

Southern Great Plains Site Scientist Team Quarterly Report

June 1 – August 31, 2004

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1. Introduction

The Southern Great Plains (SGP) Site Scientist Team (SST) prepares Quarterly Site Scientist Reports, outlining scientific support for site operations for the period covered by the report and assessing the efficacy of site operations in achieving the goals outlined in the *Site Scientific Mission Plan*. The reports are distributed to the ARM Science Team (Chief Scientist) and delivered to the ARM Program Office on March 1, June 1, September 1, and December 1 of each year. Updates on the SST's research and educational outreach programs are available in other documents provided to the ARM Program.

The following sections in this report cover the period from June 1 to August 31, 2004:

2. Site Operations Activities
3. Outreach Program
4. Data Quality
5. Instrument Mentorship
6. Meetings

2. Site Operations Activities

The SST provides scientific guidance to SGP Operations and Facility personnel in all activities that are related to data quality or that might influence the scientific productivity of the site. Each week, the SST hosts the Site Scientist Coordination teleconference to review data availability, data quality, engineering, facilities, and Field Campaign performance at the SGP. In addition to the SST, personnel from the Site Data System (SDS), Operations, the Data Quality Office (DQO), and Argonne National Laboratory (ANL) participate. Notes from these meetings, including links to the weekly Data Availability and Data Quality Reports, are available online at:

<http://www.cimms.ou.edu/ARM/sscm/minutes.html>

The SST also develops and maintains computer code to aid Operations in analyzing and reporting on data availability and validity. Changes in instrument operating frequencies and status are reflected in the code as necessary, as well as Engineering ingest and processing changes.

Don Bond continued visits to the Central Facility (CF) for meetings with Site Operations personnel, meetings with field campaign participants, etc.

Pete Lamb and Don began planning for future SGP science efforts to aid Operations in prioritizing facilities and instruments needs.

a. New Instruments and Datastreams

Aerosol: Final data, reprocessed data, and documentation from the 2003 field campaign: covert-elleman-uw, hudson-ccn, kirchstetter-tc_bc_atn, michalsky-sfcalb, wang-dma, pilewskie-ssfr, schmidt-aats14, and ji-smart.

Maps: BODS entries for sgpmaps60X1.c1 and sgpallmaps60X1.c1.

Nested Grid Model (NGM): BODS entry for NGM data and the sgpngm250X1.c1 data stream.

US Department of Agriculture (USDA): BODS and DODS entries for four USDA Radiation Monitoring Data datastreams (ascii format only).

b. Field Campaigns

Field campaigns during this period continued their focus on providing critical data sets on an episodic basis for the Science Team, as well as field support for instrument development.

Detailed descriptions of the following field campaigns are contained in Appendix A.

<u>Name of Study</u>	<u>Status</u>	<u>Dates</u>
Broadband Radiometer Cleaning Study	Completed	April 1, 2003 – June 24, 2004
AIRS Validation IOP (3 rd round)	Completed	April 2 - August 10, 2004
PGS Validation	In Progress	April 15 - Dec. 31, 2004
WSI Stereoscopic Imaging	In Progress	June 9 - October 31, 2004
Boundary Layer CO ₂ / CW Lidar	Planned	October 11 – 18, 2004
Flare Observations	Planned	October, 2004
Surface Albedo	Planned	October 20 - 27, 2004

c. Site Accomplishments

Broadband Outdoor Radiometer CALibration (BORCAL): In late August, the second BORCAL was completed. This is the process by which the broadband shortwave radiometers (PSP, 848, and NIP) are calibrated. Approximately half of the SGP broadband radiometers are calibrated in each BORCAL annually. BORCAL #2 also included radiometers from TWP and NSA.

MilliMeter Cloud Radar (MMCR): Ken Moran and Tom Ayers (NOAA/ETL) upgraded the MMCR with polarization capability on August 12th. At the same time, the operational modes of the MMCR were modified based on discussions with the ARM Cloud Properties Working Group (BCR-858).

Okmulgee, OK (Extended Facility #21): Final modifications to the rotating bird deterrent were completed (ECO-332). This device is now successfully preventing the turkey vultures from roosting on the tower and on the radiometers mounted on the top level. Spikes have been installed on the instrument booms to prevent the turkey vultures from roosting on the SMOS and ECOR systems.

Radar Wind Profiles (RWPs): Following a procedure developed by Atmospheric Boundary Layer Experiment technician John Lucas, SGP technician Mike Rainwater refurbished the phase shifter in the 915-MHz RWP at Intermediate Facility #3 (Meeker, OK). A Network Time Protocol Daemon was installed on all of the RWP systems to resolve time synchronization problems.

Raman Lidar: On June 28th the receiving telescope was removed and shipped to Optical Guidance Systems, the original manufacturer, to have all three mirrors stripped and recoated. The refurbished telescope was returned to SGP in mid-August. The lidar system will be out of service until approximately mid-September. New interference filters have also been ordered. The new filters will have a transmissivity in the 70-75% range compared with 35-40% values for the old filters, which will approximately double the light reaching the detectors (EWO-11029).

Site Data System: More cost effective satellite alternatives to the T1 links between the SGP and Boundary Facilities were implemented (ECO-00073). Hardware installation was completed by April 10th, and the T1 lines were decommissioned on June 30th.

Storage Expansion: The fire risk assessment was completed for the addition of a 60 x 60 feet unheated storage structure to the existing shipping and receiving trailer at IDP4.

Temperature and Relative Humidity Calibration: Bill Porch and Edan Lindaman (LANL) calibrated TWP sensors on July 14th using the SGP temperature and humidity chamber.

d. BCR's and ECR's

Don participates in the Baseline Change Request (BCR) and Engineering Change Request (ECR) processes to provide SST input to discussions involving operations changes. BCR's and ECR's submitted during this quarter are summarized in Appendix B.

3. Outreach Program

The SST conducts educational outreach as administered by the Oklahoma Climatological Survey (OCS). The OCS SGP outreach website is

<http://k12.ocs.ou.edu/>

Don and OCS answer emails and telephone calls from both the general public and the research community about the ARM program, instrumentation, shared data, etc. During this quarter, Don gave assistance with ARM cloud data to an OU student who toured the site last quarter.

OCS hosted the annual EarthStorm K-12 Teacher Institute in Norman from July 12th to 15th. 20 teachers from Oklahoma and Kansas learned how to integrate ARM data into their math and science curricula. Don sat on the Earthstorm Judging Panel on July 15th to explain science fair judging procedures to educators.

OCS also participated as instructors in the K-12 Teacher Engineering Institute in Amherst, MA, from July 25th to 30th. The institute was convened in conjunction with the University of Massachusetts Remote Sensing Lab. 25 teachers from Massachusetts, Arizona, Colorado, Oklahoma, Florida, and Puerto Rico were trained.

OCS began evaluating the workshop assessment forms provided by teachers in the Earthstorm K-12 workshop and the K-12 Teacher Engineering Institute. Remote sensing modules were developed for both workshops using satellite imagery and ground-based ARM measurements to teach about radiation and climate variability. These 45 teachers join almost 300 school teachers across the country now using ARM data in their classrooms to educate over 4500 students.

Planning for the 2005 OCS ARM/Mesonet Science Fair began this quarter.

4. Data Quality

Don interacts with Instrument Mentors, Site Operations, and the DQO through the new DQPR database to troubleshoot data quality problems and expedite corrective maintenance. The format of the database encourages dialogue between participating entities and provides comprehensive documentation of discussions and maintenance activities associated with the process. The DQPR database can be accessed online at

<http://www.db.arm.gov/DQPR/>

Don examines the weekly Data Quality Assessment Reports issued by the DQO to alert Site Operations of instrument problems and issue DQPR's as necessary, as well as performing calculations or investigations requested by Operations or others.

5. Instrument Mentorship

Don serves as Instrument Mentor for the Soil Water and Temperature System (SWATS). Mentoring duties include monitoring and reporting data quality, maintaining the SWATS Instrument Page, coordinating with Operations to troubleshoot instrument problems, requesting data reprocessing as necessary, and serving as a point of contact to the public for questions about the SWATS system.

The SWATS at Morris, OK, (E18) has been providing unrepresentative data due to its location in a low area where the water table is apparently just below the surface. This system was replaced (July 2003) due to lightning damage attributed in part to saturated soil conditions. It may be necessary to remove the SWATS from this location and find another site for it. In addition, other SWATS installations have steadily degraded over time. Don is conducting a thorough review of these systems to determine whether the installation of a redundant sensor array would be beneficial and for which sites it would be necessary (EWO-10928).

A new procedure for flagging SWATS data quality was issued this quarter through the BCR process. SWATS hardware changes were coordinated with the instrument vendor (EWO-10928).

Don traveled to Argonne National Laboratory to participate in the ACRF Instrument Team meeting (August 18th-19th).

6. Meetings

The SST is represented at ARM Working Group meetings as necessary in order to help plan field campaigns and participate in discussions regarding data quality, new instruments and datastreams, emerging research issues, etc.

In addition to the Instrument Team meeting (prev. section), Don traveled to the Central Facility to meet with David Kahler (Cornell Univ.) to research historical records of pan evaporation measurements in northern Oklahoma. Current precipitation instruments in Grant County (non-ARM) were visited.

Appendix A – Field Campaigns

AIRS Validation (3rd round) April 2 – August 10, 2004

In support of the validation of the AIRS instrument on the Aqua satellite launched in March 2002, two radiosondes were launched approximately daily from the Central Facility about 45 minutes apart. The SGP launched 90 successful supplemental soundings concurrent with the satellite's overpass.

Boundary Layer CO₂ / CW Lidar October 11 – 18, 2004

Mike Dobbs (ITT) is planning a series of flights over the SGP Central Facility for demonstration and validation of a new lidar remote sensing technology intended to be applied towards future NASA and NOAA missions. Data will be used to validate, by comparison with ground truth data, the performance of the instrument and retrieval algorithm as they operate together to resolve small variations in the concentration of CO₂ in the planetary boundary layer. Due to equipment problems these flights have been rescheduled for October. FAA approval for their flight plans and laser operations has been received.

Broadband Radiometer Cleaning Study April 1, 2003 – June 24, 2004

Tom Stoffel (NREL) has initiated a controlled study of the effects of radiometer cleaning schedules on the accuracy of SIRS broadband shortwave and longwave irradiance measurements at the SGP. This study is using the Radiometer Characterization System (RCS) at the SGP Guest Instrument Facility to collect downwelling irradiance measurements from duplicate instruments maintained on different schedules to simulate the current SIRS network practices. NREL will acquire and process the Cleaning Study data. The data (and plots of the data) are available at

http://www.nrel.gov/midc/arm_rcs/

SGP maintenance records for the RCS are available at

<http://www.ops.sgp.arm.gov:591/rcs/default.htm>

Appendix A – Field Campaigns (cont.)

Flare Observations

October 2004

Andrew Bowers (Hanscom Air Force Base) is planning a series of flights over the SGP Central Facility to observe a series of Armtec MJU-23 flares using both ground-based and airborne sensors. The purpose of the tests is to validate optical clutter suppression methods.

PGS Validation 2004

April 15 – December 31, 2004

This field campaign continues measurements of carbon, water, and energy fluxes in crop fields at the SGP. Two LBNL portable flux systems have been deployed. The first system is located in a pasture within 7 km of the Central Facility as in previous years and will remain in the pasture for the duration of the study. The second system was initially located in a wheat field near Extended Facility #1 (Larned, KS), but has been redeployed in a milo field near the Central Facility. The end date of this campaign has been extended twice.

Surface Albedo

October 20 – 27, 2004

Alexander Trishchenko (Canada Centre for Remote Sensing) is planning this field campaign to collect surface albedo spectra for representative surface types in the ARM SGP domain during autumn conditions. The data are necessary for conducting surface type classification from aerial and satellite remote sensing.

WSI Stereoscopic Imaging

June 9 – October 31, 2004

Gabriela Seiz (Swiss Federal Institute of Technology, Zurich) is exploring the stereoscopic sky imaging capabilities of the WSI instruments. The original WSI (unit #10) was moved to the IDP4 location on May 19th to achieve the spatial separation necessary for stereoscopic imaging. The upgraded WSI (unit #11) commenced full operation on June 9th, which marks the beginning of the study.

Appendix B – BCR’s and ECR’s

Table B1. BCR’s

ID	State/Status	Summary	Priority
BCR-00873	Closed/Completed	Updates for R1-SGPC1	3 - Very Important
BCR-00876	Closed/Completed	Use of spare MWR for AMF	3 - Very Important
BCR-00878	Closed/Completed	Modification to SAR System for notification of access/account extension	3 - Very Important
BCR-00879	Closed/Completed	Put SORTI into Standby Mode	3 - Very Important
BCR-00880	Open/In Review	Display all MMCR data stream DODs under mmcr link on DOD description web page	3 - Very Important
BCR-00881	Open/In Review	Review and terminate or update MWR VAPs for SGP.C1	3 - Very Important
BCR-00882	Closed/Completed	Change all digital barometers to one decimal place	3 - Very Important
BCR-00883	Closed/Completed	GPS Time Synch at SGP/BFs	3 - Very Important
BCR-00884	Closed/Completed	SGP PC Network UPS Relocation	3 - Very Important
BCR-00885	Open/Implementing	BIOS, Firmware updates for Dell Servers at all CART Sites	3 - Very Important
BCR-00886	Open/Implementing	Install ntpd on all W2K, NT and XP instrument Computers	3 - Very Important
BCR-00887	Closed/Completed	SAR Approval Reminders	3 - Very Important
BCR-00889	Closed/Completed	Update the DSView to include mouse overs on the processing page	3 - Very Important
BCR-00890	Closed/Completed	Install the latest irt packages at SGP	3 - Very Important
BCR-00891	Closed/Completed	Add Links to Submit Requested PIF/DQR in DQPR Summary and Detail View	3 - Very Important
BCR-00893	Closed/Completed	update secondary dns config	3 - Very Important
BCR-00894	Closed/Completed	Update r1 account Policy in SAR System	3 - Very Important
BCR-00896	Open/Implementing	SWATS Automated QC Flagging	3 - Very Important
BCR-00898	Closed/Completed	Turn off email logs to MDS	3 - Very Important
BCR-00899	Closed/Completed	New release of mmcrmom_ingest	2 - Critical
BCR-00904	Open/Implementing	NFOV - 1&2 Channel Instrument Installation at the SGP CF	3 - Very Important

Appendix B – BCR’s and ECR’s (cont.)

Table B2. ECR’s

ID	State/Status	Summary	Priority
<u>ECR-00401</u>	Closed/Completed	SAR System Enhancements for account extensions and other features	3 - Very Important
<u>ECR-00404</u>	Closed/Completed	Relocation of AOS Sample Pumps at SGP	3 - Very Important
<u>ECR-00408</u>	Closed/Completed	SGP CF Onsite Access Road Repair	3 - Very Important
<u>ECR-00409</u>	Closed/Completed	SGP Electrical Panelboard Replacement	3 - Very Important
<u>ECR-00410</u>	Closed/Completed	SGP Battery Storage Replacement and Relocation	3 - Very Important
<u>ECR-00411</u>	Closed/Completed	Cyril EF PC Enclosure, and SIRS Tracker Height Adjustment	3 - Very Important
<u>ECR-00412</u>	Closed/Completed	change ARM DNS structure	3 - Very Important
<u>ECR-00413</u>	Closed/Completed	Enable MWR air temperature sensor	3 - Very Important