Objectives for the
Atmospheric Radiation Measurement Climate Research Facility Workshop
October 21-22, 2008

In 1989, the U.S. Department of Energy (DOE) Office of Science created the Atmospheric Radiation Measurement (ARM) Program within the Office of Biological and Environmental Research (BER) to address scientific uncertainties related to global climate change, with a specific focus on the crucial role of clouds and their influence on the transfer of radiation in the atmosphere. Since the focus is climate research, BER created a user facility, the Atmospheric Radiation Measurement (ARM) Climate Research Facility (ACRF), with an operational paradigm of continuous measurement of atmospheric and surface properties at long-term sites. These sites are highly instrumented for studying cloud formation and maintenance processes and their influence on radiative transfer, and for measuring other parameters that determine the radiative properties of the atmosphere. Over the years the ACRF has evolved and has added a mobile facility (with a second one under construction) and aerial measurements to supplement the fixed sites. As ACRF enters its 17th year, BER intends to reconsider the ACRF operational concept.

Throughout its history ACRF has successfully provided the critical measurements needed by scientists for improving Global Climate Models (GCMs) and regional climate models. These models are the primary tool available to quantify potential effects of changes in atmospheric greenhouse gas concentrations, aerosols, and other climatically relevant factors on the atmospheric radiation balance and future climate. The most recent assessment report (AR4) by the Intergovernmental Panel on Climate Change (IPCC) reports that significant progress has been made to improve GCMs; however, a substantial spread in climate sensitivity to greenhouse gas emissions remains. The largest contributor to this spread is the diversity in model representations of cloud feedbacks—changes in the way clouds absorb or reflect radiative energy in a changing climate through changes in cloud amount or cloud properties. The AR4 also identifies aerosol-cloud interactions as the largest source of uncertainty in radiative forcing.

As BER develops its plans for future research needs, we are seeking input on the range of remaining scientific uncertainties, the contributions that the ACRF can make to reduce those uncertainties, and different strategies for using and structuring the ACRF to address these scientific needs. This workshop specifically addresses the different strategies and options that should be considered to address current scientific needs. Several questions should be considered by workshop participants:

- What are the outstanding science questions for the next ten years?
- What specific locations are appropriate to address science questions? How long an observational period will be required at each location?
- What measurements, instruments, and data products are needed to address science questions?
- What measurements in addition to those currently made at the ACRF should be considered and
- What is the scientific benefit of each option?
- What data products in addition to those currently produced by the ACRF should be considered and what is the scientific benefit of each option?