

Integrated Task Plan and Schedule of Deliverables

ARM Southern Great Plains Site Scientist Team

May 1, 2001 through April 30, 2002

(Year 10)

Introduction

The SGP Site Scientist Team is responsible for three major areas of activity relative to the SGP CART site:

- Providing on-site scientific expertise on a daily basis and support of data quality efforts in coordination with the Data Quality Office. The Technical Monitors for this activity are Douglas Sisterson (ARM Operations Manager) and Dr. James Liljegren (Site Program Manager for the SGP site).
- Conducting a research program focused on SGP site data, which furthers the goals of the ARM Program. The Technical Monitor for this activity is Dr. Thomas Ackerman, ARM Chief Scientist.
- Conducting an educational outreach program that exploits the availability of the SGP site and/or its data streams. The Technical Monitor for this activity is Dr. Thomas Ackerman, ARM Chief Scientist.

The specific tasks to be undertaken by the Site Scientist Team to fulfill these responsibilities are:

- Provide on-site, scientific guidance for day-to-day operational decisions affecting ARM's research programs. Guidance will be provided to the Site Program Manager, and is intended to ensure that the data acquisition effectively meets the needs of the Science Team.
- Support and advise the ARM Data Quality Office in analyzing, monitoring, and documenting ARM SGP data quality, and transition most SGP Site Scientist data quality activities to the ARM Data Quality Office.
- Develop the Site Scientific Mission. The *Site Scientific Mission* is the six-month operational strategy for the site, which outlines short-term operational goals. It includes operational priorities, descriptions of future IOPs and Campaigns, and other significant scientific and operational events.
- Conduct an ARM-approved research program focused on SGP site data that is designed to further the objectives of the ARM Program.
- Participate as a full member of the ARM Science Team, including the annual Science Team Meeting and approximately two smaller technical meetings per

year. In addition, the SGP Site Scientist will participate in the Science Team Executive Committee, which meets four to six times per year.

- Direct an educational outreach program designed to interest pre-college and undergraduate students in scientific and technical disciplines, as well as graduate students. The educational support program will be relevant to the ARM Program, adopt an innovative approach, and be well integrated into the resources already in place at the University of Oklahoma and any cooperating institutions.

This document, titled "Integrated Task Plan and Schedule of Deliverables", represents one of the nine deliverables identified by the ARM Program for fulfillment by the Site Scientist Team. The plan is to recognize the individual subtasks and deliverables required to complete the tasks outlined above, for the upcoming twelve-month period. This particular plan covers Year 10 of the Site Scientist Team's contract with ARM, which is May 1, 2001, through April 30, 2002. Since each year of the contract will begin on May 1, the Site Scientist Team will submit this plan to ARM by May 1 of each year.

Internally, and in this document, Site Scientist Team members are referred to as follows:

- Site Scientist = Peter Lamb
- Associate Site Scientist = Chad Bahrmann
- Assistant Site Scientist = To be named
- Research Team = Peter Lamb, Yefim Kogan, Zena Kogan, David Mechem, Scott Richardson, Claude Duchon, Chad Bahrmann, and students
- Educational Outreach Team = Ken Crawford, Kevin Kloesel, Renee McPherson, Andrea Melvin, and students

It should be noted that Randy Pepler became the ARM Data Quality Manager during CY 2001.

The SGP Site Scientist Team has a comprehensive web site that describes its activities and contains reports it issues. The site can be found at:

<http://parker.gcn.ou.edu/~cimms/ARM/sst.html>

Integrated Task Plan and Required Deliverables

1. PROVIDE FOR ON-SITE, SCIENTIFIC GUIDANCE FOR DAY-TO-DAY OPERATIONAL DECISIONS AFFECTING ARM'S RESEARCH PROGRAMS

As stated in the Request for Proposal, this guidance is to be provided to the Site Program

Manager (Dr. James Liljegren), and is intended to ensure that the data acquisition effectively meets the needs of the Science Team. The deliverable for this task is represented by quarterly Site Scientist reports.

These reports are to outline site operations for the period and assess the efficacy of site operations in achieving the goals outlined in *the Site Scientific Mission Plan*. The reports are to be suitable for distribution to the Site Program Manager and ARM Science Team, and delivered to the ARM Program Office on March 1, June 1, September 1, and December 1 each year of the contract.

The Site Scientist Team is in a defined position within the program to serve as the scientific liaison between the ARM Science Team and those who operate the site within the ARM infrastructure. The Site Scientist Team must communicate well with the rest of the ARM Program in order to know well what is needed to ensure the scientific integrity of the site and to translate those scientific requirements into operational strategies. This must be done in close communication with the Site Program Manager and Site Operations Manager. The subtasks as listed below will allow the Site Scientist Team to build the knowledge base to help effectively operate the site.

The Site Scientist and the Assistant Site Scientist will participate in performing this task. There is overlap between this task as stated and Task 2 (see below), which explicitly details the Site Scientist Team's duties relative to data quality. Thus, discussion of our data quality efforts will be left to that section.

The Site Scientist will maintain at least weekly contact with the Site Program Manager and Site Operations Manager through the weekly (Tuesday) Site Scientist site coordination teleconference, and other phone conversations, electronic mail, and visits to the SGP site, as necessary. These interactions will involve the development of both short-term responses to any developing problems and longer-range planning to accomplish the ARM Program's overall scientific objectives. He will also direct the activities of the other SST members (Associate Site Scientist, Assistant Site Scientist) described below on a daily basis. The Site Scientist will also act as a liaison between the ARM SGP Site Program and Operations Managers, ARM Technical and Science Directors, and the program managers and scientists in other federal agencies, concerning the broader scientific potential and usefulness of the SGP site. He will participate in the ARM Science Team Meeting and quarterly Science Team Executive Committee meetings to determine the needs of the Science Team relative to scientific optimization of the site.

The Associate Site Scientist will participate in the weekly Site Scientist teleconference, and the Site Program Manager's Site Development teleconference when necessary. He will maintain regular e-mail and telephone contact with the Site Program Manager and Site Operations Manager, and with the leaders of the Instrument Team, Engineering Group, Operations Group, ARM Technical Director, ARM Chief Scientist, and the leaders of the Scientific Working Groups, relative to coordination of scientific issues concerning the SGP site. With these individuals, he will help plan and operate IOPs and campaigns. He will review and approve Baseline Change Requests (BCRs) and other site

development tracking forms as necessary. He will take the lead in the preparation of the Site Scientist Team's quarterly reports (and other reports necessary to fulfill the obligations of the contract). He will participate in the annual ARM Science Team meeting and relevant ARM Scientific Working Group and infrastructure meetings (e.g., IRF, SCM, Instrument Team) pertaining to the scientific operation of the site. He will participate in quarterly Continuous Quality Improvement Program inspections of the SGP CART Site and prepare appropriate reports associated with these inspections.

The Associate Site Scientist will have the additional duty of serving as the Site Scientist Team's on-site representative on a bi-weekly basis to interact with Site Operations staff on science-related issues. He will also oversee the on-site portion of the Educational Outreach Program (e.g., site tours, talks to local communities).

The Assistant Site Scientist will participate in the weekly Site Scientist teleconference, help plan and operate IOPs and campaigns, and provide any weather forecasting support for IOPs. The Assistant Site Scientist will contribute to the preparation of the Site Scientist Team's Quarterly Reports, review Baseline Change Requests (BCRs), Engineering Change Requests (ECRs), and other tracking forms as necessary. The Assistant Site Scientist will participate in the annual ARM Science Team meeting and any relevant ARM Working Group meetings (e.g., IRF, SCM, Instrument Team, Cloud) pertaining to the scientific operation of the site. The Assistant Site Scientist will administer SGP data availability software created for Site Operations by the Site Scientist Team, maintain the SGP Site Scientist web page, including the posting of written reports. Help, and help conduct the on-site portion of the Educational Outreach Program by giving site tours, creating site tour materials, and giving talks to local community groups.

2. HELP TRANSITION MOST SGP SITE SCIENTIST DATA QUALITY ACTIVITIES TO THE ARM DATA QUALITY OFFICE, AND THEREAFTER SUPPORT AND ADVISE THE ARM DATA QUALITY OFFICE IN ANALYZING, MONITORING, AND DOCUMENTING ARM SGP DATA QUALITY.

The Associate and Assistant Site Scientists will perform the task of serving as ARM's SGP data quality arbiter. The ultimate goal of our work will be to determine whether the data being collected are of known (instrument is working to specifications) and reasonable (measurements are the best possible for a given geophysical variable) quality. They will work with the ARM Data Quality Office to ensure that SGP activities are in line with those of the other CART sites.

The Associate Site Scientist will maintain the SGP Site Operations Data Quality Problem Report (DQPR) database. The ARM Data Quality Office (DQO), SGP Site Scientist Team, and Instrument Mentors use the DQPR database for tracking instrument problems and maintenance actions. He will maintain daily contact with the ARM DQO on SGP data quality issues and assist and advise the ARM DQO Manager and staff during the transition of the SGP Site Scientist data quality responsibilities to the ARM DQO. This transition will involve routine data inspection procedures, associated written data quality

statements, and data quality algorithms relating to operations, maintenance, troubleshooting, and future development.

The Associate Site Scientist will assist the ARM DQO on research regarding specific data quality topics, maintain an advisory role in the development and administration of all the SGP Site Scientist scripts for updating the new SGP Instrument Health and Status Web Site. This web site is beneficial to many groups associated with the SGP site, including Site Operations, Site Scientist Team, DQO, IOP Support, and Instrument Mentors. He will participate fully in the Meta Data Navigator (MDN) initiative to develop a web-based user interface that will guide data users about ARM data and their quality and provide initial consulting advice as TWP quality routines and checking are assumed by the DQO.

The Assistant Site Scientist will assist in the maintenance of the SGP Site Operations Data Quality Problem Report (DQPR) database and maintain contact with the Data Quality Office on issues related to SGP data quality. The Associate Site Scientist will participate fully in the Meta Data Navigator (MDN) initiative to develop a web-based user interface that will guide data users about ARM data and their quality. The Associate Site Scientist will assist in the administration and development of all SGP Site Scientist scripts for updating the new SGP Instrument Health and Status Web Site and perform research in support of data quality investigations and operations planning

The SGP Site Scientist's data quality display web site is located at:

Old site:

http://www.res.sgp.arm.gov/sst/dq_monitor/DISPLAYS.html

New site under construction:

<http://r1.sgp.arm.gov/~sgpdq/>

3. DEVELOP THE SITE SCIENTIFIC MISSION

The Site Scientific Mission will be embodied in a written *Site Scientific Mission* for each six-month (January-June, July-December) period. This Plan will outline the short-term operational strategy for the Site, and will also attempt to anticipate longer-term challenges and opportunities. It will include operational priorities, descriptions of planned IOPs and campaigns, and other significant scientific and operational events. The document will reflect:

- The needs of the Science Team, as obtained through the Site Scientist Team's and Site Program Manager's communications with individual Science Team members, the Site Scientist's membership in the Science Team Executive Committee, and the assessment and guidance of the Data and Science Integration Team.
- The Site Scientist's interactions with the national and international global change community as a whole, including other research programs (e.g., CLIVAR and GAPP)

and funding agencies with active interests in the Southern Great Plains. These interactions will permit the SST to continually update and refine its assessment of the appropriateness of the SGP operational strategy. Some of the interactions may result in an enhancement of the observational capabilities of the SGP CART and the development and funding of bridging-type research to fill perceived gaps in the previously planned effort.

- The evolving concerns and priorities of ARM Management (Chief Scientist, Scientific Director, Technical Director, Operations Manager, Site Program Manager), including all relevant DOE and interagency considerations and logistical and financial constraints on site operations.

The Associate Site Scientist will work closely with the Site Program Manager to produce the Plan. A semi-final version of the proposed Plan for the upcoming six-month period will be submitted to the ARM Program Office on October 1 (for January-June) and April 1 (for July-December) of each year. Routine assessments of the extent to which the goals of the Site Scientific Mission are being accomplished will appear in the quarterly Site Scientists reports, described previously. The foundations for those assessments will be descriptions of the site operations for the quarters concerned.

4. CONDUCT AN ARM-APPROVED RESEARCH PROGRAM FOCUSED ON THE SGP SITE DATA THAT IS DESIGNED TO FURTHER THE OBJECTIVES OF THE ARM PROGRAM

The Site Scientist Team is in a unique position to draw on the research expertise of the University of Oklahoma to perform research studies on focused subjects that have as their ultimate goal the improvement of the scientific operational capability of the SGP CART site. This research program will continue to use the growing observational capabilities of the site. It will be squarely focused on the site data and ARM's scientific goals, and will have feedback into operations. This research should be seen as complementary to the efforts of the ARM Science Team, and may fill voids in that effort. It should also have connections to the Scientific Working Groups and to other national projects when possible. The Site Scientist and his Research Team will perform this work.

Deliverables will come in the form of a research plan, for approval by the ARM Science Director, for the activities planned for the upcoming three years. It will be due on February 1 before the start of a new three-year funding cycle. The research in this plan will be reviewed annually by the ARM Science Director. Updates to the research plan will be provided to the ARM Science Director. An annual report will be prepared on August 31 of each year, describing the progress of the approved research plan. It will summarize a) research activities, b) specific results, and c) research plans and updates for the subsequent year. These reports will be delivered to the ARM Science Director and the ARM Chief Scientist. Also, every effort will be made to publish findings as scientific articles in peer reviewed journals and to present research results at relevant conferences and workshops.

Research focus areas during the next three years represent the expertise of the Research Team. They include cloud microphysics, measurement of the atmospheric state (particularly water vapor and temperature), soil moisture, radar meteorology, and solar radiation. More detail on these subjects can be found in the three-year research plan and the annual research updates.

5. PARTICIPATE AS A FULL MEMBER OF THE ARM SCIENCE TEAM

The entire Site Scientist Team will participate fully in the series of meetings through which the development of the ARM Program is formulated and the progress of that development is reported and monitored. This will involve:

- The Site Scientist contributing presentations to the likes of JASON, Washington Advisory Group, and other similar groups as requested, and participating in the multi-annual meetings of the Science Team Executive Committee (of which he is a member) and where needed some of the workshops conducted by individual ARM working groups (e.g., IRF, SCM, DSIT, Instrument Team, Cloud, Water Vapor, Aerosol);
- The Associate Site Scientist's and Assistant Site Scientist's attendance at ARM working group meetings and other smaller technical meetings, such as those of the IRF, SCM, DSIT, Instrument Team, Cloud, Water Vapor, Aerosol, held at various times or as needed;
- The participation in the annual ARM Science Team meeting of the Site Scientist, Associate Site Scientist, Assistant Site Scientist, and relevant members of the OU Science Team. Where appropriate, this participation will communicate to the overall ARM Science Team our Site Scientist Team's roles concerning SGP site operations and research, as outlined earlier in this document.
- The Outreach Coordinator and the Outreach Scientific Content Developer will participate in all relevant meetings conducted by Battelle, DOE, and other agencies and organizations.

6. DIRECT AN EDUCATIONAL OUTREACH PROGRAM DESIGNED TO INTEREST PRE-COLLEGE AND UNDERGRADUATE STUDENTS IN SCIENTIFIC AND TECHNICAL DISCIPLINES, AS WELL AS GRADUATE STUDENTS

The Oklahoma Climatological Survey (OCS) will continue to direct the SGP thrust for ARM's Education Outreach Program. A full three-year strategic plan for this component of our Site Scientist Program will be provided to the ARM Chief Scientist on April 1, 2001, and updated annually thereafter (due April 30 of each year). Consistent with the educational mission of DOE, this plan will address all levels of education from pre-college through graduate opportunities.

During the past nine years, OCS has established a solid infrastructure for atmospheric science education, at both the pre-college and college levels with support of the ARM Program. Environmental data, including those from the ARM SGP site and the Oklahoma Mesonet, are available to educators who have World Wide Web access:

<http://outreach.ocs.ou.edu/arm/>

Unique display software has been developed for the students' and teachers' interactive use of the data. Reference materials and lessons are online and in printed form to aid the educator in the application of the data in the classroom. Most importantly, "master teachers" have been educated to understand and use the data in multi-curricular ways. These master teachers now serve as a significant resource by providing workshop instruction to additional K-12 teachers at state, national, and international conferences. These efforts led the Eisenhower National Clearinghouse to highlight OCS's online instructional materials in their January 2001 issue of "Focus on Learner-Centered Professional Development". In addition, The American Association for the Advancement of Science reviewed the activities of OCS in May 2000. Their report (June 21, 2000) applauded the content and user-friendly format of the products produced by OCS that make them valuable in educational applications.

The primary goal of Years 10-12 of the SGP outreach program will be to expand the awareness and use of data from all three ARM sites in an intuitive way. For the students and teachers working with SGP data, it is critical that they understand the spatial and temporal differences in atmospheric radiation measurements, and the importance of these measurements in global climate studies. To this end, we will enhance our web pages by facilitating the integration of data from the SGP, TWP, and NSA ARM sites for comparative purposes. We will conduct workshops at local schools in Oklahoma and Kansas and at appropriate regional and national teachers' conventions, with the goal of creating a national awareness of these unique data and their utility in the classroom. In concert with the Oklahoma EPSCoR program, we will continue to offer instruction to faculty at Oklahoma's two- and four-year colleges (20+) so that they can include ARM/OCS materials in the courses they offer to pre-service teachers. In addition, we will produce newsletters, conduct science fairs, and give conference presentations that help publicize the availability of these data and materials to educators.

As has been the history of OCS during the previous nine years of ARM outreach activities, we will continue to develop scientifically accurate reference materials and pedagogically sound lessons, placing them online and producing them in print. Finally, we will also continue to enhance our visualization software to allow for the overlay of data from a variety of sources, including SMOS stations at each ARM site, Oklahoma Mesonet sites, National Weather Service ASOS sites, and satellite (including derived) products.

Schedule of Deliverables

Anytime

- Publish findings in peer-reviewed journals

Weekly

- Provide assessments of site activities, issues, and data quality in "Site Scientist Coordination Meeting Minutes"

May 1, 2001

- Submit Integrated Task Plan and Schedule of Deliverables - *this document* (updated annually)
- Submit Three-Year Research Plan for 2001-2003
- Submit Three-Year Plan for the Educational Outreach Program for 2001-2003

June 1, 2001

- Submit Site Scientist Team Quarterly Report for March-May 2001

August 31, 2001

- Submit Annual Report on the Progress of the Research Program, which includes an update of the research plans for the upcoming year.

September 1, 2001

- Submit Site Scientist Team Quarterly Report for June-August 2001

October 1, 2001

- Submit draft of *Site Scientific Mission Plan* for January-June 2002

December 1, 2001

- Submit Site Scientist Team Quarterly Report for September-November 2001

March 1, 2002

- Submit Site Scientist Team Quarterly Report for December 2001-February 2002

April 1, 2002

- Submit draft of *Site Scientific Mission Plan* for July-December 2002

April 30, 2002

- **Submit Annual Reports on the Progress of the Educational Outreach, which includes an update of outreach plans for the upcoming year**