

October 1999

ARM Facilities Newsletter



Okmulgee Update

The ARM SGP CART facility in the Okmulgee State Park (see May 1999 newsletter) has encountered a problem with nature. The 60-foot instrument tower has recently become a popular hangout for the birds and the bees.

Perching turkey vultures are making a mess by leaving behind



droppings that coat the instruments and make them inoperable. In addition, the bird droppings pose health and safety concerns for workers who could slip on the dropping-coated stairs or contract a disease from the bird waste. The ARM operations

team is initiating a program to clean the tower and instruments and to discourage the birds from perching there. A sonic bird repeller that emits a turkey vulture distress cry will be installed on the tower. The birds, thinking that danger is near and that flock mates are in trouble, are expected to leave the area. The sounds are not harmful to the birds but should keep them off the tower. In addition, two inflatable red and yellow balls will be installed. The balls have holographic "eyes" that appear to follow a bird's movements, frightening it away.

Large swarms of yellow jacket wasps have also taken interest in the instrument tower (more likely the bird droppings), making it impossible for ARM workers to access the structure. Because this species of wasp packs a potent sting, maintenance has been put on hold until cold weather arrives to subdue the yellow jackets.



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Cloud Layer Experiment IOP

During the first three weeks of November, scientists will be focusing their attention on the clouds. The Cloud Layer Experiment (CLEX-5) on November 2-19,



Figure 1. The University of North Dakota Citation II research aircraft.

1999, will be centered over and around the SGP CART site central facility near Lamont, Oklahoma. This intensive observation period is being directed by the Cooperative Institute for Research in the Atmosphere and the Colorado State University Department of Atmospheric Science. CLEX-5 is a continuation of a similar field project that took place at the SGP CART site in July 1996.

The objective of CLEX-5 is to study mid-level (1.25 to 3.75 miles high), non-precipitating clouds and develop a way to determine the heights of cloud bases and tops by using images and data gathered by satellites. Scientists also will be studying the interaction of solar radiation with mid-level clouds and the effect on the overall energy budget. In addition, scientists will use information gathered about clouds to improve the performance of weather forecasting models.

Data will be gathered from space via weather satellites, from the clouds by research aircraft, and on the ground through the vast network of ARM instrumentation. The University of North Dakota's Citation II research aircraft (Figure 1) will measure properties such as cloud liquid water content, cloud droplet size and distribution, atmospheric pressure, temperature, humidity, and winds. Scientists will also observe and videotape the clouds from which they gather data during the flights. The Citation II is a twin-engine fan jet aircraft that is very versatile and can fly at high or low altitudes and at the slower air speeds that are sometimes required for microphysical cloud measurements. The aircraft cabin, 5 feet in diameter and 16 feet long, carries three flight crew members and one or two scientists.

Data collected on the ground will include radar images and time-lapse videotape of



Figure 2. The millimeter-wave cloud radar (MMCR) located at the ARM SGP central facility.

clouds, as well as a host of solar radiation measurements and standard meteorological measurements. These measurements will be used as the "ground truth" for verifying data gathered by satellites.

One of the more interesting ground-based ARM instruments is the millimeter-wave cloud radar (MMCR) located at the central facility (Figure 2). The MMCR, a vertical-pointing radar that operates at a frequency of 35 gigahertz (1 gigahertz = 1

Colorado, the MMCR was designed to operate at the ARM SGP CART site on a long-term basis. The average life span of an MMCR is 20,000 hours or approximately 2.3 years of continuous operation.

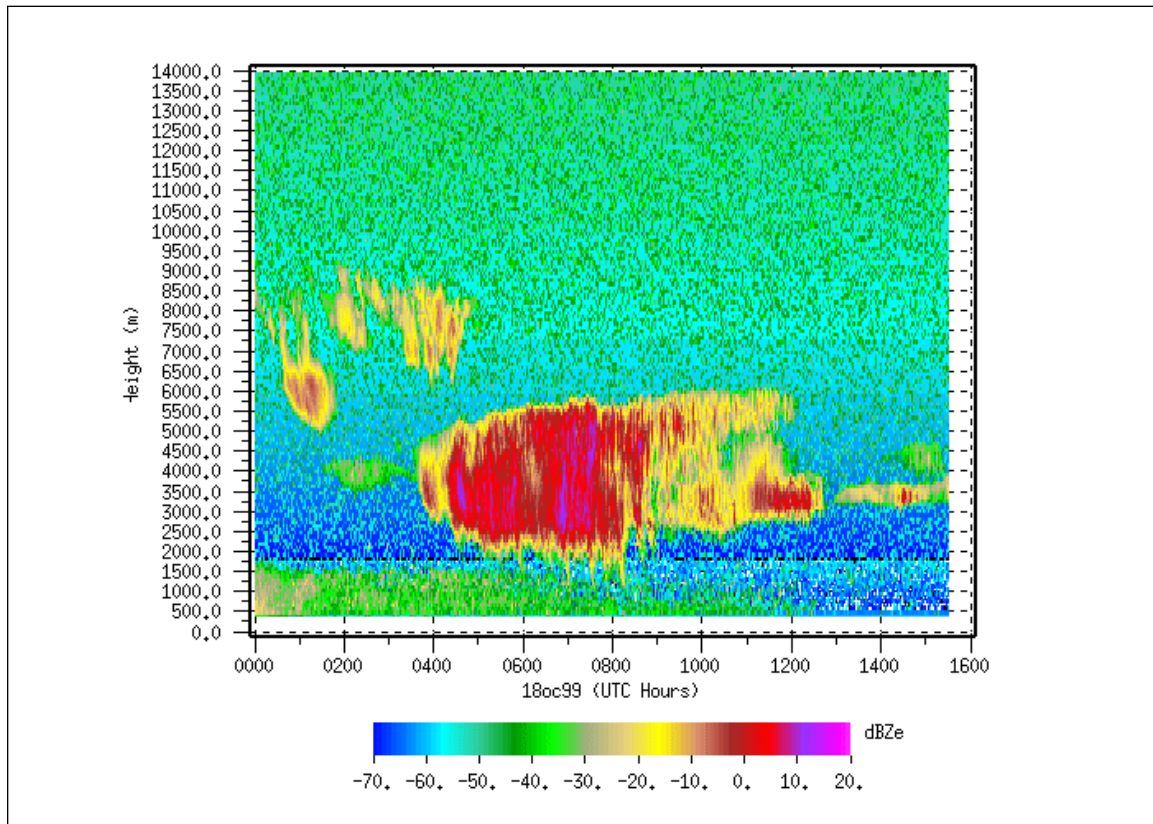


Figure 3. A time-height cross section from the millimeter-wave cloud radar (MMCR). A cloud is indicated above the MMCR location between 0400 and 1200 UTC. The cloud base is at approximately 2000 meters (6550 feet). The cloud top is near 5500 meters (18,050 feet).

billion pulses per second), is used to observe cloud structure and to locate the heights of cloud bottoms and tops. Like a traditional weather radar, the MMCR can report reflectivity. Its Doppler capabilities provide detailed information on the speed and direction of a cloud's movement. During operation, the MMCR captures images of what is occurring directly overhead. The plots (Figure 3) show the cloud images detected by the MMCR over a period of time. Built by the National Oceanic and Atmospheric Administration's Environmental Technology Laboratory in Boulder,

The ARM SGP CART site has a large, diverse array of instrumentation that operates continuously and permanently and provides uninterrupted data streams. This very productive and cost effective field site is one of the most advanced outdoor research facilities in the world. By focusing their research over this unique site and by using the high-quality data collected by ARM, CLEX-5 researchers hope to advance their understanding of mid-level clouds and improve the accuracy of weather forecast models.