ARM
CLIMATE RESEARCH FACILITY

FACT SHEET

U.S. Department of Energy

ARM Aerial Facility

As an integral measurement capability of the ARM Climate Research Facility, the ARM Aerial Facility (AAF) provides airborne measurements required to answer science questions proposed by the international research community. Ground-based instrumentation at the ARM sites provides a unique and continuous record of the components of the atmospheric state and constituents that impact the surface radiation budget. The AAF enhances the utility and information content of long-term ground-based measurements by providing:

- in situ measurements of cloud properties for evaluating and improving ground-based remote sensing retrievals
- critical data for scaling ground-based remote sensing retrievals to larger temporal and spatial scales detected by satellites
- aircraft measurements of clouds, aerosols, and radiation for testing and evaluating high-resolution models and model parameterizations.

Facilities & Resources

The AAF supports routine airborne observations and participates in field campaigns designed to contribute to the fundamental understanding of clouds, aerosols, and radiation. To ensure that the best airborne data set can be obtained for a given campaign or routine airborne observational time period, the AAF continually assesses the capabilities of existing instruments and instruments under development within the airborne measurement community. New instruments are integrated into the AAF suite to fill current measurement gaps, as needed.

Working with instrument developers from national laboratories, universities, and private industry, the AAF takes an active role in new instrument development, particularly in the area of miniaturization, where existing instrumentation is merged with new technology to better fit into a space/weight-constrained airborne platform.

Research aircraft are selected and commissioned to address the wide range of airborne measurement requirements associated with atmospheric science issues. Aircraft choice for a given campaign or routine observational time period is dictated by science requirements—such as the required measurements and desired flight profile—and aircraft availability. As flight missions are identified, a risk evaluation is performed to ensure that the aircraft and mission meet all U.S. Department of Energy aviation policy guidelines and safety protocols. Data obtained from the aircraft are documented, checked for quality, integrated into the ARM Data Archive, and made available in a timely and consistent manner for use by the scientific community through the ARM website, ***http://www.arm.gov.***

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Field Campaigns

The AAF provides aerial measurement platforms that can be used to support experiments at the fixed sites, in conjunction with a mobile facility, or in support of other research activities, such as maturation/hardening of instruments. Use of the aircraft and instruments must be requested through the ARM field campaign process. To learn more about the proposal process for field campaigns involving the AAF, refer to ***http://www.arm.gov/sites/aaf***.

A Cessna 206 is obtaining routine measurements of carbon cycle trace gases over the Southern Great Plains site.

Deployments

Indirect and Semi-Direct Aerosol Campaign

For three weeks in April 2008, the ISDAC field campaign used a Convair-580 aircraft to obtain measurements from the sky above ARM's North Slope of Alaska site. Instrumentation on the aircraft gathered measurements of the atmospheric state, cloud microphysics, aerosol properties, and visible and infrared radiation. ISDAC took place during the International Polar Year, allowing researchers to interpret ISDAC data in combination with data gathered from other ancillary observing systems. These data, gathered in April, also provide a contrast to data gathered in October during a previous field campaign.

Routine AAF CLOWD Optical Radiative Observations

From January to June 2009, the AAF supported the RACORO field campaign. During this long-term campaign, a Twin Otter aircraft equipped with a full payload of research instrumentation conducted routine flights at the ARM Southern Great Plains site to sample low-altitude liquid-water clouds in the boundary layer. The purpose was to obtain representative statistics of cloud microphysical properties needed to validate retrieval algorithms and support process studies and model simulations of boundary layer clouds and, in particular, clouds with low optical water depths.

Routine Measurements of the Southern Great Plains

To meet new requirements for airborne measurements taken over the ARM Southern Great Plains site, the AAF's Cessna Turbo 206 is obtaining airborne carbon measurements on a routine basis. Airborne measurements of carbon cycle trace gases will provide data for quantifying regional carbon exchange and tracing the balance between anthropogenic (human-produced) emissions and biogeochemical cycling, which are identified as priorities by the U.S. Climate Change Research Program and the North American Carbon Program.

For more information, contact:

http://www.arm.gov/sites/aaf

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