Building a Coordinated National Soil Moisture Monitoring Network

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National Soil Moisture Network Workshop

May 24th, 2016

Pilot Use Cases

1. Operational Drought Monitoring: NOAA, U.S. Drought Monitor
2. Experimental Land Surface Modeling: NOAA/NOHRSC, Snow Modeling
3. Operational Hydrological Modeling: NOAA RFCs

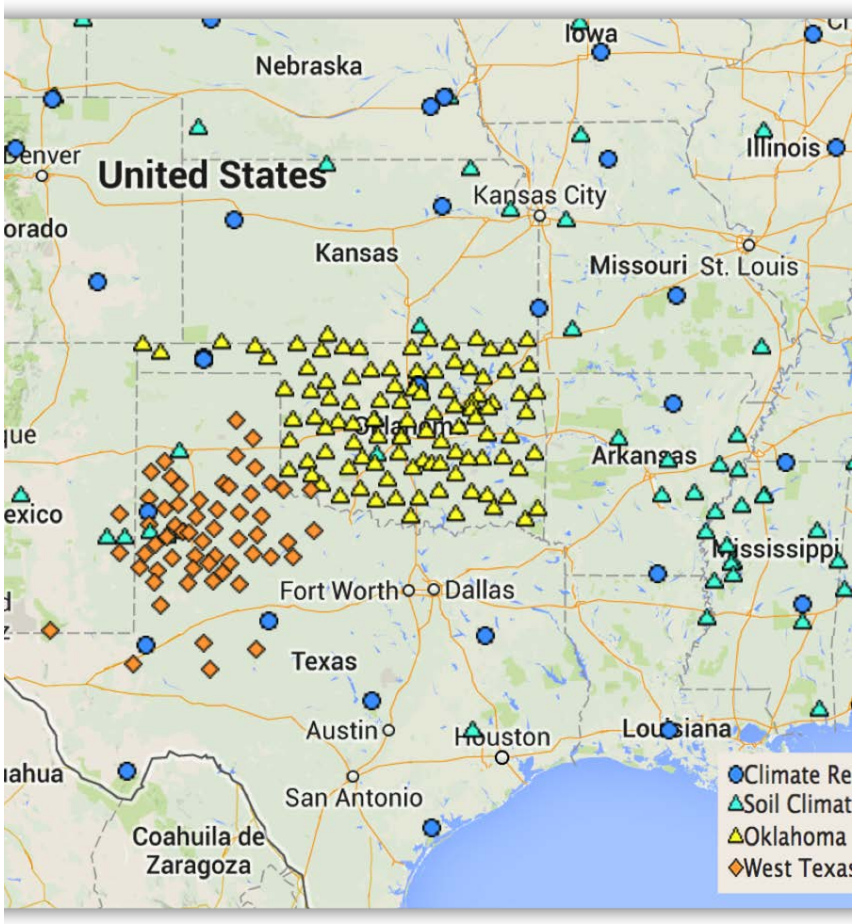
Goal

As a U.S. Drought Monitor Author I want to see a map of percentile ranking of current volumetric water content (VWC) at discrete and common depths, related to 30 yr record, for sites colored using the drought monitor legend so that I can determine the necessary changes to be made to this week's DM map.

Pilot Data Sets

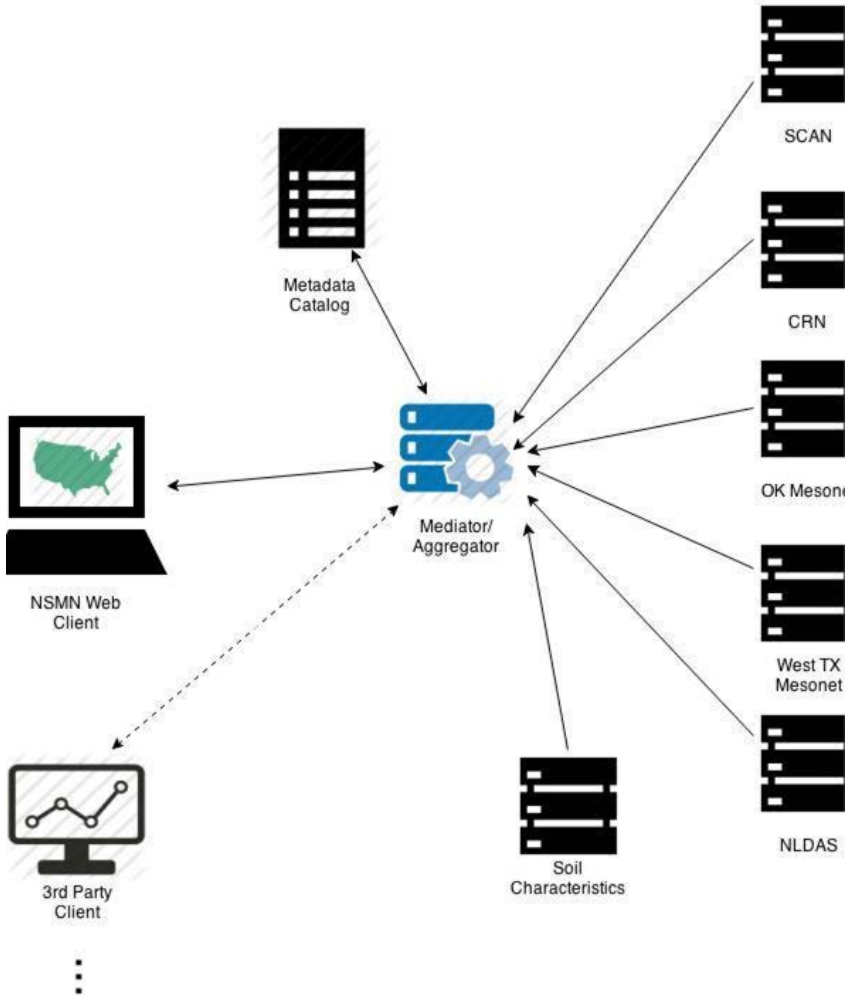
- In Situ:
  - Climate Reference Network
  - SCAN & SNOTEL
  - Oklahoma Mesonet
  - West Texas Mesonet

- Modeled:
  - NLDAS-2 model-derived soil moisture from: Noah, Mosaic, SAC and VIC

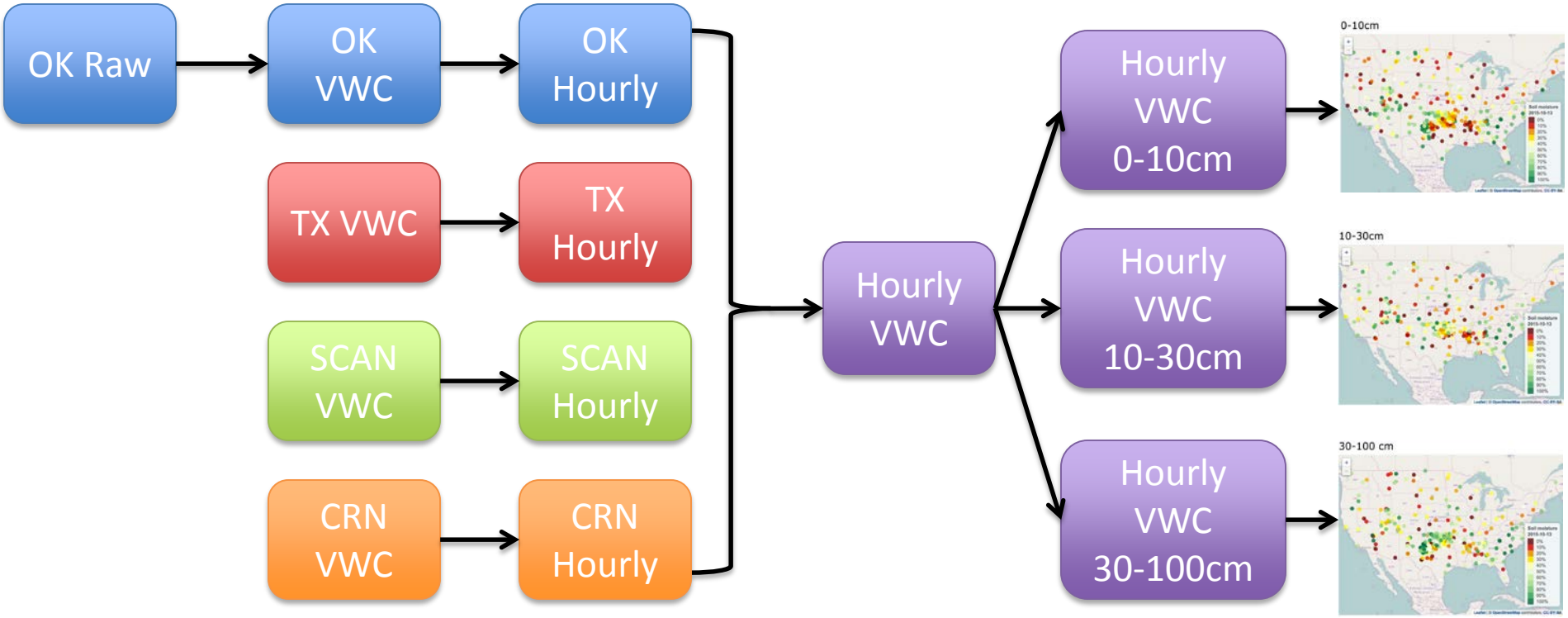


System Components

- Site metadata and soil characteristics web service
- Catalog of data sets and service metadata
- CRN web service - NCDC ArcServer (does not include soil moisture)
- SCAN web service - AWDB SOAP
- OK Mesonet web service
- West TX Mesonet web service
- NLDAS web service - USGS Geo Data Portal
- Algorithm development for calculating percentiles, aggregating datasets
- Service mediator/aggregator
- Map-based visualization web tools

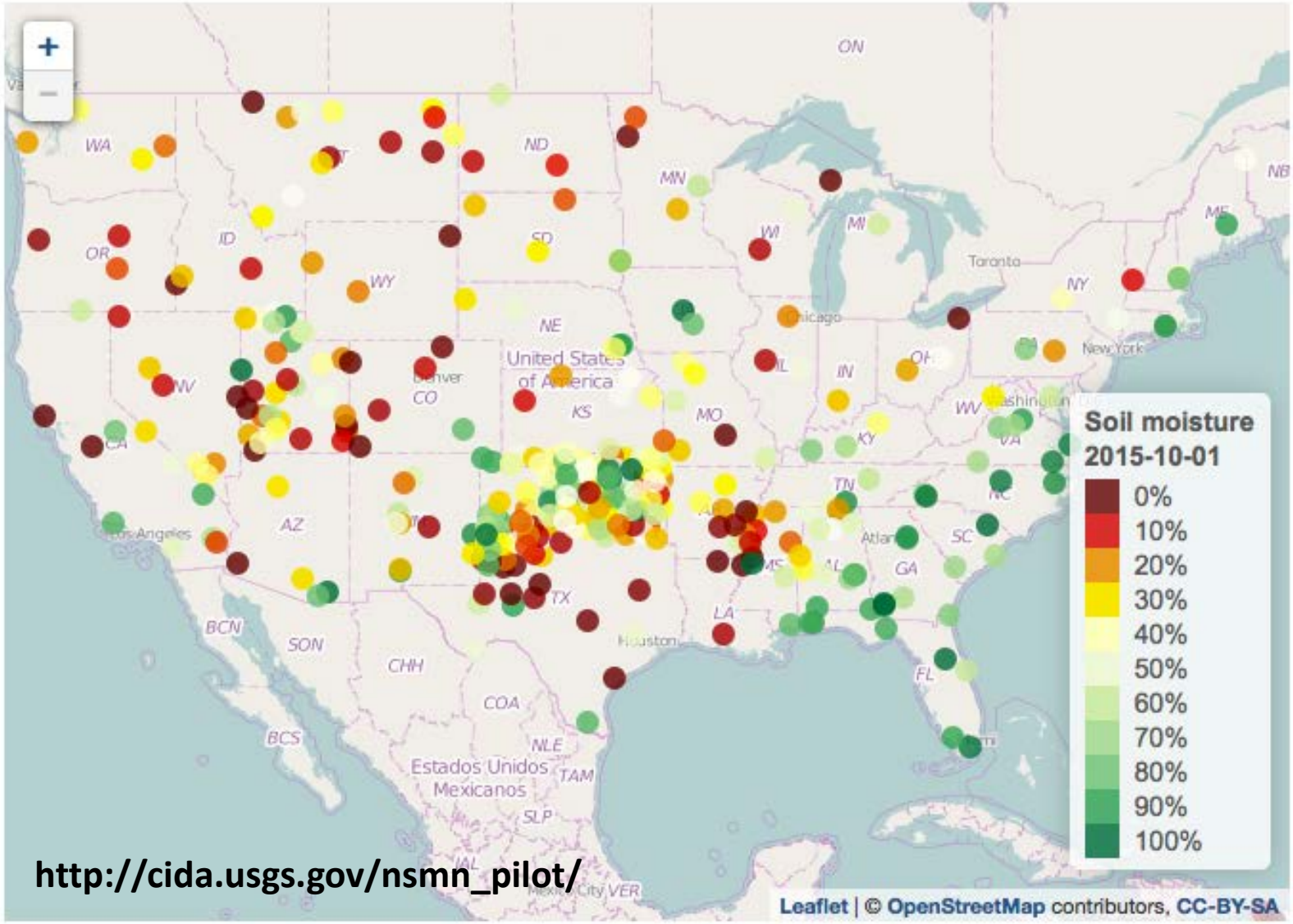


Data Processing Pipeline



National Soil Moisture Network

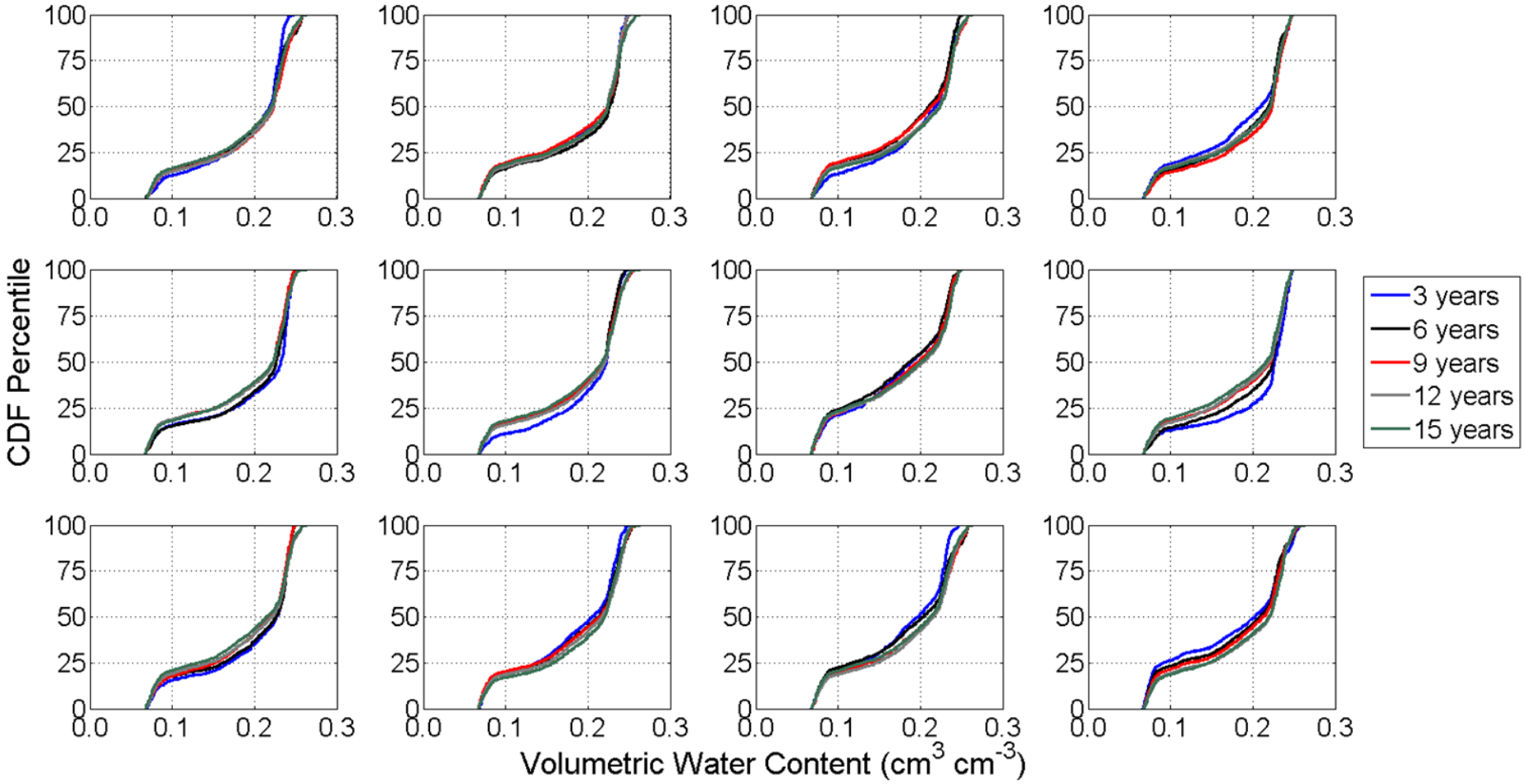
0-10cm



NSMN Pilot Work Completed

- Station metadata has been gathered
- Web services established for West Texas Mesonet, Oklahoma Mesonet and Climate Reference Network; TAMU is serving these data (temporary for pilot)
- Mediator coded to access and process all 4 networks
- Interactive map has been developed
- Analysis of historical data to calculate cumulative distribution functions (CDF)
- Quality control and percentile calculations have been automated
- Developed an SOS service for aggregated VWC data

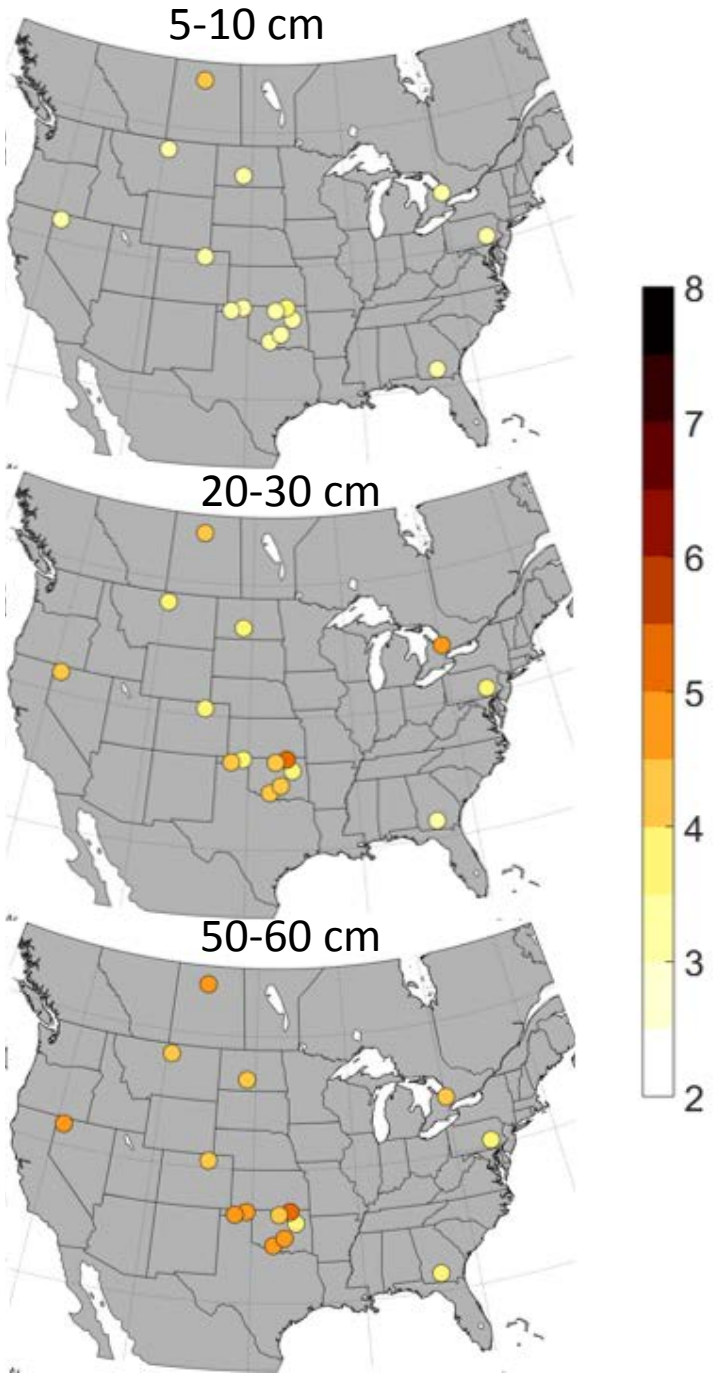
Soil Moisture Percentiles



Soil Moisture Percentiles

Depth of measurement variations: the average number of years of data that are necessary to generate stable soil moisture percentiles at each station.

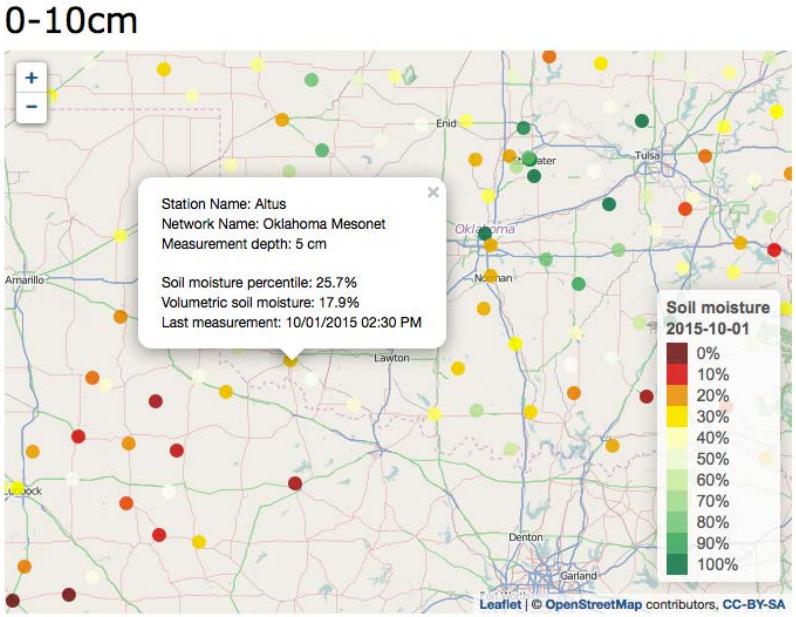
The record length thresholds are determined using the Anderson-Darling test with a Bonferroni adjustment for measurements made at: 5-10 cm, 20-30 cm, and 50-60 cm



Ford et al. (submitted)

Challenges & Opportunities

- Tremendous potential and interest for NSMN
- Establishing continuity in leadership and support has been a challenge
- Web services are inconsistent across Networks
- Station metadata are not available via services
- Network data streams are dynamic



Next Steps: Moving Beyond the Pilot

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VSP UCAR Visiting Scientist Programs

National Soil Moisture Network Workshop

24-26 May 2016

Boulder, CO

WORKSHOP INFORMATION

Please join us for the National Soil Moisture Network workshop in Boulder, CO. on May 24-26, 2016. The purpose of the workshop is to discuss the continued development of a coordinated national network focused on soil moisture, the progress made to-date, approaches to continue and improve coordination of the network and integration of soil moisture data, and identifying both short, mid, and long-term goals.

The workshop is part of the National Drought Resilience Partnership, which is part of the President's Climate Action Plan. The USDA's Natural Resources Conservation Service, the National Integrated Drought Information System (NIDIS) led by NOAA, DOI's U.S. Geological Survey, and Texas A&M

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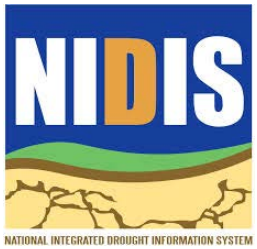

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