ARM

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U.S. Department of Energy

ARM Mobile Facility

With long-term and mobile sites across the globe, the Atmospheric Radiation Measurement (ARM) user facility is used by scientists to obtain measurements of radiative fluxes, cloud and aerosol properties, precipitation interactions, and related atmospheric characteristics in diverse environments. To collect these measurements geared toward improving earth system models, ARM operates long-term, fixed-location atmospheric observatories in three regions—referred to as the Southern Great Plains, North Slope of Alaska, and Eastern North Atlantic—through strong collaborations between nine U.S. Department of Energy (DOE) national laboratories. These measurements are supplemented through periodic field campaigns by the ARM Aerial Facility and ARM Mobile Facility (AMF) deployments.

Consisting of several portable shelters, a baseline suite of instruments, data communications, and data systems, ARM Mobile Facilities are easily transported and relocated to make ideal platforms for conducting collaborative research anywhere in the world. An experienced team is deployed with each of the three mobile facilities to set up the shelters and instruments. Data from these facilities undergo quality checks and are made available in near-real time. Scientific and infrastructure staff are also available for collaborative planning activities, and systems are available to provide local onsite or virtual support for collaborating scientists using an AMF for their research.

AMF1: La Porte, Texas
(2021–2022)

AMF2: Gothic, Colorado
(2021–2023)

AMF3: Oliktok Point, Alaska
(2013–2021)

Baseline Capabilities

An AMF has instrumentation and data systems similar to the fixed atmospheric observatories. Each AMF has about 50 instruments to obtain continuous measurements of clouds, aerosols, precipitation, energy, and other meteorological variables. Instrumentation for the second ARM Mobile Facility (AMF2) is, with a few notable exceptions, the same as used by the first and third ARM Mobile Facilities (AMF1 and AMF3). Because shipboard deployments of AMF2 are encouraged, the baseline suite of instruments is marine-focused.

Key instruments include vertically pointing Ka-band radars, scanning dual-frequency X- and Ka-band radars, and one scanning C-band radar to measure properties of cloud and precipitation particles. A micropulse lidar monitors elevated aerosol layers and thin clouds, while the Doppler lidar combined with an infrared spectral radiometer provides measurements of boundary-layer winds, temperature, and humidity. Radiosondes on weather balloons provide wind and thermodynamic profiles throughout the troposphere. A suite of aerosol instrumentation is included with each AMF to collect measurements of aerosol optical depth, composition, size distribution, scattering, and absorption; cloud condensation nuclei; ice-nucleating particles; and trace gases.

Other instruments include a radar wind profiler to measure vertical wind and precipitation profiles, radiometers and eddy correlation flux measurement systems for monitoring surface fluxes, microwave radiometers for measuring precipitable water and liquid water path, and rain gauges and disdrometers for measuring rainfall characteristics. Digital cameras track cloud boundary location and movement.

Measurements obtained by these instruments are collected by computers inside an operations shelter. This shelter houses numerous computer stations for data and communication systems. The AMF operates 24 hours a day, seven days a week and is maintained by ARM staff. Because it is designed to support the scientific community, the AMF can also host guest instruments from collaborating researchers funded by DOE or other agencies. For a full list of available instruments, see ***www.arm.gov/capabilities/observatories/amf***.

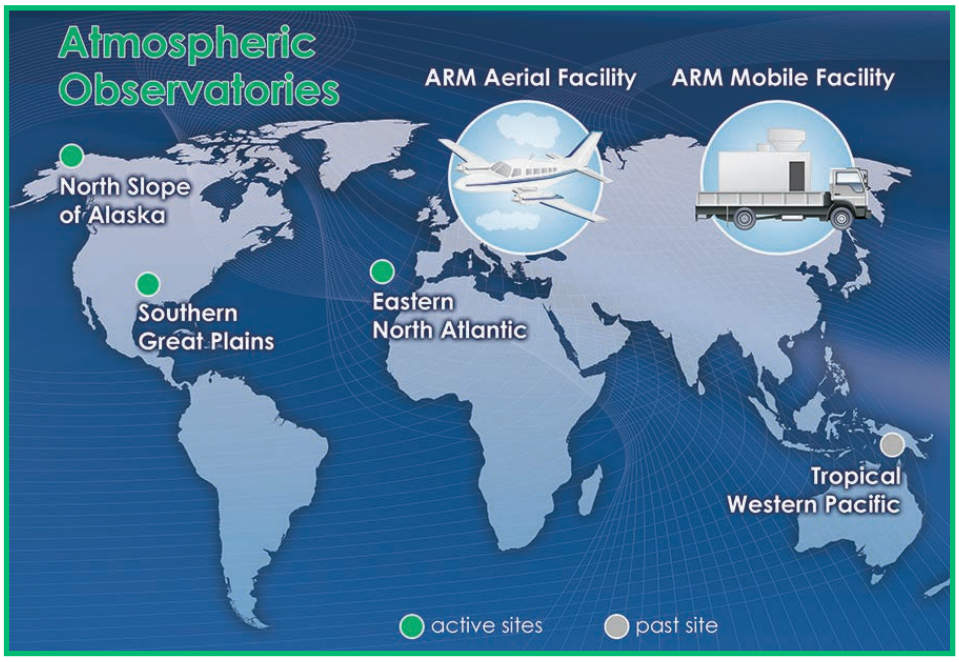
U.S. DEPARTMENT OF ENERGY | Office of Science

AMF Science

The purpose of an AMF is to explore research questions beyond those addressed by ARM's fixed atmospheric observatories in Alaska, Oklahoma, and the Azores in undersampled regions around the world. The AMF produces data sets for use by the atmospheric community to improve fundamental understanding of aerosol and cloud processes that affect the Earth's energy and water cycles and to test and improve earth system models.

Data from the AMF instruments are processed using specialized routines to produce standardized data products. These data are evaluated by scientific staff for overall quality and then processed and made available to the world, free of charge, in near-real time through the ARM Data Center, ***www.arm.gov/data.***

Each deployment is the result of a competitive process based upon proposals submitted by teams of scientists. Details about the AMF proposal process can be found at ***www.arm.gov/policies/campaign-guidelines/annual-facility-call***.



Recent Deployments

ARM Mobile Facility 1 (2021–2022)

To help researchers study the effects of aerosols on storms, the **TRacking Aerosol Convection interactions ExpeRiment (TRACER)** is scheduled from October 2021 through September 2022 around Houston, Texas. Scientists are interested in the area because of its numerous isolated convective storms, humid subtropical climate, and range of industrial and natural aerosol sources.

For TRACER, AMF1 is based at an airport in La Porte, 25 minutes east of downtown Houston. It is the first AMF deployment in an urban coastal environment.

ARM will have three other sites collecting data in the Houston area for TRACER. Together, the data will help scientists better understand how storms in the region begin, grow, fade, and dissipate.

ARM Mobile Facility 2 (2021–2023)

AMF2 will operate from September 2021 to June 2023 in Gothic, Colorado, as part of the **Surface Atmosphere Integrated Field Laboratory (SAIL)** campaign. The campaign aims to improve the understanding and modeling of processes connected to mountain hydrology.

Taking place in the East River Watershed within the Upper Colorado River Basin, SAIL will combine atmospheric measurements from ARM with existing surface and subsurface data from partner research organizations. Researchers will develop detailed measurements of mountainous water-cycle processes as they pertain to the Colorado River, which supplies water for 40 million people in the American West.

Through SAIL, researchers will enable an atmosphere-through-bedrock understanding of mountainous water cycles.

ARM Mobile Facility 3 (2013–2021)

Located at the North Slope of Alaska on the coast of the Arctic Ocean, Oliktok Point became the temporary home for AMF3, beginning in September 2013. ARM gathered data at Oliktok for an extended deployment of eight years to better understand aerosol, cloud, and radiative transfer processes that may play an important role in arctic atmospheric processes.

In 2021, ARM ended AMF3 operations at Oliktok. Next, ARM will move AMF3 to a location to be determined in the Southeastern United States for a new extended deployment. The Southeast was one of several high-priority science locations identified by the ARM science community in a 2018 workshop.

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www.arm.gov/capabilities/observatories/amf

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