Air Resources Laboratory

U.S. Climate Reference Network

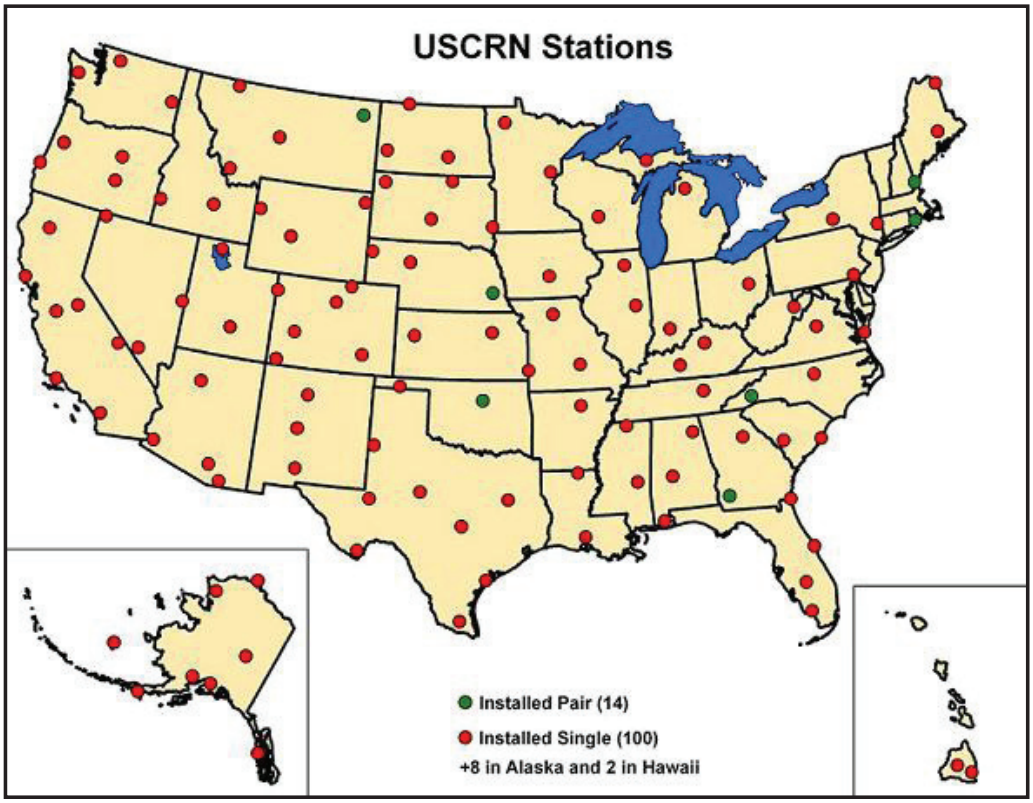
Collecting High-Quality Data to Determine How Climate Has Changed in the Future

The lack of high quality surface measurements of precipitation and air temperature historically has hampered the ability of climate scientists to fully characterize the national and regional climate signals with confidence. The U.S. Climate Reference Network (USCRN) provides the Nation with a climate-quality benchmark observing system for real-time measurements of air temperature and precipitation that meets national commitments to monitor the climate of the U.S. for the next 50–100 years. The USCRN also provides a platform for additional sensors that can be easily added. Currently, sensors for solar radiation, relative humidity, wind speed, soil moisture and land surface temperature have been added. Observations from USCRN also provide critical anchor points for other networks, both public and private. Society and the economy benefit from the USCRN as the near-real time data availability are used in the decision support activities for weather warnings. Data are also used to improve both short- and long-term forecasts to protect lives and property.

What We Do

The Air Resources Laboratory (ARL) is one of three NOAA offices cooperating in the USCRN program. ARL researchers provide the engineering design and measurement capabilities and expertise for the stations, including the deployment and maintenance of the sites and regular calibration of the sensors. ARL also provides analysis of emerging sensor technologies for future applications. High quality data for all sites in near-real time are provided by NOAA's National Climatic Data Center. The USCRN implements the ten climate monitoring principles www.ncdc.noaa.gov/crn/crnclimmonprin.html recommended by the National Research Council (NRC 1999), that were proposed by Thomas Karl et al. (NCDC, 1995).

The USCRN consists of 114 stations in the 48 contiguous States, 8 stations installed in Alaska, and 2 stations in Hawaii. An additional site is located in Canada to benchmark the U.S. networks with our North American partners. Each station is strategically placed away from urban and suburban influences to avoid any

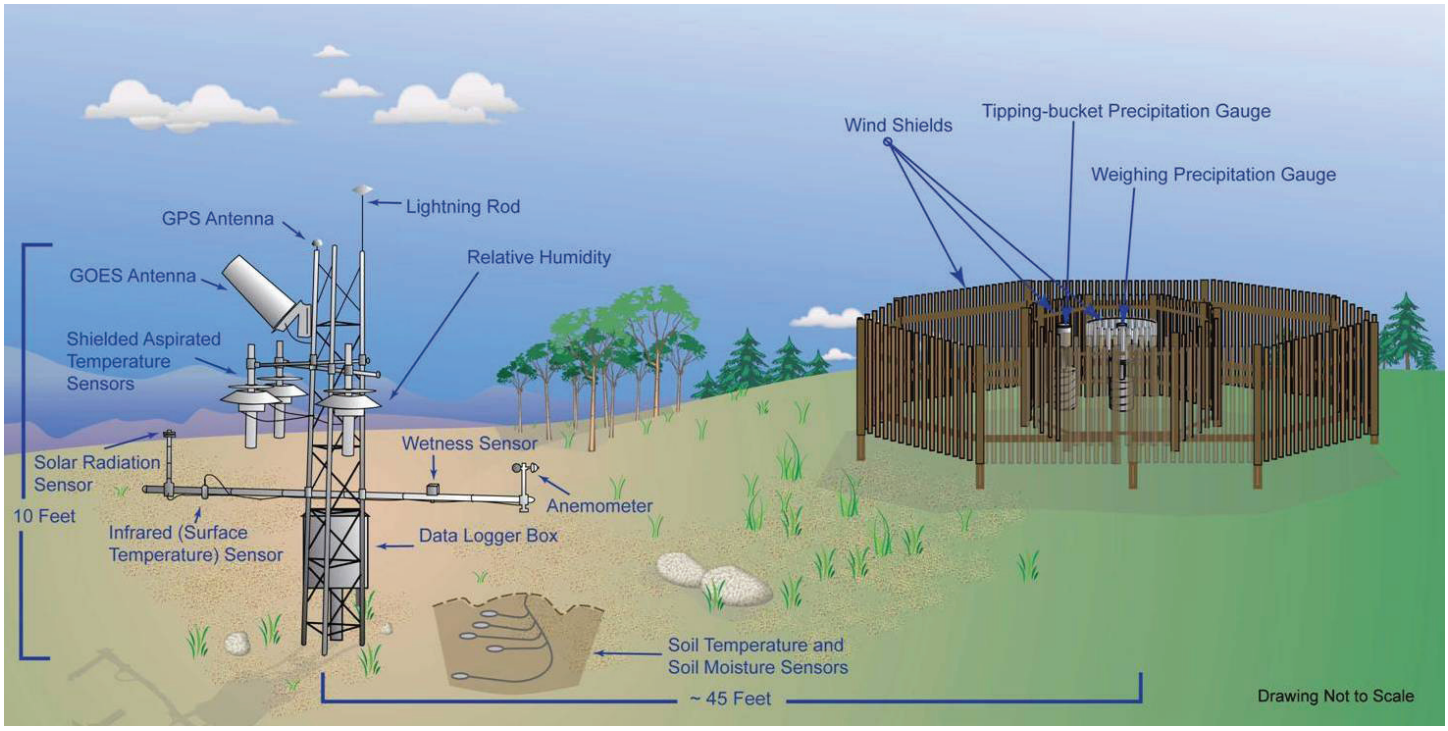


A map of the USCRN stations. Seven locations have paired sites for data comparisons.

possible locally-induced biases in the climate record. The USCRN reports multiple observations per hour for temperature and precipitation. This temporal resolution of the data provides additional climate information, such as precipitation intensity and duration of extreme events. All of the stations in the contiguous States are equipped with soil moisture, soil temperature, and relative humidity sensors, which are supported by the National Integrated Drought Information System.

In addition to these sensors, USCRN stations measure:

- Air temperature obtained through the use of a temperature probe placed inside a white-painted aspirated solar shield with a DC-powered fan to aid in the circulation of ambient air. There are three air temperature sensors and shields located at each USCRN site.
- Wind speed measured with a three-cup anemometer assembly with a magnet-reed switch, which produces contact closures whose frequency is proportional to wind speed.
- Solar radiation monitored via a silicon pyranometer.
- Precipitation amount recorded with a weighing gauge. The precipitation in the container is weighed with three sensors with a frequency output. There is also a secondary tipping bucket gauge.
- Surface temperature of the ground measured with an infrared thermometer.



A configuration of a typical U.S. Climate Reference Network Station
Source: National Climatic Data Center

ARL Climate Reference Network
www.atdd.noaa.gov
National Climatic Data Center
www.ncdc.noaa.gov/crn/
Air Resources Laboratory
www.arl.noaa.gov

Ref: Karl, T.R., V.E. Derr, D.R. Easterling, C.K. Folland, D.J. Hoffman, S. Levitus, N.Nicholls, D.E. Parker, and G.W. Withee, 1995: Critical issues for long-term climate monitoring. Climatic Change, 31, 185-221.

Ref: National Research Council (NRC), 1999: Adequacy of Climate Observing Systems, National Academy Press, Washington, D.C.

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