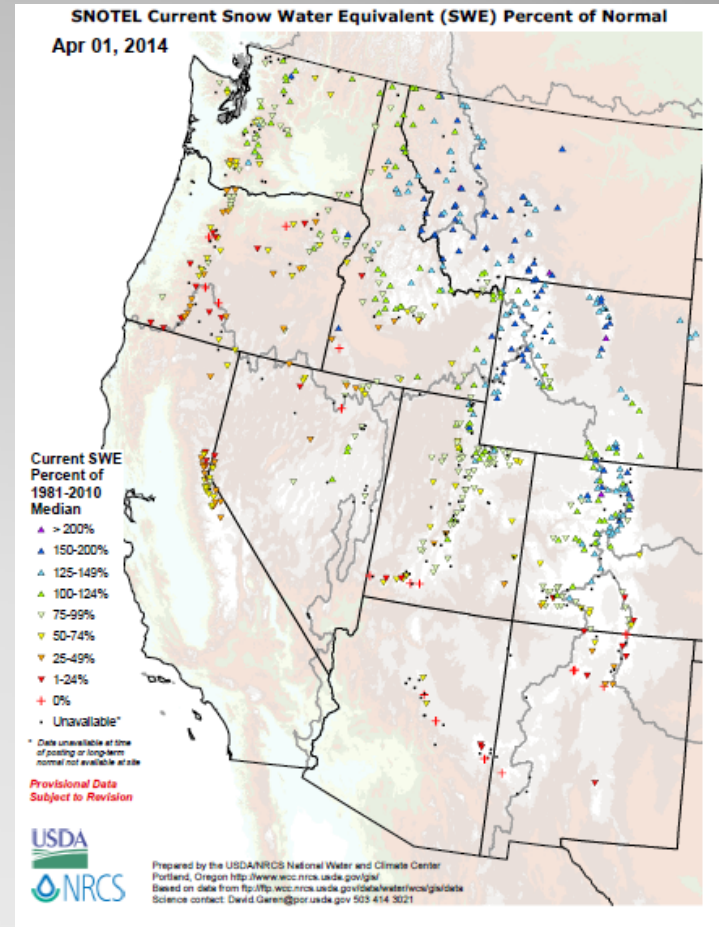




Federal Water Data Activities and Coordination

Western States Water Council Meeting, Water Resources
Committee Meeting
Lake Tahoe, Nevada – July 8-10, 2015

“Coordinates” – “National” Data Networks



Developing a Coordinated National Soil Moisture Network in the United States

Thanks to Dr. Michael L. Strobel, USDA-NRCS and Jessica Lucido, USGS for support with briefing information

Goal-Motivation

- President's Climate Action Plan
- National Drought Resilience Partnership
- National Integrated Drought Information System (NIDIS)
- NIDIS Kansas City Soil Moisture Monitoring Network Workshop (Nov. 2013)



Meeting a critical need

Soil moisture data are critical for assessing:

- Drought conditions and operational drought monitoring
- Flood potential
- Experimental land surface modeling
- Estimates of crop yields
- Water supply forecasting
- Operational hydrologic models
- Impacts of climate change



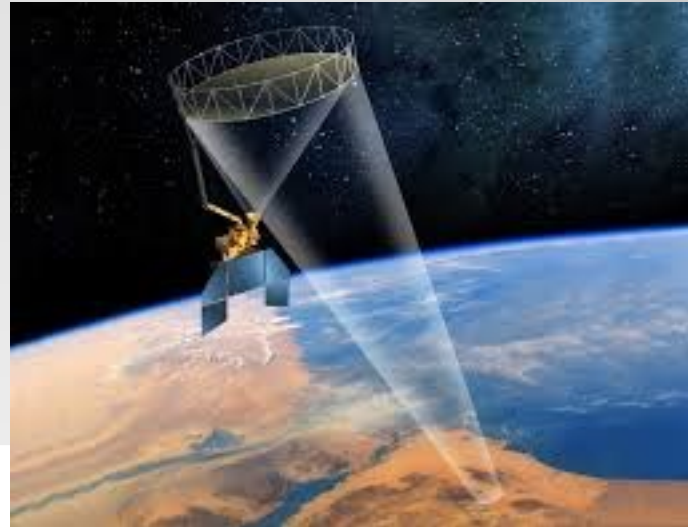
Data-rich: Data-challenged

- Many sources of information
- Highly variable:
 - Spatial distribution
 - Vertical data collection
 - Sensor types
 - Scale
 - Time
 - Data storage (format, distribution)
 - Applications



Integration

- In situ stations collecting point data
- Remote sensing at various scales
- Models



Network Name	Geographic Region	Number of Stations	Period of Record	Observing Depths (cm)
Agricultural Research Service (ARS)	Oklahoma	44	2005-present	5, 25, 45
AmeriFlux	United States	39	1997-present	Variable
Atmospheric Radiation Measurement (ARM)	Kansas, Oklahoma	17	1996-present	5, 15, 25, 35, 60, 85, 125, 175
Automated Weather Data Network (AWDN)	Nebraska	52	2006-present	10, 25, 50, 100
Climate Reference Network (CRN)	United States	114	2009-present	5, 10, 20, 50, 100
Cosmic Ray Soil moisture Observing Station (COSMOS)	United States	54	2008-present	Variable
Delaware Environmental Observing System (DEOS)	Delaware	29	2004-present	5
**Georgia Automated Environmental Monitoring Network (GAEMN)	Georgia	79	1992-present	Variable
Illinois Climate Network (ICN)	Illinois	19	1988-present	5, 10, 20, 50, 100, 150
Kansas Mesonet	Kansas	15	2008-present	5, 10, 20, 50, 100
Michigan Enviro-weather (Automated Weather Network, MAWN)	Michigan, Wisconsin	80	2000-present	5, 10
Missouri Agriculture Weather Network (MAW)	Missouri	8	2002-present	5, 10
**New Jersey Mesonet	New Jersey	10	2003-present	5
NOAA Hydrometeorological Testbed	Western U.S.	25	2004-present	Variable
North Carolina EcoNet	North Carolina	36	1999-present	20
Oklahoma Mesonet	Oklahoma	113	1998-present	5, 25, 60, 75
**Remote Automated Weather Stations (RAWS)	Western U.S.	50	1983-present	Variable
Snowpack Telemetry (SNOTEL)	Western U.S.	414	2000-present	Variable
Soil Climate Analysis Network (SCAN)	United States	203	1996-present	5, 10, 20, 50, 100
South Dakota Network	Selected Representative In Situ Soil Moisture Networks in the United States.			
UA Fairbanks Water and Environmental Research Center (WERC)	Alaska	24	2000-present	Variable
West Texas Mesonet	Texas, New Mexico	64	2000-present	5, 20, 60, 75

- “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 the 30-year 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”



- Initiation of a pilot soil moisture monitoring system for smaller regions to integrate all available soil moisture data types and assess how the data would be used by researchers, agencies and different sectors

2013 NIDIS Workshop – Network Pilot



Pilot Data Sets

In Situ:

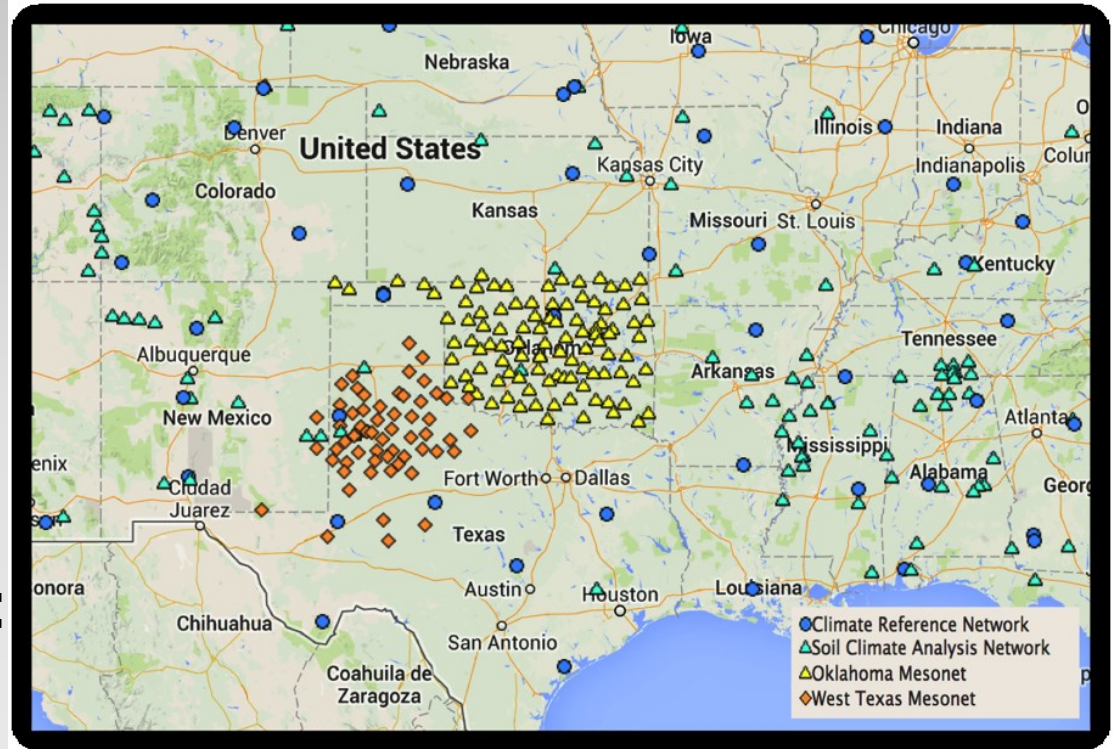
- Oklahoma Mesonet
- West Texas Mesonet
- US CRN (NOAA)
- SCAN (NRCS)

Station Metadata:

- North Am. Soil Moisture Database (NASMD) – A&M

Modeled/Assimilated:

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

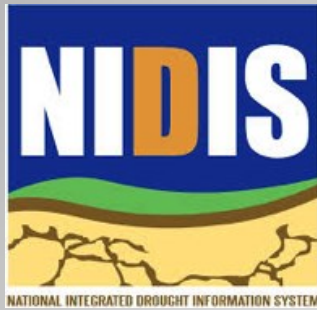


Pilot Objectives

- Proof-of-concept near real-time soil moisture network implementation
- Demonstrate the potential usefulness of a coordinated effort
- Demonstrate the benefits of in situ soil moisture (and related products) to a broad range of end users
- Identify best practices for calibration/validation and metadata characterization
- Effectively leverage the full variety of existing networks and modeling efforts.



National Soil Moisture Network



Pilot Timeline

- System Planning - December 2014
- Start Pilot Development - January 2015
- Submit Midway Progress Report - April 1, 2015
- Development Completed- July 1, 2015
- Demo Pilot - July/August 2015
- Final Project Report - August 31, 2015



Lessons Learned (so far)

- Most major in-situ networks do not currently serve soil moisture via web services, including CRN (FTP only)
- Existing services often have little or no documentation
- Station metadata are not available via web services (soil parameters, sensor info, etc.)
- A wide range of sensor depths are used
- Network sites can be added or removed over time
- Although the period of record is relatively short, stable percentiles can be estimated for most stations

