

ARM

CLIMATE RESEARCH FACILITY

FACT SHEET

Purpose

As a national user facility, the ARM Climate Research Facility is a unique asset for national and international research efforts related to global climate change. Scientists around the world use its capabilities to study the interactions between clouds, aerosols, and energy feedback processes in the atmosphere, ultimately leading to advances in climate models.

Sponsor

The U.S. Department of Energy's Office of Science

Participants

Nine national laboratories and numerous government agencies, universities, private companies, and foreign organizations work together in managing and operating the ARM Facility.

Features

- Three primary locations representing a range of climate conditions—Southern Great Plains, Tropical Western Pacific, and North Slope of Alaska—host heavily instrumented sites that gather massive amounts of climate data.
- ARM Mobile Facilities provide flexible instrument platforms for conducting field experiments lasting from 6 to 12 months in any environment, from the cold of the Arctic to the heat of the tropics.
- The ARM Aerial Facility uses aerial platforms to obtain key in situ and remote sensing measurements that contribute to the fundamental understanding of clouds, aerosols, and radiation.
- Serving nearly 5000 registered users from 15 federal and state agencies, 375 universities, and 67 countries, the ARM Data Archive collects and delivers about 5 terabytes of data per month.

www.arm.gov

U.S. Department of Energy Atmospheric Radiation Measurement Climate Research Facility

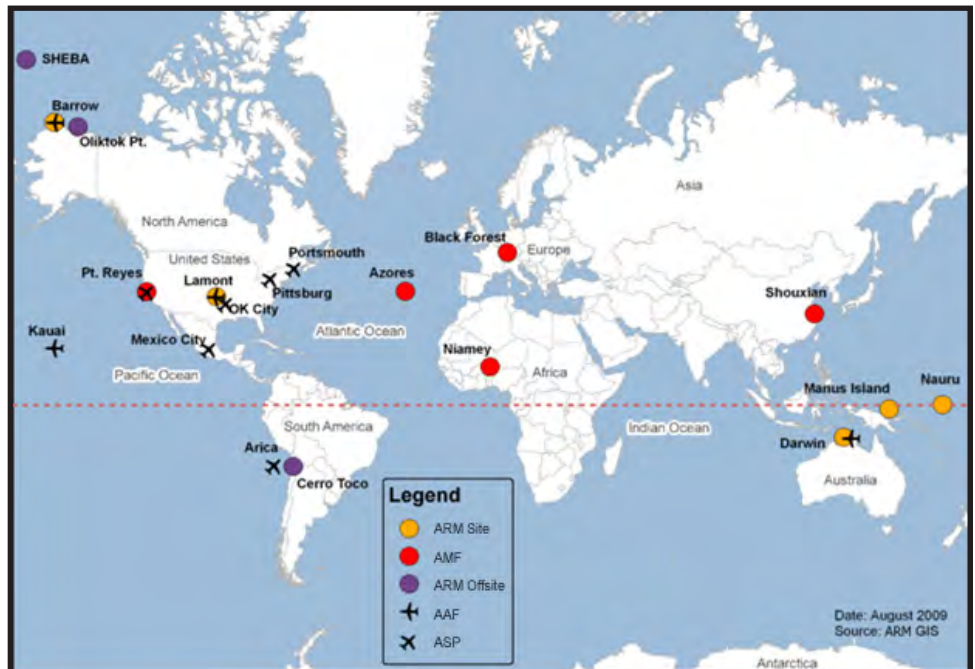
The Atmospheric Radiation Measurement (ARM) Climate Research Facility is a U.S. Department of Energy scientific user facility for researchers to study the effects and interactions of sunlight, infrared radiation, aerosols, and clouds to better understand their impact on temperatures, precipitation, and other aspects of weather and climate.

A central feature of this user facility is a set of heavily instrumented field research sites located at climatically diverse regions around the world. These sites obtain continuous measurements of atmospheric radiation and the properties controlling this radiation, such as the distribution of clouds and water vapor. Measurements from the fixed sites are supplemented through field campaigns using the ARM Mobile Facilities (AMF) and ARM Aerial Facility (AAF). Data collected through these capabilities, collectively referred to as the ARM Facility, are stored in the ARM Data Archive. Selected data sets are additionally analyzed and tested to create enhanced data products, and software tools are provided to help open and use these products. All data and enhanced products are freely available to the science community via the ARM Data Archive (www.archive.arm.gov) to aid in further research.

Researchers can use the ARM Facility in several ways:

- Make an in-person or virtual visit to a site
- Access data through the ARM Data Archive
- Propose and conduct a field campaign.

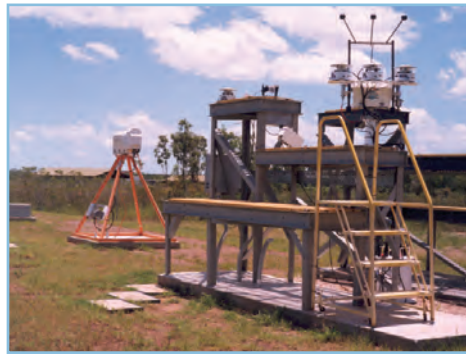
Each year, a call for proposals to use the ARM Facility is issued via advertisements in scientific news publications and on the ARM website (www.arm.gov/campaigns).





Southern Great Plains

The SGP site—located in north-central Oklahoma and south-central Kansas—was the first field measurement site established by ARM. This site is now the largest and most extensive climate research field site in the world. The SGP experiences a wide variety of cloud types and surface flux properties, as well as large seasonal variations in temperature and humidity. Collection of continuous measurements at this location began in 1994, with a complete suite of instruments operating since 1996.



Tropical Western Pacific

Three instrumented sites operate in the TWP locale, which is characterized by warm sea temperatures, deep and frequent atmospheric convection, high rain rates, strong coupling between the atmosphere and ocean, and substantial variability associated with El Niño. The first of these sites was established in 1996 on Manus Island, Papua New Guinea. The second TWP site was established on Nauru Island in 1998, and a third site began operating in April 2002 in Darwin, Australia. All three sites are operated in cooperation with local governments.



North Slope of Alaska

The NSA locale, situated on the edge of the Arctic Ocean, provides important information because unique climate processes—such as planetary heat loss from the poles and extensive sheets of ice that affect solar absorption and sea level—occur at high latitudes. The NSA's principal instrumented facility was installed near Barrow in 1997, followed by a smaller remote site in Atkasuk in 1999. Routine operations at these sites are conducted in partnership with employees of Ukpéagvik Iñupiat Corporation/Science Division.



ARM Mobile Facilities

The AMF was designed to explore science questions beyond those addressed by the current fixed sites. With instrumentation and data systems similar to the fixed sites, the AMF can be deployed to locations around the world for campaigns lasting 6 to 12 months. It is designed to operate in any environment, from the cold of the Arctic to the heat of the tropics. First deployed at Pt. Reyes, California, in 2005, the facility has since been to Niamey, Niger; Heselbach, Germany; Shouxian, China; and the Azores. A second mobile facility is under development.



ARM Aerial Facility

The AAF complements the long-term, ground-based measurements of cloud and atmospheric properties by emphasizing instrumented airborne measurement campaigns. In situ and remote sensing data acquired from instrumented aircraft at various altitudes provide critical information for studying how clouds and aerosols interact with solar and infrared radiation. The data are also used to evaluate and improve remote sensing measurement techniques.

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