

# Developments and Accomplishments at the ARM Climate Research Facility Southern Great Plains Site During 2005

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## New Instruments

New instruments were installed at the ARM Climate Research Facility (ACRF) in 2005. This paper discusses these developments as well as accomplishments that occurred during the year.

### **W-Band Atmospheric Radiation Measurement (ARM) Program Cloud Radar (WACR)**

The WACR was installed in the millimeter wave cloud radar (MMCR) trailer and will provide information on insect returns and other “atmospheric plankton,” which are problematic in the MMCR data, as well as additional information on clouds. We thank Kevin Widener, Pacific Northwest National Laboratory, for his significant effort in this process. The WACR was removed to support the ARM Mobile Facility (AMF) deployment with a replacement expected in April 2006. A picture of the WACR at ProSensing is shown in Figure 1. The Instrument Mentor is Kevin Widener.



**Figure 1.** The WACR shown at ProSensing.

## **Infrared Sky Imager**

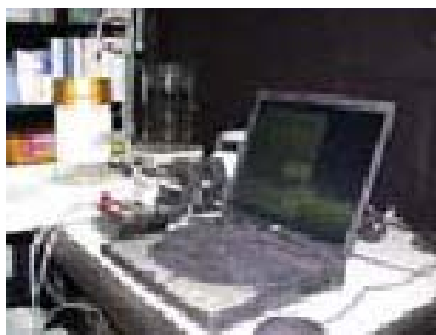
An infrared sky imager (Figure 2) designed specifically for the ARM Program was deployed at the Southern Great Plains (SGP) Central Facility (CF). Complimenting the total sky imager, the primary function of the infrared sky imager is to produce images and cloud fraction at night. The Instrument Mentor is Victor Morris, Pacific Northwest National Laboratory.



**Figure 2.** The infrared sky imager at the SGP CF.

## **Dynamic Rain Gauge Calibrator**

A new dynamic rain gauge calibrator has been built and is being used to calibrate rain gauges for the Hydro-Kansas campaign (setup shown below). Mike Ritsche put a significant effort on this project, which will be used eventually to calibrate all ARM rain gauges. The Instrument Mentor is Mike Ritsche, Argonne National Laboratory.



**Figure 3.** The dynamic rain gauge calibrator.

## **Tandem Differential Mobility Analyzer**

The Tandem Differential Mobility Analyzer (Figure 4) was installed by Texas A&M University for measurement of size distribution, hygroscopic growth, and volatility of sub-micron aerosols. The Tandem Differential Mobility Analyzer is shown before installation in the aerosol observing system. The Instrument Mentor is Don Collins, Texas A&M University.



**Figure 4.** The Tandem Differential Mobility Analyzer before installation in the aerosol observing system.

### **Extended Facility Infrared Thermometers**

A network of infrared thermometers was deployed at 12 of the SGP extended facilities (EFs). A test unit is shown in Figure 5. Chuck Long and Vic Morris were instrumental in this effort. Dan Nelson was fundamental in developing an enclosure to protect the mirrors. The Instrument Mentor is Victor Morris.



**Figure 5.** A test unit of infrared thermometers.

### **Surface Temperature and Humidity Reference System**

A new surface temperature and humidity sensing system was installed at the SGP CF for ground reference checks for radiosonde launches. It replaces the old chilled mirror system and features six temperature and humidity sensors. The Instrument Mentor is Mike Ritsche.

## **Facilities**

### **Shipping and Receiving**

Construction of a new shipping and receiving building at the SGP CF was completed (Figure 6). This was a much needed addition for onsite storage of spare parts and the increased volume of shipments that pass through the SGP. Figure 7 shows Dan Nelson presenting George Sawyer with the keys to the shipping and receiving building.



**Figure 6.** The photo on the right shows Dan Nelson presenting George Sawyer with the keys to the new shipping and receiving building (photo at left) as Dan Rusk and Brad Orr stand guard.

## **Electric Panel Upgrades**

The aging, original plywood electric panels were replaced with rugged aluminum framed panels. These panels are used to support the electric meters and breaker boxes throughout the SGP CF

## **Computer Systems**

### **EF Laptop Replacement**

The EF laptop computers were replaced with more robust and climate-tolerant systems, which were designed by Ron Reed at the SGP site. This has produced an increase in instrument system reliability.

### **Network Equipment Upgrade**

The ESNet gateway router and Voice-Over IP servers were replaced. This included a significant redesign of the computer rack layout.

### **Data System Computer Upgrade**

Replacement of the Site Data Systems with SUN Sparc V-120s was completed.

### **New Tape Backup System**

A new tape backup system was installed to replace the slow and aging tape library system.

## **Data and Visitors**

### **Data Availability**

Dave Breedlove and his staff did an excellent job keeping SGP site data availability above 95% during the last year.

### **Radiometer Calibrations**

350 radiometers were calibrated as part of BORCAL and IRCAL.

## Site Visitors

The SGP site had over 650 visits by scientists and guests at the CF.

## Field Campaigns

Table 1 lists the field campaigns conducted at the SGP site during 2005.



Figure 7. Photos of various field campaigns conducted at the SGP site in 2005.

<b>Table 1. Field campaigns conducted at the SGP site during 2005</b>		
<b>Field Campaign</b>	<b>PIs Involved</b>	<b>Purpose of Campaign</b>
Hydro-Kansas	Vijay Gupta, Witold Krajewski	Support the deployment, maintenance, and data collection of a network of rain and steam gauges that will be used to test new predictive models of flooding and runoff generation.
Atmospheric Infrared Sounder Validation – Phase IV	Barry Lesht	Provide sounding validation for the Aqua satellite Atmospheric Infrared Sounder sensor water vapor retrievals.
Combined Wind Profiler and Polarimetric Radar Study of Precipitation	Phil Chilson	Use a 915-MHz wind profiler to estimate precipitation drop-size distributions for comparison with the National Severe Storms Laboratory WSR-88D KOUN radar.
Precision Gas Sampling	Marc Fischer	Continue to support the measurement of eddy covariance and soil chamber fluxes in burned and unburned prairie near the SGP site.
Aerosol Lidar Validation Experiment	Beat Schmid	Validation of Raman lidar and micropulse lidar extinction profiles using the National Aeronautics and Space Agency AATS-14.
Boundary Layer CO <sub>2</sub> Experiment	Michael Dobbs	To use Southern Great Plains instrumentation to validate retrieval algorithms for airborne lidar derived boundary layer CO <sub>2</sub> concentrations.
ARM Atmospheric Compensation	Debra Davidson	Test the use of ARM instrumentation for atmospheric compensation of airborne imagery.

## **Acknowledgements**

We would like to thank the entire SPG site staff for an excellent job this last year in their continued support of all aspects of operations. We continually receive compliments from guest scientists and visitors on the accommodating and professional attitude of the staff. For further information about the SGP site or ARM see [www.arm.gov](http://www.arm.gov).