Southern Great Plains Newsletter

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New Cloud Radar Is Deployed at SGP

The W-band ARM cloud radar (WACR), under development since 2004, has been deployed at the SGP central facility. A dual-polarization radar operating at 95 gigahertz (GHz), the WACR will provide continuous zenith (vertically pointing) measurements of clouds to complement measurements made by the millimeter-wavelength cloud radar (MMCR).

The MMCR is also a zenith-pointing radar, but it operates at a frequency of 35 GHz. The MMCR determines cloud boundaries (cloud bottoms and tops), as well as radar reflectivity (dBZ) of the atmosphere up to 14 km. Both radars' Doppler capabilities allow measurement of vertical velocities of cloud elements.

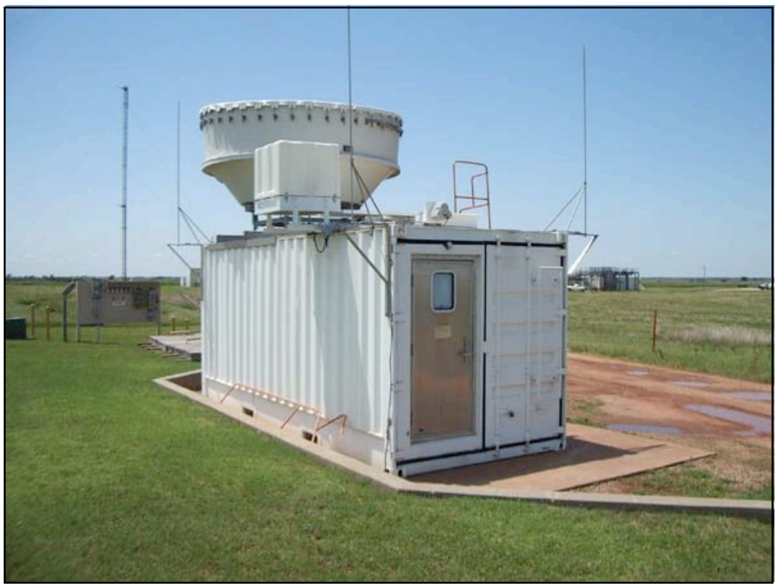

Figure 1. The cloud radar shelter at the SGP. The large MMCR antenna is at the rear of the shelter. The WACR antenna is the white cube in the foreground (ARM photo).

The WACR was built by ProSensing, Inc., of Amherst, Massachusetts, specifically for the ARM Program. It has been installed in the existing MMCR shelter at the SGP central facility (Figures 1 and 2). Dual-wavelength data from the collocated WACR and MMCR systems will improve estimates of cloud parameters.

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Technical Contact: James C. Liljegren
Phone: 630-252-9540
Email: jcliljegren@anl.gov
Editor: Donna J. Holdridge
Website: http://www.arm.gov

Both the MMCR and WACR work by transmitting pulses of millimeter-wave energy through an antenna. The energy propagates through the atmosphere until it hits an object — clouds, precipitation, insects, spider webs, man-made objects, etc.—that reflects some of the energy back to the antenna. The signal returning to the antenna is processed into data.

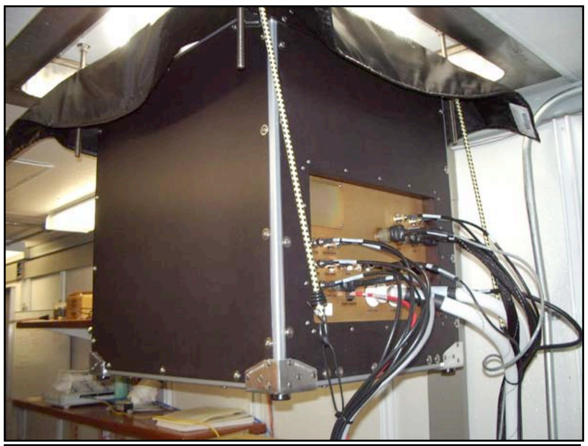

Figure 2. The W-band ARM cloud radar mounted inside the MMCR shelter at the SGP central facility (ARM photo).

An important advantage of the WACR system is that it is less sensitive than the MMCR to backscatter from insects. Insects can reflect radar energy at certain wavelengths and generate false radar images. By distinguishing cloud signals from contaminating signals due to insects and other false radar returns, the WACR will give scientists the best possible data on the clouds in the atmospheric boundary layer.

ARM Welcomes Brad Orr as SGP Assistant Site Manager

Brad Orr (Figure 3) joined the ARM Climate Research Facility (ACRF) Operations Team at Argonne on July 11, 2005, as the assistant site manager for the SGP site. Brad did his undergraduate work at the University of Nebraska-Lincoln and obtained his master of science degree ("Boundary Layer Momentum Budgets as Determined by a Single Scanning Doppler Radar") at Colorado State University.

Brad enjoyed a long association with the National Oceanic and Atmospheric Administration's Environmental Technology Laboratory (NOAA/ETL), beginning as an undergraduate research assistant in 1985-1987 and a graduate research assistant in 1988-1990. He continued as a research meteorologist with NOAA/ETL in the Radar Meteorology and Oceanography Division (1991-2001), then in the Optical Remote Sensing Division (2001-2003). He most recently served NOAA/ETL as deputy division chief/research meteorologist in the Microwave Systems Development Division (2003-2005).

Figure 3. Brad Orr as he joins the ACRF Operations Team (ARM photo).

Brad brings to ARM a broad background in remote sensing fieldwork, with extensive experience operating sophisticated remote sensors in the field and subsequent data processing. He has worked with scanning precipitation and cloud radars, vertically profiling cloud radars, wind profilers, microwave radiometers, and lidars.

Brad participated in the Nauru 99 international research expedition in the tropical western Pacific Ocean. He also worked on reanalysis of microwave radiometer data collected at ice station SHEBA (in the project Surface Heat Budget of the Arctic, conducted on an icebreaker frozen in the Arctic ice pack) and at the ACRF North Slope of Alaska site. He is therefore familiar with the ARM Program and has collaborated and published with several ARM Science Team members. Most recently, he played an important role in a high-visibility NOAA project designed to demonstrate the potential of unmanned aerospace vehicles as weather observation platforms.

For the last three years, Brad has moved toward management as deputy chief of a science/technical division at NOAA/ETL. This work gave him experience with a wide range of issues — from the development of legal agreements to the distribution and tracking of funds and the handling of large acquisitions, legal requirements, and personnel matters at all levels. We are pleased to have Brad join the ACRF infrastructure team.

Climate Capsule

"Climate Capsule" is a monthly feature introducing climate and weather definitions.

Radar Reflectivity

: the amount of transmitted power returned to a radar receiver, often designated by the symbol *z*. A complex empirical equation that relates the amount of power received (in watts), the distance and nature of the target, and other factors is used to calculate *z*. In addition, *z* can be defined in terms of the density of water droplets that would return an equivalent amount of power. Because the range of *z* values is wide enough to include both very weak and very strong signals, *z* values are often converted to the logarithmic decibel scale (dBz) for convenient calculation and comparison. On radar maps, *z* is expressed in dBz units.