

Deployment of the First Phase of Climate Reference Network Sites

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Background.

The U.S. Climate Reference Network (CRN) is an array of climate stations now being developed to provide future long-term homogeneous observations of temperature and precipitation that can be coupled to past observational records for the detection and attribution of present and future climate change. Data from the CRN will be used in operational climate monitoring activities and for placing current climate anomalies into an historical perspective. The CRN will also provide the USA with a reference network that meets the requirements of the Global Climate Observing System (GCOS). When fully implemented, the network will consist of about 250 stations nationwide.

Leadership of the CRN is at the National Climate Data Center of NESDIS, at Asheville, North Carolina. Under an agreement between NCDC and the Air Resources Laboratory, development of instrumentation and installation of CRN sites is by staff of the ARL Atmospheric Turbulence and Diffusion Division, at Oak Ridge, Tennessee. This agreement is in recognition of the long-standing experience and reputation of ATDD scientists in setting up and maintaining research monitoring networks, i.e. networks in which advances in instrumentation technology can be assimilated without interfering with the network operations and data stream. This is fundamentally at odds with the operational philosophies of conventional monitoring, in which a key factor is the standardization of measurement techniques and operating protocols. In concept, the research networks of ARL are always evolving, with a steadily improving quality of the data derived. When coupled with ongoing research based on the data stream, these operations satisfy the widely accepted definitions of “integrated monitoring.”

The SURFRAD network

The sister ARL group in Boulder, Colorado – the Surface Radiation Research Branch – runs the US surface radiation network (SURFRAD), designed specifically to provide the highest quality radiation data possible for meteorological prediction, satellite ground truthing, and climate change purposes. The SURFRAD sites are long-term installations designed to monitor both incoming and outgoing radiation components, together with cloud cover. As in the case of other networks operated by ATDD, the SURFRAD array is designed to accept technological improvements as they become available. An early decision was made to utilize as many as possible of the existing SURFRAD sites in the first phase of CRN deployment.

Figure 1 shows the present array of SURFRAD stations. Data from these stations are routinely used by NESDIS and NWS in their operational programs. The data are also used by NASA for satellite sensor calibration.



Figure 1. Currently operating stations of the NOAA SURface RADiation program (SURFRAD). SURFRAD operates in close collaboration with the DOE ARM site in Oklahoma.

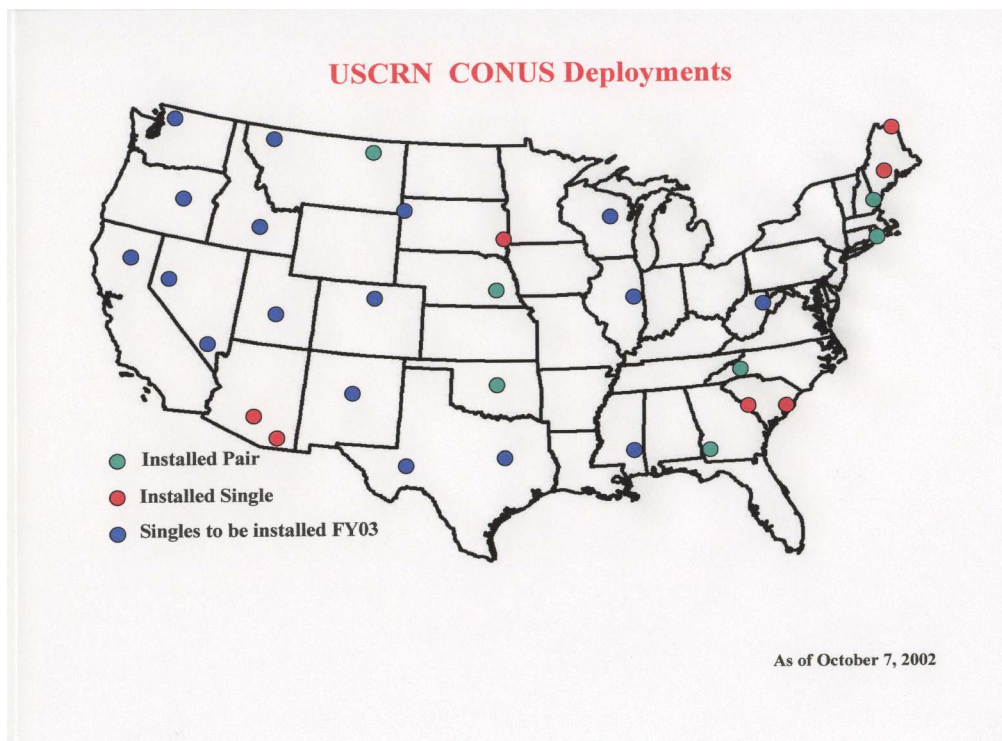


Figure 2. CRN stations now operating. Two additional stations are located in Alaska.

CRN Site Installation Status.

Installation of CRN sites is continuing, to reach a total of 40 by the end of 2002. About 25 stations are now operational. Siting is contingent on several factors: site suitability, which must be formally approved by a CRN siting review committee and approved by the CRN Executive Director; good assurance of long-term availability (50 to 100 years), as judged by the CRN Program Manager; and formal long-term commitment by the host organization in the form of a signed Site Licensing Agreement (SLA). As at most other sites, installations at SURFRAD sites have been delayed by these factors to some extent. In practice, many of the SURFRAD stations have not been easy to use as CRN sites, primarily because of licensing agreements, which are being negotiated on a site-by-site basis between the host agency lawyers and the NCDC lawyers. This does not move quickly.

At the Bondville, IL, SURFRAD site, the site licensing agreement for the CRN official site is still under negotiation between NCDC and the University of Illinois. However, ten CRN intercomparison stations have been operating there for more than six months, and extensive precipitation gauge and precipitation gauge wind shield studies will be conducted there during the next twelve months using those stations. Negotiations are also nearing completion at Canaan Valley, WV; Desert Rock, NV; and State College, PA.

The Fort Peck, MT, CRN site is now fully operational at the SURFRAD location.

Future Plans

The remaining SURFRAD sites are still under active consideration as CRN locations. At many of the sites now jointly occupied, ARL operates eddy covariance instrumentation to provide data on the surface fluxes of heat, moisture, momentum, and carbon dioxide. The ARL intent is to provide a "full service" surface boundary layer system as is needed to satisfy all research needs related to climate, air quality, and the linkage between them.