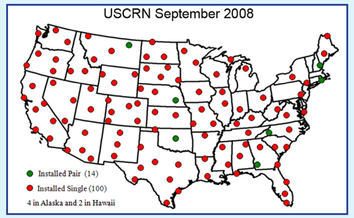
U.S. Climate Reference Network: Current Status and Future Directions

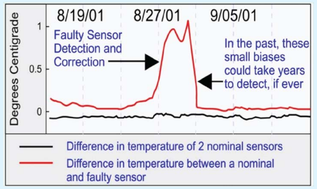
USCRN Continental U.S. Deployment Completed in 2008



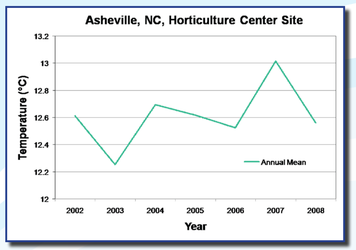
- Making science quality climate observations adhering to the Ten Climate Monitoring Principles of GCOS, NRC/NAS, and CCSP
- Answering the question at mid-century: "How has the climate of the United States changed over the last 50 years?"
- Serving as a reference standard for other networks, while evaluating new technology
- Leveraging USCRN knowledge and infrastructure to support new missions

The Basics: How USCRN Works

Primary variables are measured with triplicate configurations that allow for intercomparisons:



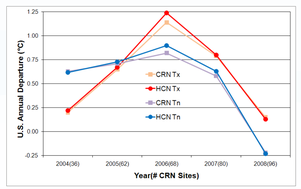
What is Happening Over Time?



Annual temperature averages (°C) for 2002-2008 at one of the first stations in the USCRN, at the North Carolina Mountain Horticultural Crops Research Center near Asheville, NC.

Comparison of the USCRN 2004-2008 continental U.S. annual air temperature departures from the 1971-2000 normal (°C) with those from the U.S. Historical Climatology Network Version 2. More than 99.5% of the variance is held in common between these two independent measurements.

A First Look at the USCRN National Air Temperature Departure Time Series



USCRN Soil Moisture/Soil Temperature Network

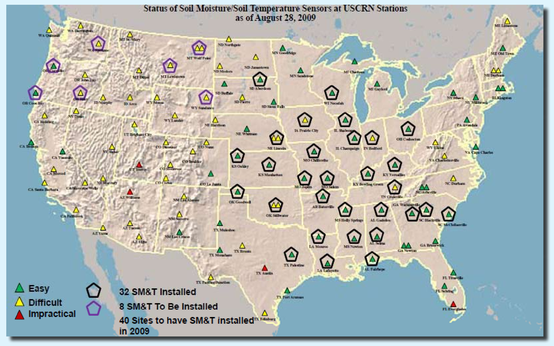
Soil Moisture/Soil Temperature

Soil moisture / temperature probes and RH instruments will be deployed across the USCRN network in cooperation with the National Integrated Drought Information System (NIDIS) program.

Probes will be installed at 5 cm, 10 cm, 20 cm, 50 cm, and 100 cm depths in three separated locations around the USCRN station tower.

Initial installation of soil probes at Crossville, Tennessee, April 2009.

Deployment Commenced in 2009



Deployment progress map: Black pentagon stations have been installed; purple pentagon stations are planned for FY09.

Triplicate Configuration

The USCRN soil probe network will be unique in sampling the soil climate at three locations around the tower base at five depths. A national soil moisture network with redundancy will allow for:

- Continuity in case of single probe failure
- Characterization of local variance of soil moisture / soil temperature at five levels
- Sophisticated QA/QC approaches based on multiple measurements

The triplicate configuration will be valuable for SMAP satellite applications and calibration/validation efforts.

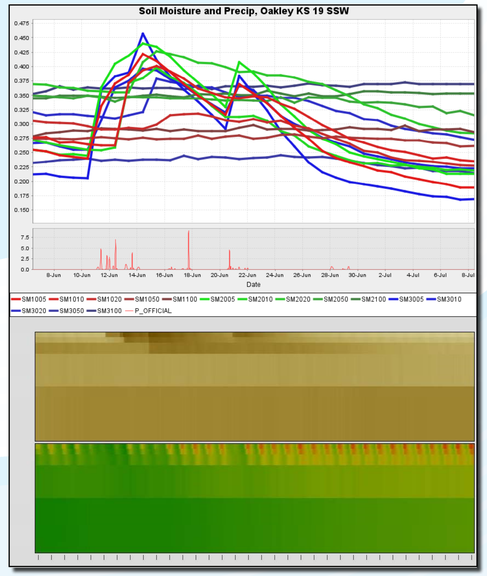
- USCRN in situ observations at depth can be combined with SMAP surface soil moisture products for drought monitoring and other applications
- The USCRN program will participate in testbeds for SMAP calibration/validation

Data Availability in Late 2009

The initial release of observations from the USCRN soil moisture will occur in late 2009, after completion of the design of the first generation QA/QC process. Data availability will be announced at: http://www.ncdc.noaa.gov/crn/

Data Visualization

The problem of usefully displaying data from 15 soil probes at once is being addressed as part of product development. The top diagram below is a snapshot showing the complexity of just looking at soil moisture for a station, while the bottom demonstrates a method to examine layer average soil moisture and temperature.



Soil moisture/soil temperature at Oakley, Kansas.

USCRN: Meeting the Needs of Climate Stakeholders in the U.S.

- Accurate, real time, climate science quality observations of temperature and precipitation
- Unique triplicate measurements of soil moisture, precipitation, and temperature will be invaluable to operational needs (weather prediction, drought monitoring, agriculture, horticulture), and scientific needs (satellite calibration/validation, soil moisture modeling, soil moisture/temperature trend detection)