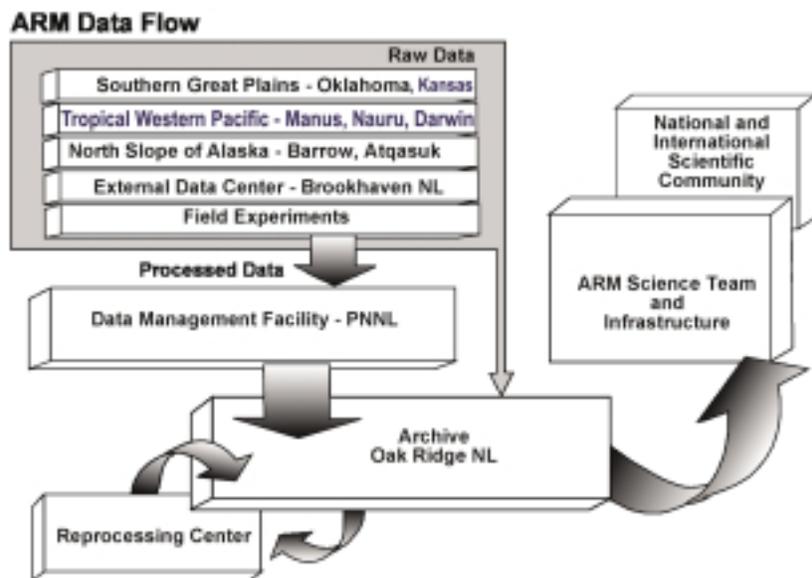


U.S. Department of Energy ARM Data Systems

The many instruments used in the Atmospheric Radiation Measurement (ARM) Program generate massive amounts of data. These data are collected from ARM field measurement sites, the Data Measurement Facility (DMF), or our External Data Center (XDC). These data must be effectively managed so that participants in the ARM Science Team and the general scientific community can use them effectively in their research. The ARM Data Quality Office, established in 2000, helps to coordinate evolution and implementation efforts to ensure the quality of the data collected by its field instrumentation. The data systems for the ARM Program collect, analyze, process, and transfer data streams of known and reasonable quality to the ARM Archive for long-term storage and delivery to users.



Sources of ARM Data

- Data from instruments at the Southern Great Plains (SGP) site are delivered over the Internet. The SGP provides approximately 5 gigabytes (GB) of data daily from ARM instruments during routine operations.
- The Tropical Western Pacific (TWP) sites located at Manus Island, Papua New Guinea; Nauru; and Darwin, Australia, collect approximately 2GB of data a day. The data are transmitted daily over the network that includes satellite links to remote locations.



- The North Slope of Alaska (NSA) sites, located at Barrow and Atkasuk, collect approximately 2GB of data a day. The data are transferred over a satellite-based network to the DMF.
- The DMF collects and manages data from our remote ARM sites in the Tropics and North Slope. Data from the remote sites have minimal processing and the DMF converts these data into engineering units then performs and documents quality checks. The DMF provides approximately 3GB of processed data daily to the Archive.
- The XDC collects and processes external data from many sources as an adjunct to ARM site data. This includes satellite, weather, hydrological, aerosols, land use, and other supporting scientific data. The XDC provides approximately 8GB of processed data daily to the Archive.

Field Measurement Data System Architecture

ARM field measurement data systems are composed of three primary groups developed to collect, process, and transfer instrument data for scientific use and analyses.

- The collection system's major functions are data collection and transfer to the site data system processing server. At regularly scheduled intervals, it collects each instrument's data and frees up the instrument's storage to make room for subsequent measurements. Instruments interface with the collector via an Ethernet LAN or by individual serial connections.
- Once deposited in the appropriate collection directories, the data become available for processing. The major thrust of this processing is converting the native instrument format to network common data format (netCDF). Further processing includes calibrating the instrument data, converting where needed to engineering units, and conducting simple quality checks.

- The transfer of data from our field measurement sites to the DMF and Archive is managed by the Site Transfer Suite. This is an automated process designed to ensure complete transfer of ARM data from node to node.

Data processed on ARM production systems are assigned a data level that reflects the nature of processing that has been performed on the data. "First generation" data from field instruments are assessed through simple threshold checks of minimum and maximum values before they reach the Data Management Center. The checks help determine the quality of the data, and the results are included in the data stream.

The ARM Engineering Group provides standards and configuration management procedures for the development and production computing environments used in the ARM Program. The main goal of the ARM Information Architecture (AIA) development environment is to allow software to be quickly and easily installed at any ARM computing location and have that software be trackable, maintainable, and consistent across all installation locations.

For more information contact:

<http://www.arm.gov>
ARM Program Office (509) 375-2745

ARM Program Office
P.O. Box 999, K9-38
Richland, Washington 99352

Printed in U.S.A. on recycled paper (10/03).

