

# ARM

CLIMATE RESEARCH FACILITY

## FACT SHEET

# U.S. Department of Energy ARM Mobile Facility

The Atmospheric Radiation Measurement (ARM) Climate Research Facility maintains field sites in the Southern Great Plains, the North Slope of Alaska, and the Tropical Western Pacific, plus the ARM Aerial Facility, to obtain continuous measurements of cloud and radiative properties for improving climate models. In addition, the ARM Mobile Facilities (AMF) provide flexible instrument platforms for conducting atmospheric experiments lasting from 6 to 12 months, in any environment, from the cold of the poles to the heat of the tropics. The first mobile facility, AMF1, was first deployed in 2005; the second facility, AMF2, is scheduled for its first deployment in October 2010.

Consisting of several portable shelters, a baseline suite of instruments, data communications, and data systems, the AMF is easily transported. An experienced team is deployed with the facility to set up the shelters and instruments. AMF data undergo quality checks and are made available in near real-time.

Because of its flexibility and portability, the AMF is an ideal platform for conducting collaborative research anywhere in the world. Scientific and infrastructure staff are available for collaborative planning activities, and systems are available to provide local on-site or virtual support for collaborating scientists using the AMF for their research.



Niamey, Niger (2006)



Shouxian, China (2008)



Graciosa Island, Azores (2009-2010)

## Baseline Capabilities

Measurement capabilities of AMF1 include the standard meteorological instrumentation, broadband and spectral radiometer suite, and remote sensing instruments. Instrumentation for AMF2 is, with a few notable exceptions, the same as used by AMF1. Because shipboard deployments of AMF2 are encouraged, the baseline suite of instruments is marine-focused.

- 95-GHz W-Band ARM Cloud Radar
- Balloon-Borne Sounding System
- Doppler Lidar, Micropulse Lidar, and Laser Ceilometer
- Microwave Radiometer
- Microwave Radiometer Profiler
- Sky Radiation System
- Ground Radiation System
- Atmospheric Emitted Radiance Interferometer
- Radar Wind Profiler
- Total Sky Imager
- Aerosol Observing System
- Surface Meteorology Station
- Eddy Correlation System
- Cimel Sun Photometer
- W- and Ka-Band Scanning ARM Cloud Radar (AMF1)
- X- and Ka-Band Scanning ARM Cloud Radar (AMF2)
- Ocean Meteorology Instruments (AMF2)

Measurements obtained by all these instruments are collected by computers inside an operations shelter. This shelter houses numerous computer stations for data and communication systems. The AMF operates on a continuous 24/7 schedule and is maintained by ARM Facility staff. Because it is designed to collaborate with experiments from other agencies, the AMF can also host instruments other than the baseline collection. For a full list of available instruments, see <http://www.arm.gov/sites/amf>.

## AMF Science

The purpose of the AMF is to collect essential information about cloudy and clear atmospheres in under-sampled climatically important regions. In some of these regions, even the macroscopic cloud structure is relatively unknown. The AMF produces data sets for use by the atmospheric community to test and improve parameterizations in global climate models.

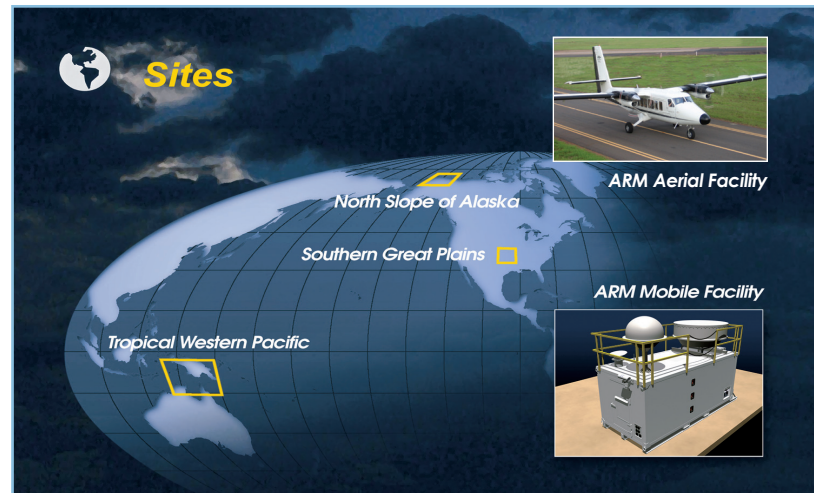
Data from the AMF instruments are processed using specialized routines to produce cloud and clear-sky data products. These data are evaluated by scientific staff for overall quality and then processed and made available to the world, free of charge, in near real-time through the ARM Data Archive—<http://www.archive.arm.gov>.

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 <http://www.arm.gov/campaigns/submit-proposals>.

### Shouxian, China (2008)

In its most complex deployment to date, the AMF participated in a four-site observational effort to acquire essential cloud, aerosol, radiative, and meteorological measurements for the Study of Aerosol Indirect Effects in China. Anchored by AMF1 at the Shouxian National Climate Observatory, the campaign included a supplemental facility with a reduced complement of AMF instruments at an observatory maintained by the Chinese Academy of Sciences. Both AMF1 and the supplementary facility operated from May through December 2008.

In addition, an ancillary facility with a subset of AMF instruments was established to the north and was operated by collaborators from Lanzhou University. Between May and October 2008, this facility obtained comparative measurements in two locations with different environmental conditions: semi-desert conditions at Zhangye in north-



central China, followed by a primarily agricultural environment at Xianghe on the northeast coast.

Measurements obtained from all the study sites during the eight-month deployment in China will help scientists to validate satellite-based data, understand the mechanisms of the aerosol indirect effects in the region, and examine the roles of aerosols in affecting regional climate and atmospheric circulation, with a special focus on the impact of the East Asian monsoon system.

### Graciosa Island, Azores (2009-2010)

In collaboration with the University of Azores and Portuguese Meteorological Institute, AMF1 is in the Azores for a 20-month field campaign to study low-level marine clouds and aerosols. Deployed to Graciosa Island in the Atlantic Ocean, the AMF is collecting data for the Clouds, Aerosol, and Precipitation in the Marine Boundary Layer field campaign from May 2009 to December 2010.

The length of this deployment will provide statistically relevant information about the relationships between aerosol and cloud properties required for evaluation of climate and process models. This will provide an unprecedented opportunity to study the seasonal cycle and create a rare data set for the subtropical marine boundary layer, where climate models show some of the greatest uncertainty in cloud behavior.

### Steamboat Springs, Colorado (2010-2011)

In late 2010, AMF2 will be deployed to Steamboat Springs, Colorado, to study liquid and mixed-phase clouds in conjunction with the Storm Peak Lab (SPL), a cloud and aerosol research facility operated by the Desert Research Institute. The already extensive instrument suite at SPL will be augmented with additional state-of-the-art instruments that are typically used for airborne cloud research by the Stratton Park Engineering Corporation (SPEC). SPL and SPEC will collect in situ cloud and precipitation property measurements while AMF2 operates at a lower elevation, gathering complementary measurements.

For more information, contact:

<http://www.arm.gov/sites/amf>

Kim Nitschke  
AMF1 Site Manager  
(505) 667-1186  
nitschke@lanl.gov

Nicki Hickmon  
AMF Technical Operations Support  
(630) 252-7662  
nhickmon@anl.gov

Doug Sisterson  
ARM Operations Manager  
(630) 252-5836  
dlsisterson@anl.gov