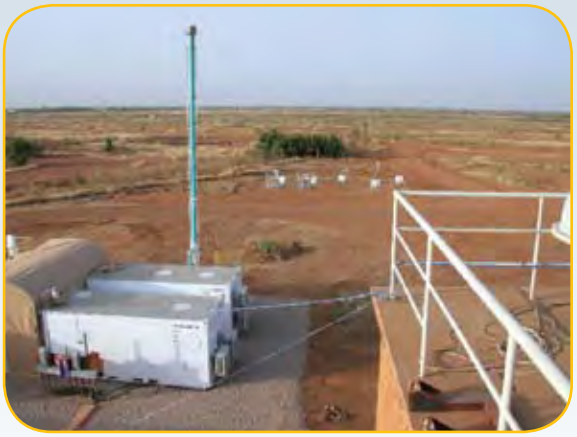
Radiative Atmospheric Divergence using ARM Mobile Facility, GERB, and AMMA Stations (RADAGAST)

Beginning in January 2006, the ARM Mobile Facility (AMF) began supporting RADAGAST to provide the first well-sampled direct estimates of the energy balance across the atmosphere. The experiment is part of an ongoing international study of the West African monsoon system and Saharan dust storms. Stationed outside the Niger Meteorological Office at the Niamey International Airport, the AMF is located beneath an instrumented geostationary satellite.

The field campaign is sponsored by the Atmospheric Radiation Measurement (ARM) Program, the largest global change research program within the U.S. Department of Energy's Office of Science.



In 2006, the ARM Mobile Facility is collecting cloud and atmospheric property measurements from a location near the airport in Niamey, Niger, West Africa.

Why Africa?

Saharan dust is an extremely fine powder that can cause hazy, overcast skies. An African dust storm is like a blizzard; it can close schools and airports, and force everyone to stay indoors. The effects of this dust, including its impact on the frequency and severity of the African monsoon season, are important to regional health, water supplies, agriculture, and the economy.

Data from the 1-year deployment in Niamey, Niger, will allow scientists to study how dust storms start, how far they spread, and what impact they have on incoming solar energy and the generation of monsoons. Because the dust can block incoming solar energy, and because solar energy drives weather and climate, scientists around the world are looking for ways to better understand these natural phenomena.

RADAGAST?

The "**Radiative Atmospheric Divergence using ARM Mobile Facility, GERB data and AMMA Stations**" project (better known by the acronym RADAGAST) encompasses the various components of the year-long AMF field campaign in Niamey, Niger.

ARM Mobile Facility – the AMF is a portable atmospheric laboratory equipped with a sophisticated suite of instruments designed to collect essential data from cloudy and clear atmospheres in important but under-sampled climatic regions. While in Africa, the AMF is sampling absorbing aerosols from desert dust in the dry season, and deep convective clouds and associated moisture loadings during the summer monsoon. In addition to the airport location, a small ancillary site located approximately 60 kilometers from Niamey is measuring gradients in atmospheric properties to help decipher localized effects.

GERB – the Geostationary Earth Radiation Budget (GERB) sensor is an instrument that measures incoming solar radiation, solar radiation reflected across the top of the atmosphere, and thermal radiation emitted by the earth. This instrument is onboard a European Union geostationary weather satellite launched in December 2005; it is collecting data over Niamey and the surrounding region.

AMMA – the African Monsoon Multidisciplinary Analysis (AMMA) is an ongoing study of the interactions between West African monsoon dynamics and scale, continental water cycle, aerosols, atmospheric chemistry, food, water, and health. To study these elements, scientists are collecting data using airplanes, satellites, and instrumented ground stations—including a station at Niamey.

For more information about this campaign, see http://www.arm.gov/sites/amf/niamey/

ARM Mobile Facility

The AMF requires a rotating staff of two people to maintain the instruments and ancillary equipment. It consists of the following main components:

- operations shelters
- standard meteorological instrumentation, broadband and spectral radiometer suite, and remote sensing instruments
- data and communications systems

Operations Shelters

A minimum of two large shipping containers serve as the facility shelters. Converted into laboratory space, these shelters house the computer and data systems connected to the high-tech instruments that collect data from the atmosphere. They also provide space for spare parts storage and conducting repairs.

Measurement Capabilities

Measurement capabilities include the standard meteorological instrumentation, broadband and spectral radiometer suite, and remote sensing instruments.

- 95 gigahertz W-band ARM Cloud Radar
- Micropulse Lidar
- Ceilometer
- Total Sky Imager
- Ground Radiation collection of radiometers, including
  - an inverted shortwave radiometer and
  - an inverted longwave radiometer
- Sky Radiation collection of radiometers, including
  - a shaded and unshaded shortwave radiometer,
  - a solar tracking normal incidence shortwave radiometer, and
  - a shaded longwave radiometer
- Multifilter Rotating Shadowband Radiometer
- Microwave Radiometer
- Microwave Radiometer Profiler
- Radar Wind Profiler
- Precipitation Radar
- Infrared Thermometers
- Surface Meteorology Station
- Balloon-Borne Sounding System
- Atmospheric Emitted Radiance Interferometer
- Aerosol Observing System

Data and Communication System

Continuous measurements obtained by the sensors and instruments are collected by computers in the operations shelters. These data are routinely checked for quality and transmitted to the ARM Data Archive for storage and availability to the scientific community.

Using the ARM Mobile Facility

The AMF is designed to collaborate with experiments (especially those involving aircraft) from other agencies. It can also accommodate other instruments in addition to, or in place of, the baseline collection. Organizations interested in using the AMF are encouraged to submit proposals at the following website:

http://www.arm.gov/acrf/submit_proposals.stm

Sponsor

The AMF was developed by the ARM Program through funding from the DOE Office of Science. Managed through the ARM Climate Research Facility, numerous national laboratories are responsible for the science, engineering, and operation of the AMF.

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