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New ARM Measurements of Clouds, Aerosols, and the Atmospheric State

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The DOE Atmospheric Radiation Measurement (ARM) program has recently enhanced its observational capabilities at its fixed and mobile sites as well as its aerial facility. New capabilities include scanning radars, several types of lidars, an array of aerosol instruments, and in situ cloud probes. All ARM sites have been equipped with dual frequency scanning cloud radars that will provide three-dimensional observations of cloud fields for analysis of cloud field evolution. Sites in Oklahoma, Alaska, and Papua New Guinea have also received scanning centimeter wavelength radars for observing precipitation fields. This combination of radars will provide the means to study the interaction of clouds and precipitation. New lidars include a Raman lidar in Darwin, Australia and High Spectral Resolution Lidars in Barrow and with the second ARM Mobile Facility. Each of these lidars will provide profiles of aerosol extinction while the Raman will also measure profiles of water vapor. ARM has also expanded its capabilities in the realm of aerosol observations. ARM is adding Aerosol Observing Systems to its sites in Darwin and the second mobile facility. These aerosol systems principally provided measurements of aerosol optical properties. In addition, a new Mobile Aerosol Observing System has been developed that includes a variety of instruments to provide information about aerosol chemistry and size distributions. Many of these aerosol instruments are also available for the ARM Aerial Facility. The Aerial Facility also now includes a variety of cloud probes for measuring size distribution and water content. The new array of ARM instruments is intended to build upon the existing ARM capabilities to better study the interactions among aerosol, clouds, and precipitation. Data from these instruments are now available and development of advanced data products is underway.