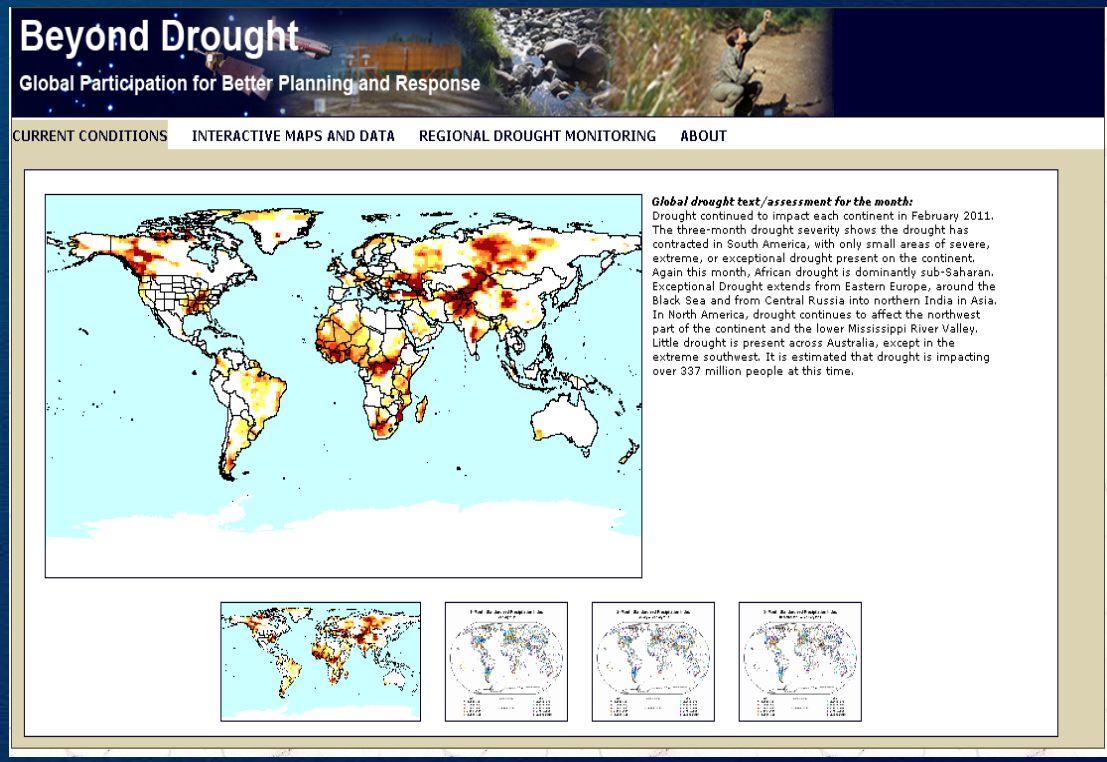
NCDC Drought Monitoring

- Operational infrastructure for North American Drought Monitoring
- Rotating authorship of North American Drought Monitor



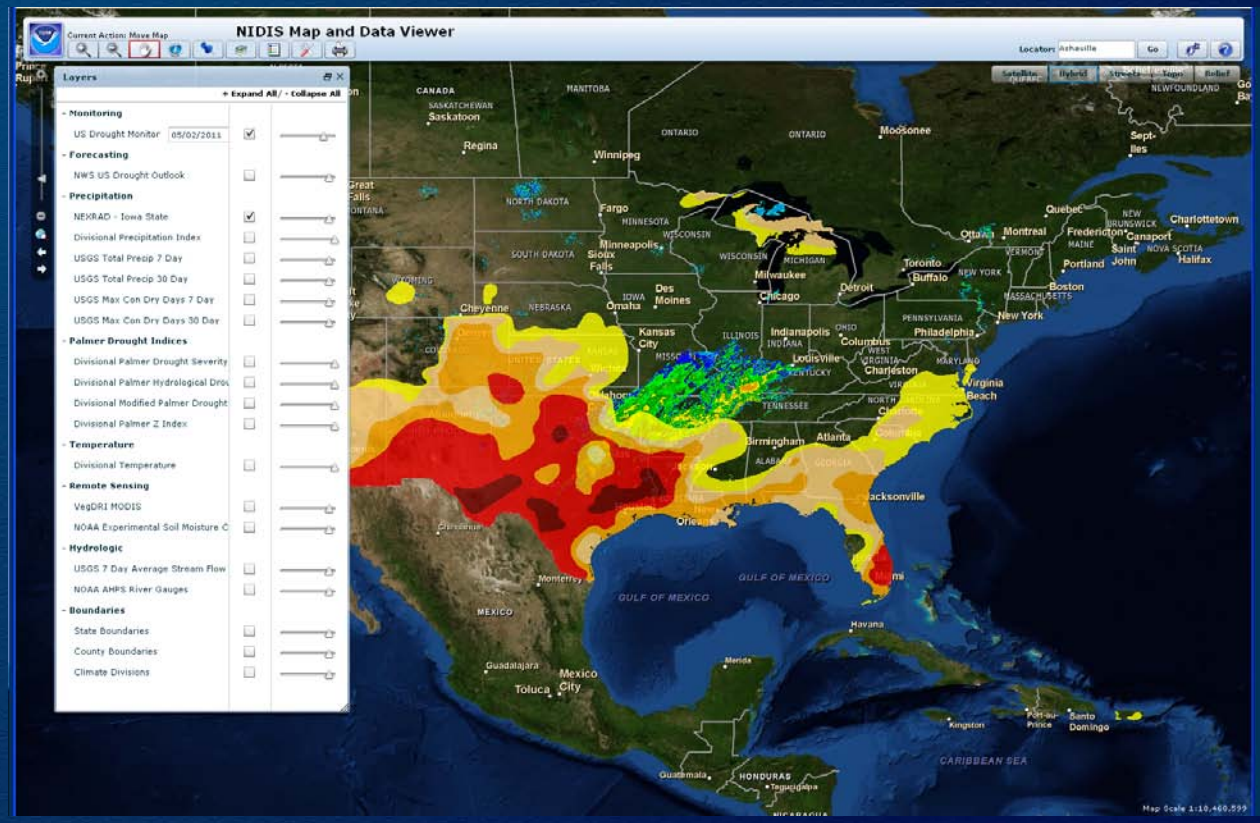
NCDC Drought Monitoring

- Operational infrastructure for Global Drought Monitoring
- Endorsed by GEO and WMO
- Multiple country involvement through regional communities of practice



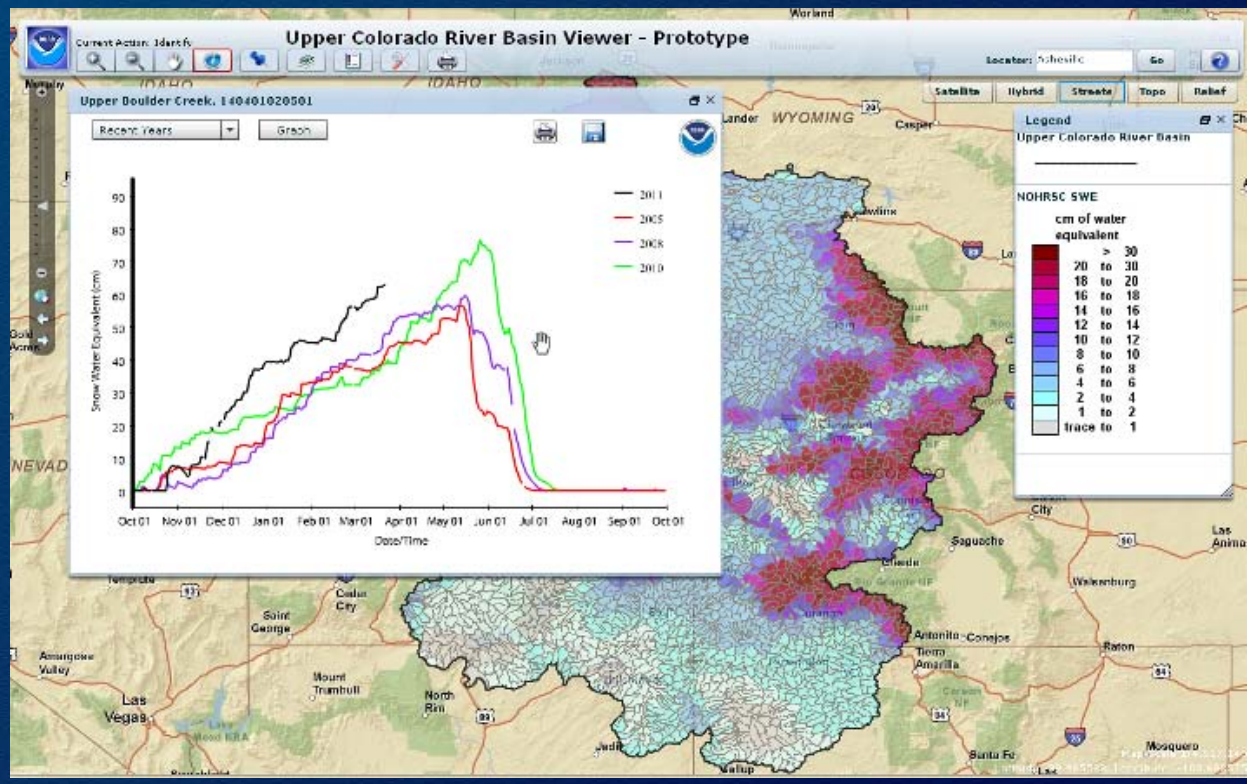
NCDC Drought Monitoring

- Data interoperability through Open Geospatial Consortium standards



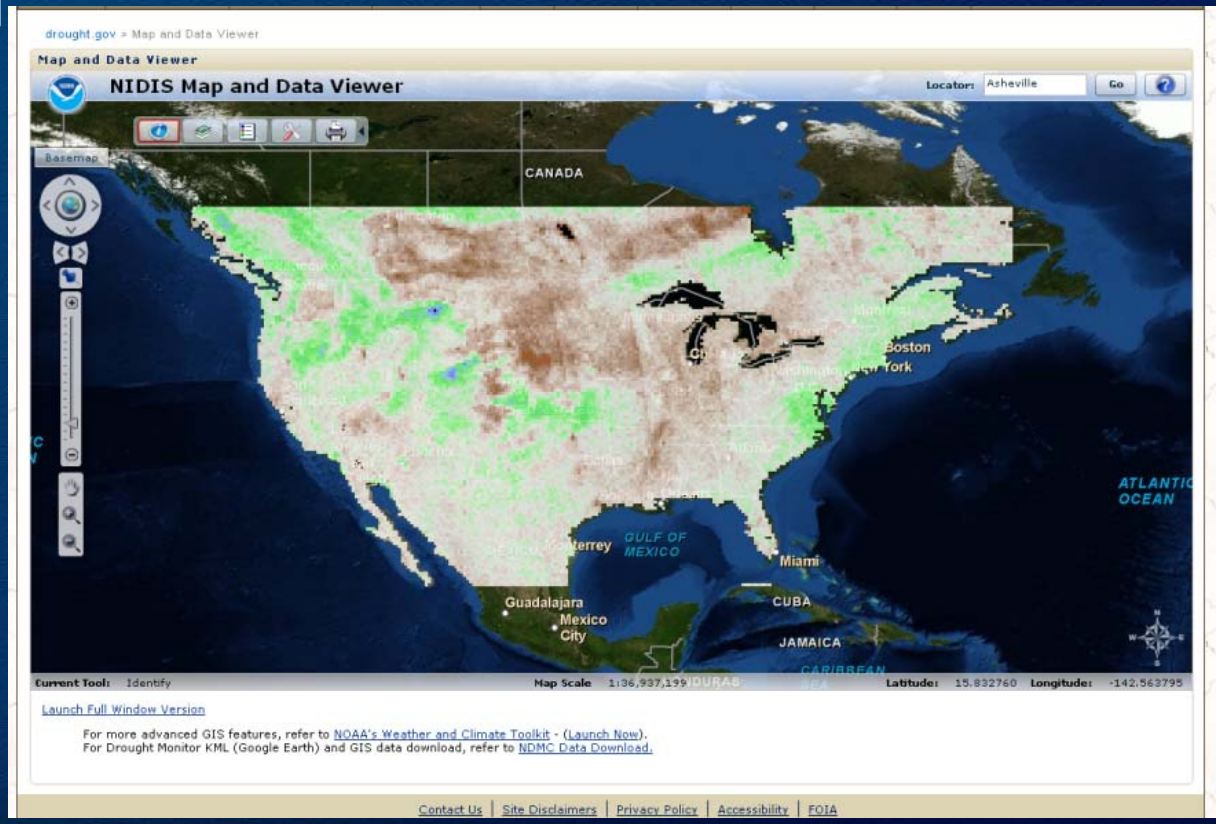
NCDC Drought Monitoring

- Leverage similar toolbox down to the local level
- Integrated map and data tools



NCDC Drought Monitoring

- Working with partners
- Remotely-sensed soil moisture information



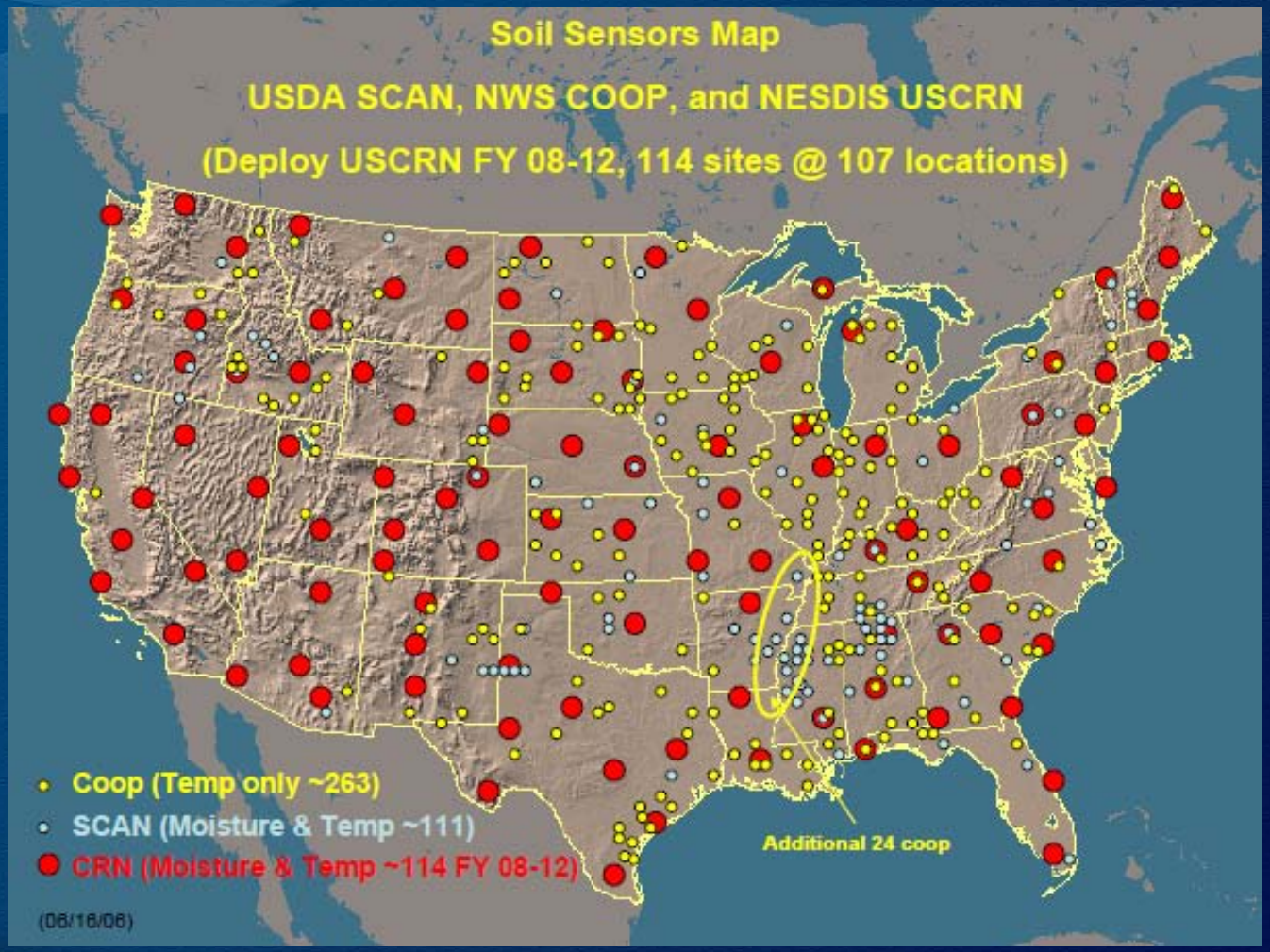
In situ Soil Moisture Monitoring

- Deploy soil moisture / temperature probes and RH instruments across the US Climate Reference Network in cooperation with the National Integrated Drought Information System (NIDIS) program
- Initiate new science activities
- Improve data availability

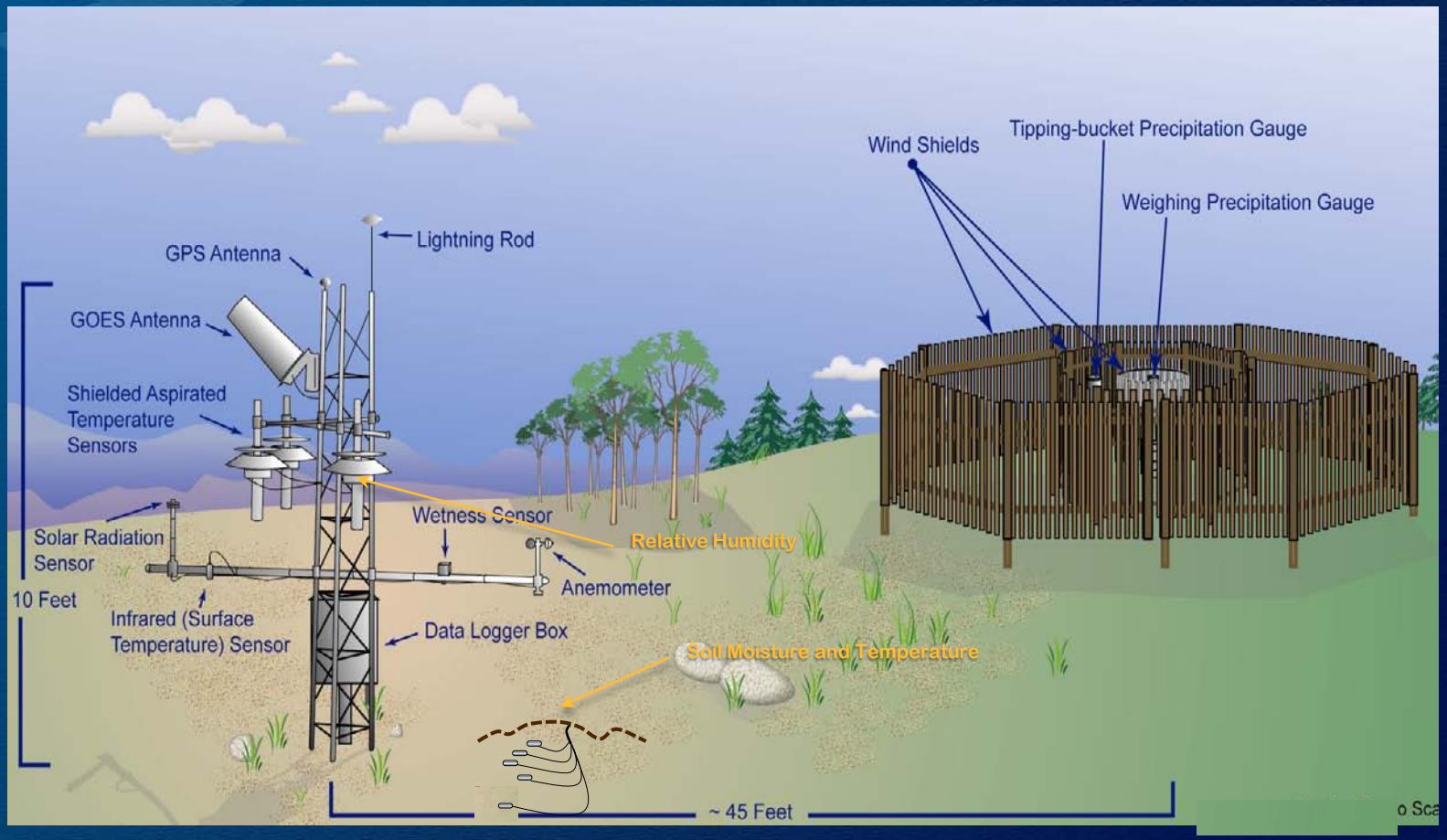
USCRN Soil Moisture / Temperature

- Advantages
  - Existing infrastructure
  - Base funding
  - National distribution
- Disadvantages
  - Lack of experience
  - Coarse spatial resolution
  - Fixed locations

USCRN Locations Compared to USDA SCAN SM/ST and NWS COOP ST



New Instruments

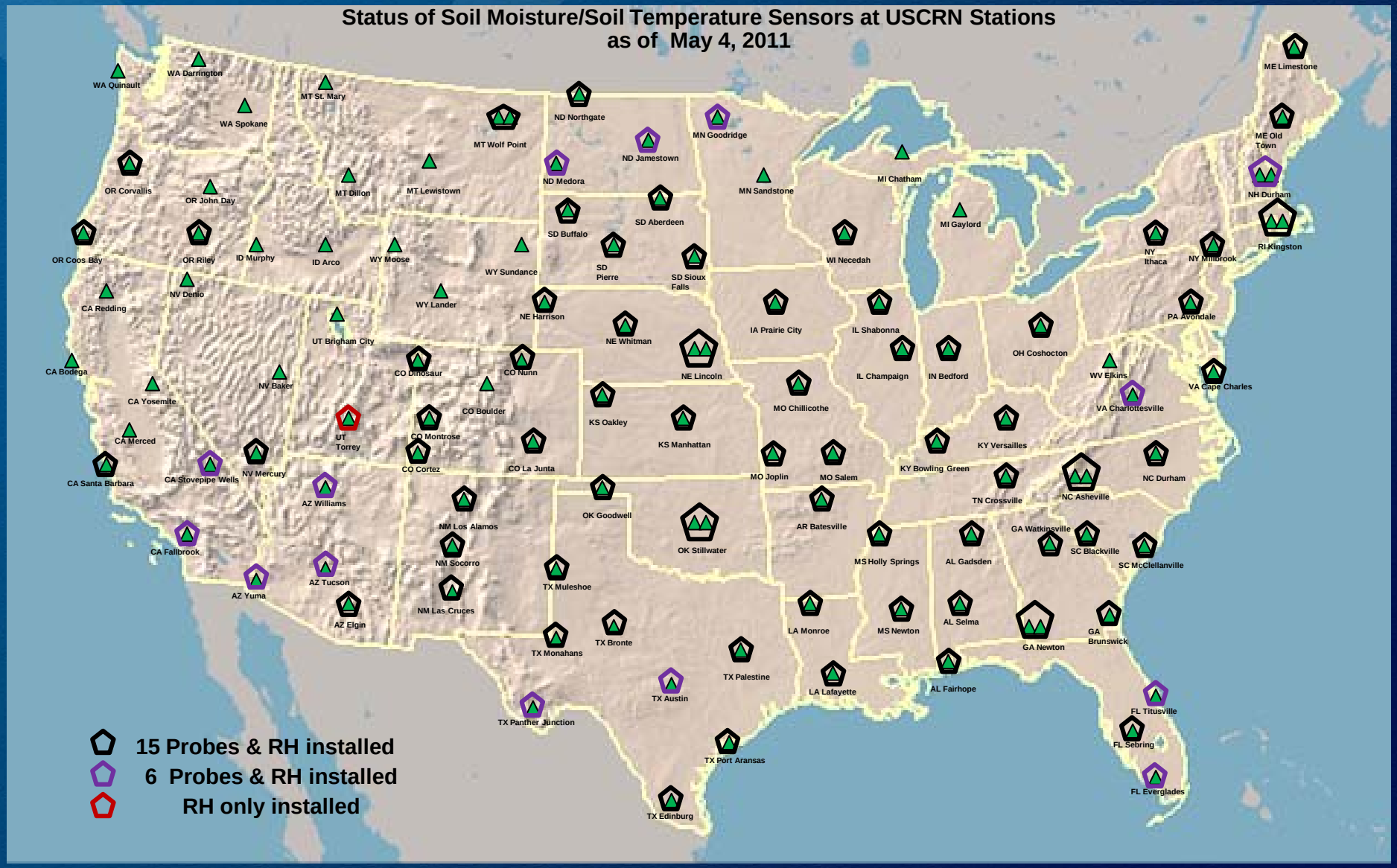


12

Crossville, TN, first official USCRN installation of soil probes, April 2009

Engineering, installation, and maintenance by USCRN partners at Oak Ridge, TN, the Atmospheric Turbulence and Diffusion Division, NOAA/OAR/ARL.

Status of Soil Moisture/Soil Temperature Sensors at USCRN Stations as of May 4, 2011



Soil Moisture/Temperature Data

- On drought.gov, data can be graphed at: http://www.drought.gov/portal/server.pt/community/drought.gov/crn_soil_data
- Hourly average data for each site (3 samples averaged at each level) can be accessed at: http://www.ncdc.noaa.gov/crn/observations.htm

  or

  ftp://ftp.ncdc.noaa.gov/pub/data/uscrn/products/soilsip01/
- Station data become available after a burn-in period

More Data Access

- Web Site improvements are ongoing
  - http://www.ncdc.noaa.gov/crn/
- Hourly and daily data available in bulk by ftp
  - ftp://ftp.ncdc.noaa.gov/pub/data/uscrn/products/hourly02/
  - ftp://ftp.ncdc.noaa.gov/pub/data/uscrn/products/daily01/
  - ftp://ftp.ncdc.noaa.gov/pub/data/uscrn/products/soilsip01/

National Integrated Drought Information System

U.S. Drought Portal

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drought.gov > CRN Soil Data

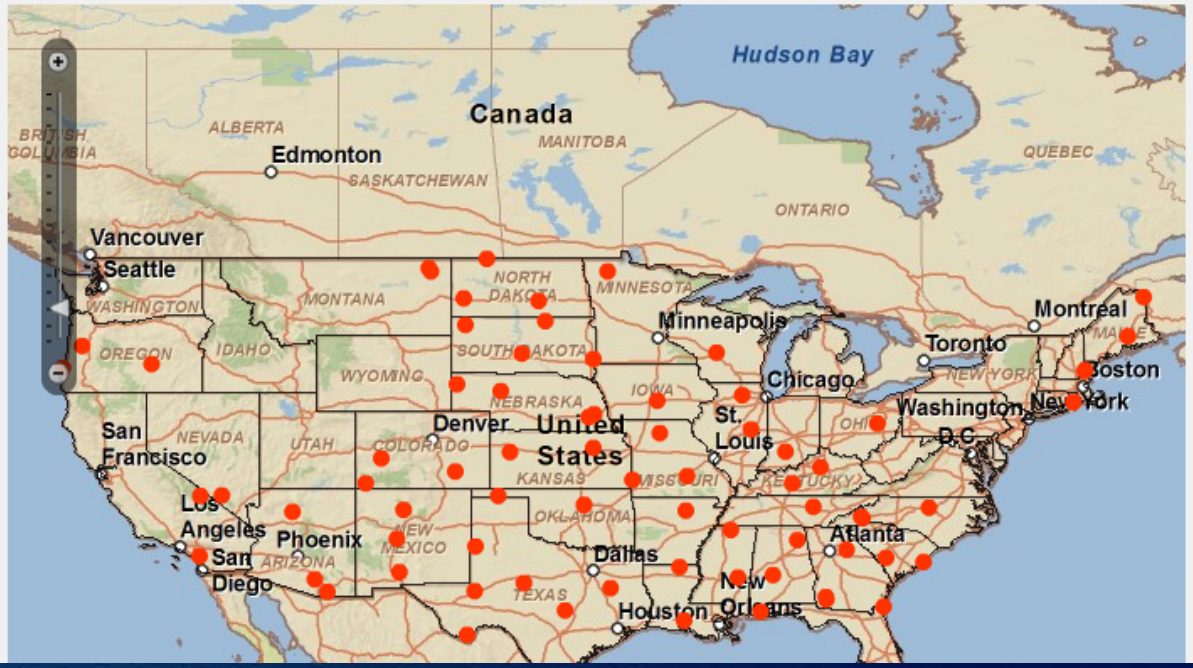
Climate Reference Network (CRN) Soil Moisture and Temperature

Moisture Data	Temperature Data
5cm	5cm
10cm	10cm
20cm	20cm
50cm	50cm
100cm	100cm

To generate an interactive graph, select options on the left:

1. Select desired Variable(s).
2. Select a Station from the map.

Once the graph is generated, you will be able to click and drag the axes to manipulate the view or look back in the period of record.
Another useful feature is the ability to resize the axes.
To resize the axes, hold down the 'Shift' key, then click and drag on the desired axis.
The graph window can be moved by clicking the transparent area above the graph and dragging.
Multiple graphs can be viewed at one time by selecting additional stations.



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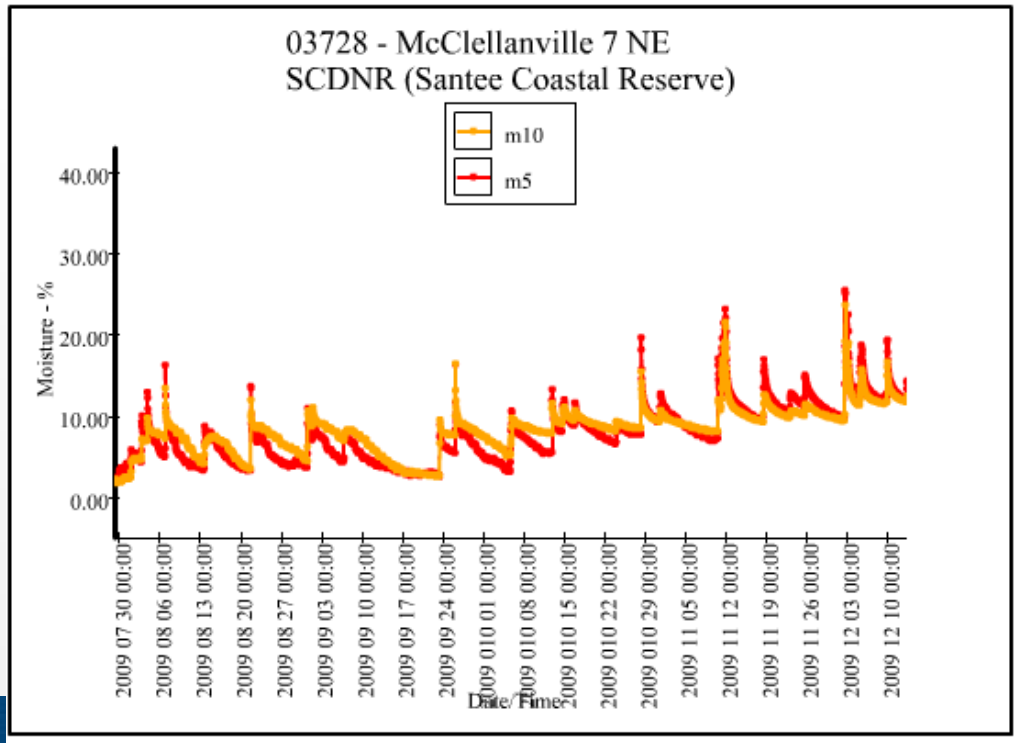
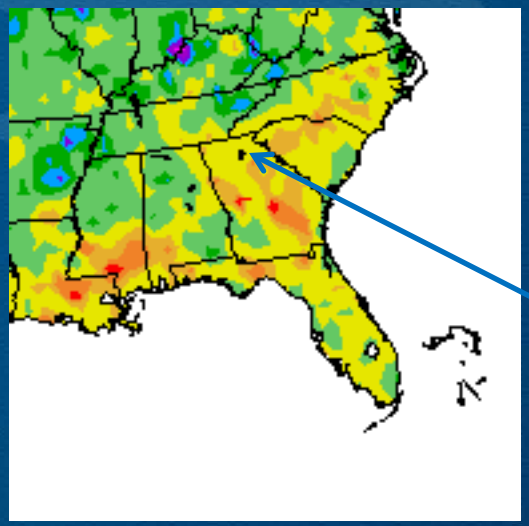
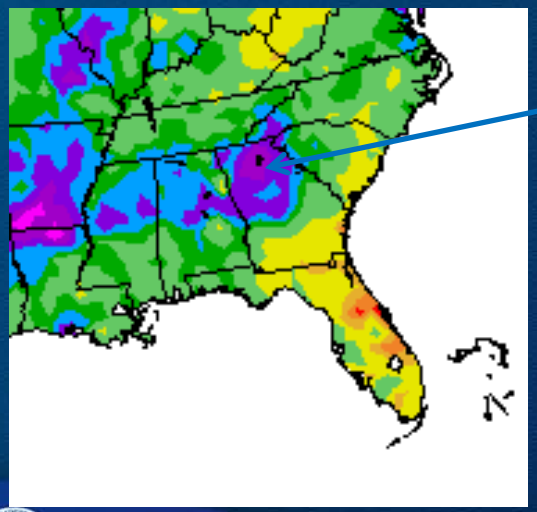
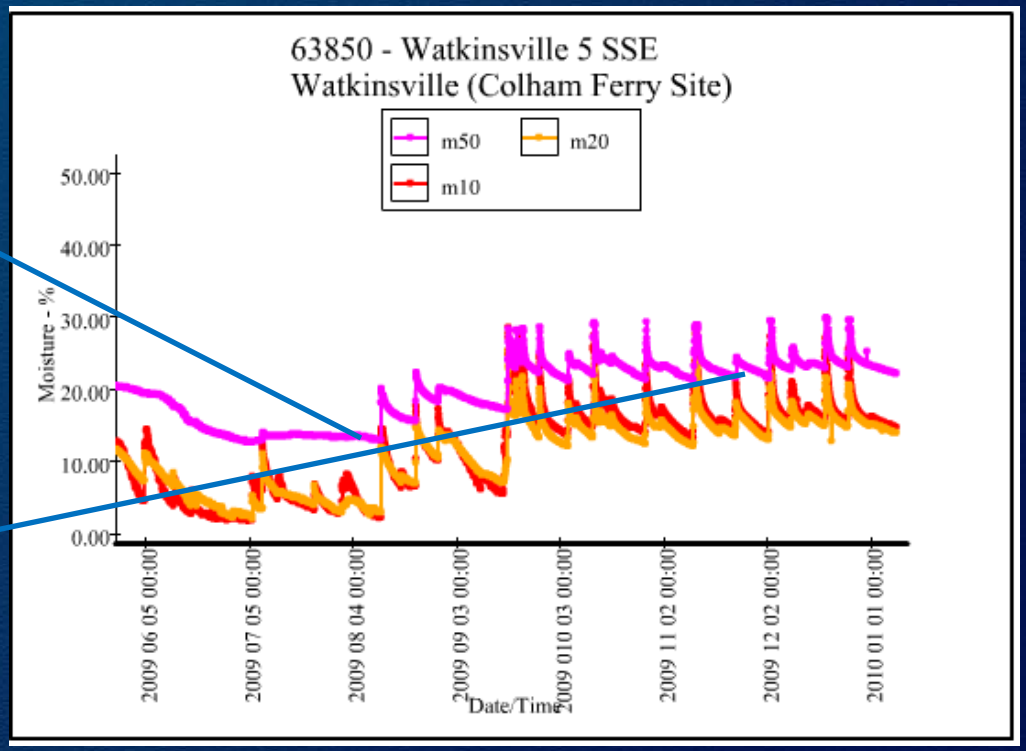


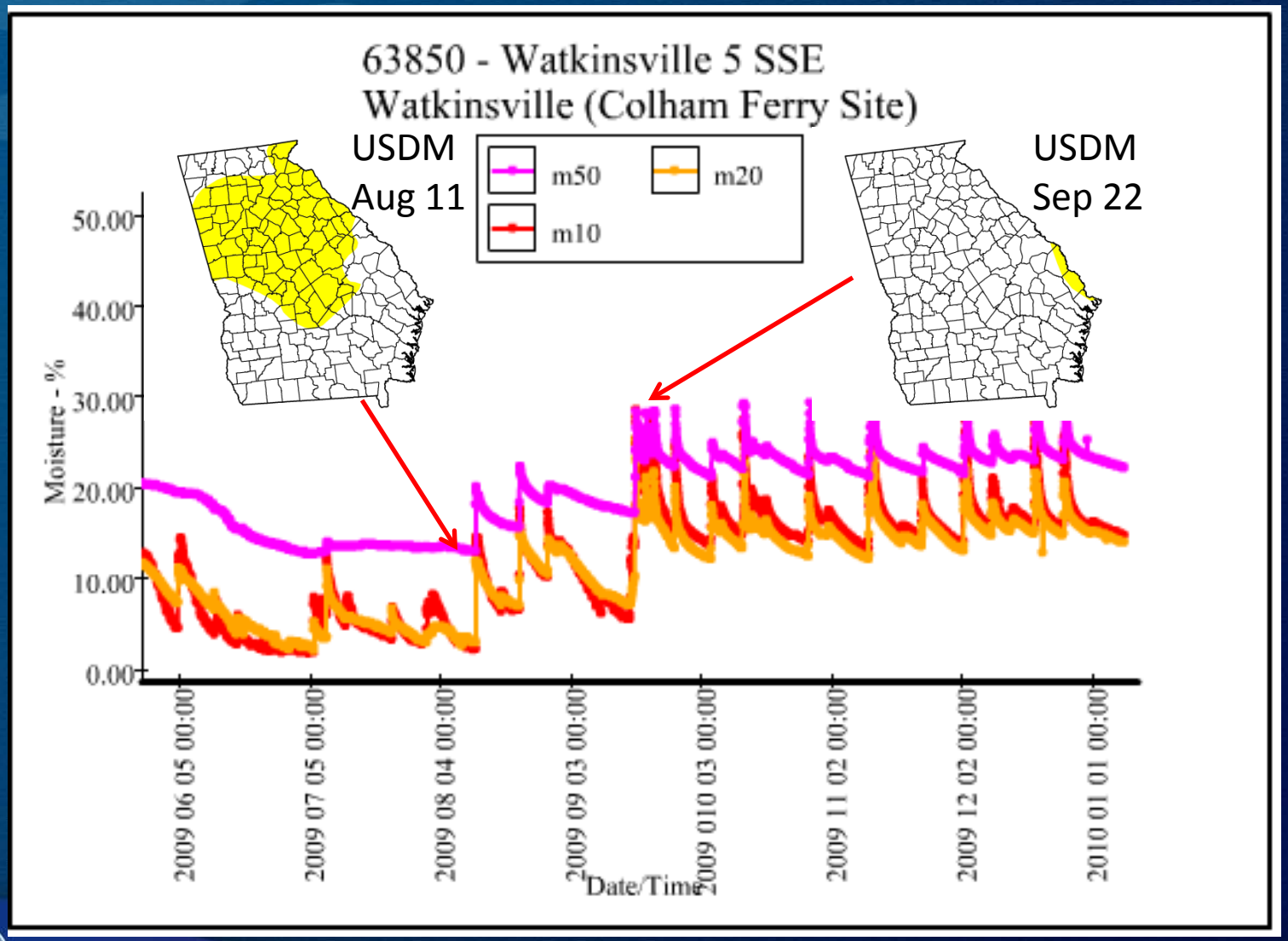
3-month SPI ending Aug & Nov 2009



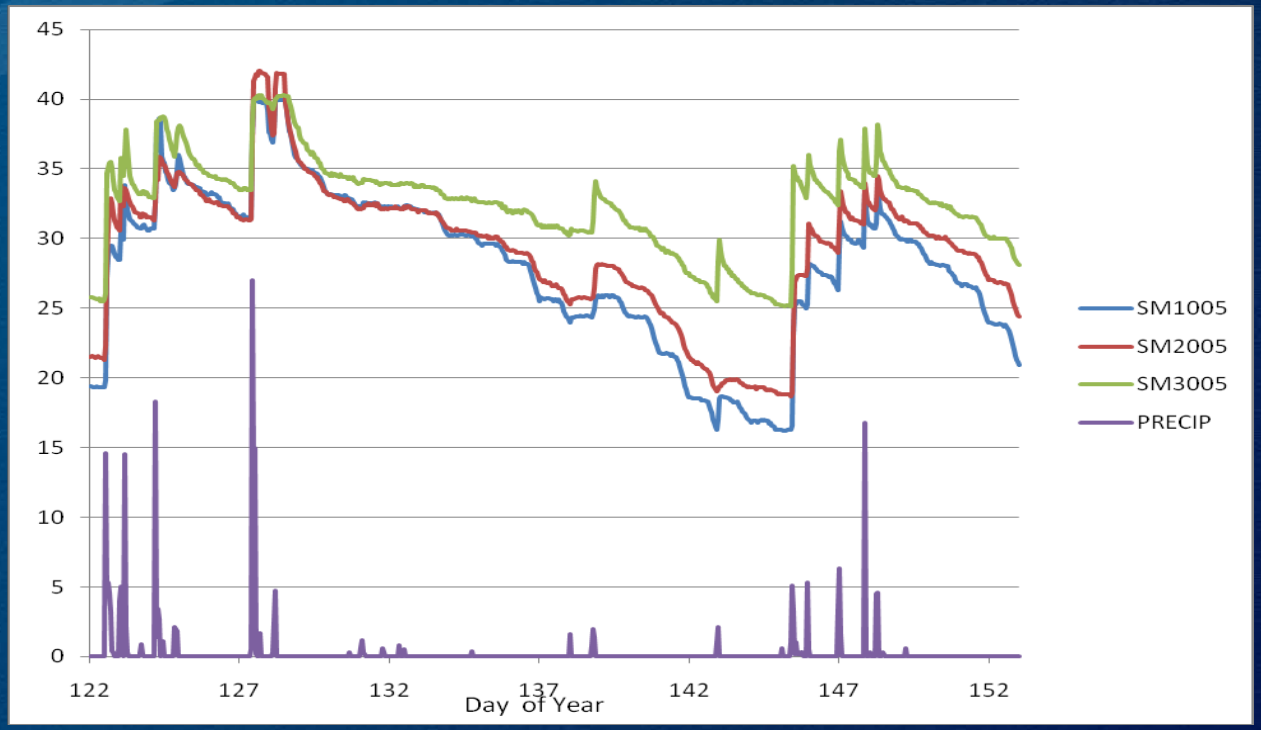




Shift in USDM status at Watkinsville, GA

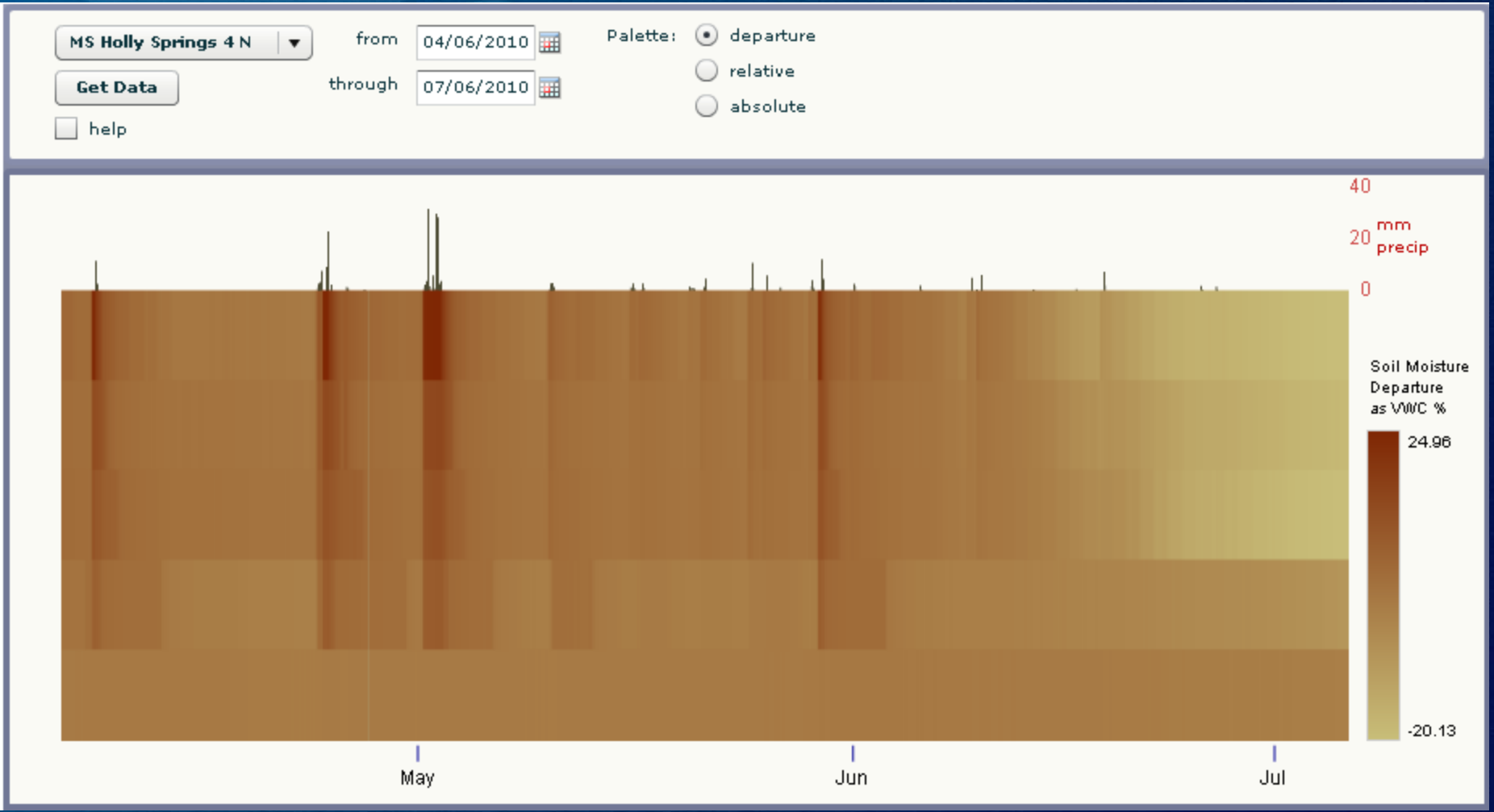


Variability Between Plots



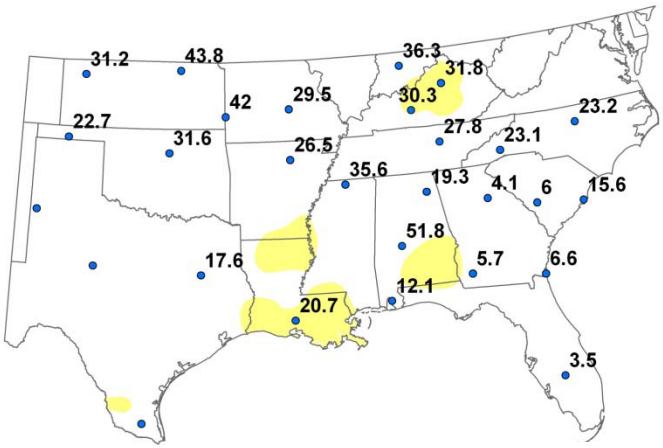
- Even within a 7 meter distance, soil characteristics vary
- Between sensor comparison is not straightforward, and will not be part of initial QC suite

Soil Data Visualization – Infiltration Plot



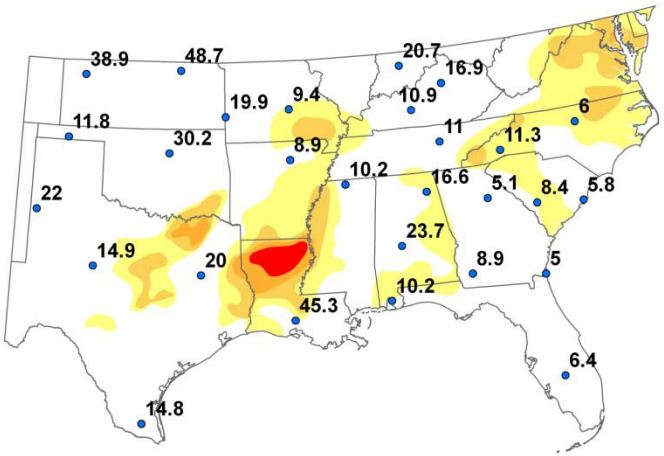
Monitoring changes in soil moisture

April 2010

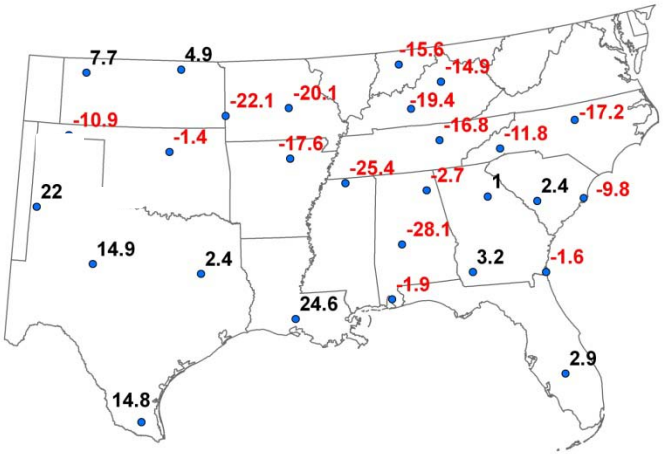


5 cm

July 2010



July-April 2010



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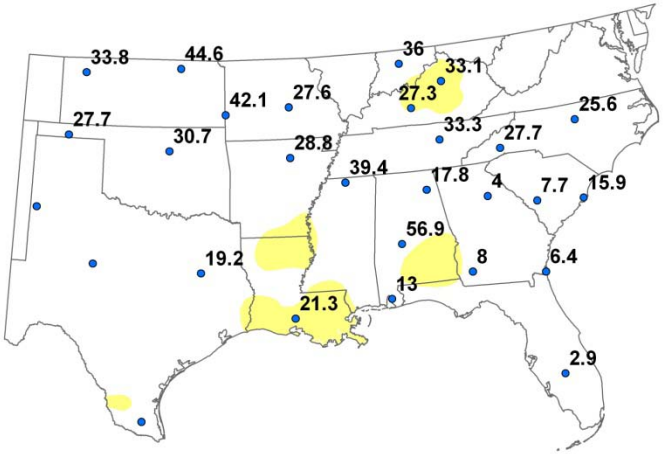
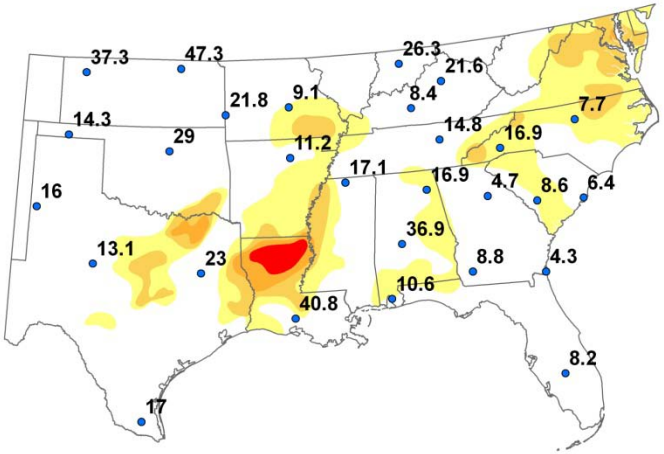


10 cm

July 2010



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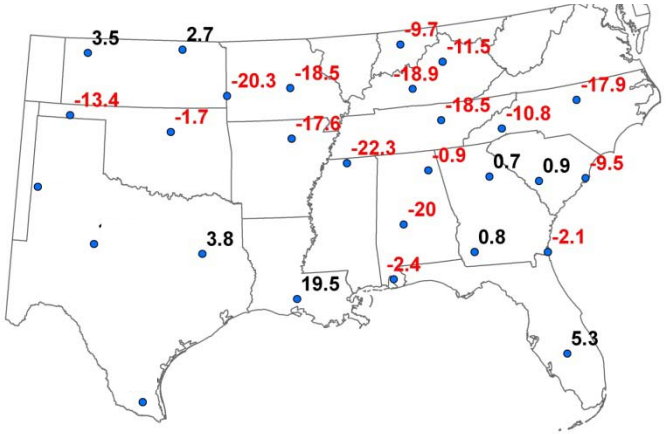

Future

- NIDIS: Integration of partner soil moisture data (USDA, OK, IL, NE, others)
- NIDIS: Integration of remotely sensed and in situ soil moisture data into one mapping/data application
- CRN: Comparison of soil moisture instruments – field study in 2010-2012 in Oklahoma
- CRN: Involvement in providing in situ soil moisture data for satellite calibration / validation – Soil Moisture Active Passive (SMAP) Mission