



U.S. DEPARTMENT OF  
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# **Atmospheric Radiation Measurement Program Climate Research Facility Operations Quarterly Report**

July 1–September 30, 2010



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**Atmospheric Radiation Measurement  
Program Climate Research Facility  
Operations  
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# Atmospheric Radiation Measurement Program Climate Research Facility Operations Quarterly Report July 1–September 30, 2010

## 1.0 Data Availability

**Description.** Individual raw datastreams from instrumentation at the Atmospheric Radiation Measurement (ARM) Climate Research Facility fixed and mobile sites are collected and sent to the Data Management Facility (DMF) at Pacific Northwest National Laboratory (PNNL) for processing in near real-time. Raw and processed data are then sent approximately daily to the ARM Archive, where they are made available to users. For each instrument, we calculate the ratio of the actual number of data records received daily at the Archive to the expected number of data records. The results are tabulated by (1) individual datastream, site, and month for the current year and (2) site and fiscal year (FY) dating back to 1998.

The U.S. Department of Energy (DOE) requires national user facilities to report time-based operating data. The requirements concern the actual hours of operation (ACTUAL); the estimated maximum operation or uptime goal (OPSMAX), which accounts for planned downtime; and the VARIANCE [ $1 - (\text{ACTUAL}/\text{OPSMAX})$ ], which accounts for unplanned downtime. The OPSMAX time for the fourth quarter of FY2010 for the Southern Great Plains (SGP) site is 2097.60 hours ( $0.95 \times 2208$  hours this quarter). The OPSMAX for the North Slope of Alaska (NSA) locale is 1987.20 hours ( $0.90 \times 2208$ ) and for the Tropical Western Pacific (TWP) locale is 1876.80 hours ( $0.85 \times 2208$ ). The first ARM Mobile Facility (AMF1) deployment in Graciosa Island, the Azores, Portugal, continues, so the OPSMAX time this quarter is 2097.60 hours ( $0.95 \times 2208$ ). The differences in OPSMAX performance reflect the complexity of local logistics and the frequency of extreme weather events. It is impractical to measure OPSMAX for each instrument or datastream. Data availability reported here refers to the average of the individual, continuous datastreams that have been received by the Archive. Data not at the Archive are caused by downtime (scheduled or unplanned) of the individual instruments. Therefore, data availability is directly related to individual instrument uptime. Thus, the average percentage of data in the Archive represents the average percentage of the time (24 hours per day, 92 days for this quarter) that the instruments were operating this quarter.

**Summary.** Table 1 shows the accumulated maximum operation time (planned uptime), actual hours of operation, and variance (unplanned downtime) for the period July 1–September 30, 2010, for the fixed sites. Because the AMF operates episodically, the AMF statistics are reported separately and not included in the aggregate average with the fixed sites. This fourth quarter comprises a total of 2208 possible hours for the fixed and mobile sites. The average of the fixed sites exceeded our goal this quarter.

**Table 1.** Operational Statistics for the fixed ARM Sites and the AMF for the Period July 1–September 30, 2010.

Site	Hours Of Operation			Data Availability	
	Opsmax	Actual	Variance	Goal	Actual
NSA	1987.20	2097.60	-0.0511	0.90	0.95
SGP	2097.60	1987.20	+0.0495	0.95	0.90
TWP	1876.80	2009.28	-0.0707	0.85	0.91
Site Average	1987.20	2031.36	-0.0219	0.90	0.92
AMF1 Azores	2097.60	2097.60	0.0000	0.95	0.95

## 2.0 Scientific Users

**Description.** The Site Access Request System is a web-based database used to track visitors to the fixed and mobile sites, all of which have facilities that can be visited. The NSA locale has the Barrow and Atqasuk sites. The SGP site has historically had a Central Facility, 23 extended facilities, 4 boundary facilities, and 3 intermediate facilities. Beginning in the second quarter of FY2010, the SGP began a transition to a smaller footprint (150 km x 150 km) by rearranging the original instrumentation and new instrumentation made available through the American Recovery and Reinvestment Act of 2009 (ARRA). The Central Facility and 4 extended facilities will remain, but there will be up to 12 new surface characterization facilities, 4 radar facilities, and 3 profiler facilities sited in the smaller domain. This new configuration will provide observations at scales more appropriate to current and future climate models. The transition to the smaller footprint is ongoing through this quarter. The TWP locale has the Manus, Nauru, and Darwin sites. These sites will also have expanded measurement capabilities with the addition of new instrumentation made available through ARRA funds. It is anticipated that the new instrumentation at all the fixed sites will be in place by the end of calendar year 2011. AMF1 continues its 20-month deployment in Graciosa Island, the Azores, Portugal, that began on May 1, 2009. The AMF will also have additional observational capabilities by the end of 2011. The second ARM Mobile Facility (AMF2) was deployed this quarter to Steamboat Springs, Colorado, in support of the Storm Peak Lab Cloud Property Validation Experiment (STORMVEX). The first field deployment of the second ARM Mobile Facility will be used to validate ARM-developed algorithms that convert the remote sensing measurements to cloud properties for liquid and mixed phase clouds. Although AMF2 is being set up this quarter, the official start date of the field campaign is not until November 1, 2010.

Users can participate in field experiments at the sites and mobile facility, or they can participate remotely. Therefore, there are a variety of mechanisms provided to users to access site information. Users who have immediate (real-time) needs for data access can request a research account on the local site data systems. This access is particularly useful to users for quick decisions in executing time-dependent activities associated with field campaigns at the fixed sites and mobile facility locations. The eight computers for the research accounts are located at the Barrow and Atqasuk sites; the SGP Central Facility; the TWP Manus, Nauru, and Darwin sites; the two AMFs; and the DMF at PNNL. However, users are warned that data provided at the time of collection are not fully screened for quality and therefore not considered to be official ARM data. Hence, these accounts are considered to be part of the

facility activities associated with field campaign activities, and users are tracked. Fully screened and approved ARM data are officially requested through the ARM Archive.

In addition, users that visit sites can connect their computer or instrument to an ARM site data system network, which requires an on-site device account. Remote (off-site) users can also have remote access to any ARM instrument or computer system at any ARM site, which requires an off-site device account. These accounts are also managed and tracked.

Official ARM data collected through the routine operations and scientific field experiments at the fixed sites and mobile facilities that have passed through the formal data quality review process are stored at and distributed through the Archive. The Archive receives fully quality-assured data within 24–48 hours of the collection and processing of data that takes place at the DMF. These data are available to the public free of charge.

The Archive also serves as a data repository for atmospheric data at the long-term Arctic atmospheric observatory in Eureka, Canada, (80°05' N, 86°43' W) as part of the multiagency Study of Environmental Arctic Change (SEARCH) Program. NOAA began providing instruments for the site in 2005. The intent of the site is to monitor the important components of the Arctic atmosphere, including clouds, aerosols, atmospheric radiation, and local-scale atmospheric dynamics. Because of the similarity of ARM NSA datastreams and the important synergy that can be formed between a network of Arctic atmospheric observations, the SEARCH radar data are archived in the ARM Archive. Instruments will be added to the site over time. The designation for the archived Eureka data is YEU and is now included in the ARM user metrics.

DOE requires national user facilities to report facility use by total visitor days—broken down by institution type, gender, race, citizenship, visitor role, visit purpose, and facility—for actual visitors and for active user research computer and Archive accounts. This information is maintained but not presented in this report. Visitor role and visit purpose information are used to identify scientific users. Based on the user self-provided information about their role and visit purpose, the following types of users categorized as scientific users are: Principal and Co-Principal Investigators, Post Doctorates, Graduate Students, Undergraduate Students, Infrastructure Instrument Mentors, and Infrastructure Chief and Site Scientists. Although there are other categories that can be identified, they are considered non-scientific. They are reported here for completeness.

This quarterly report provides the cumulative numbers of scientific user accounts by site for the period October 1, 2009–September 30, 2010. Only scientific users are officially counted, and they are determined by the sum of unique scientific users for each of the ARM facility components. As before, all user accounts are established for a period of up to one year and must be renewed. To report users, we count the number of active users for the previous 12 months during the last month of the quarterly reporting period.

**Summary.** Table 2 shows the summary of cumulative scientific and non-scientific users for the period October 1, 2009–September 30, 2010. While the number of ARM unique users was 1185 in total, 918 were characterized as scientific users. In addition to the AMF deployment in the Azores, ARM supported a field campaign that is not located at any of the fixed sites. The Radiative Heating in Underexplored Bands Campaign (RHUBC-II) is an off-site campaign that took place from August to October 2009 at a location near Cerro Chajnantor in Chile, at an altitude of more than 5400 m. In addition, the Darwin

ARM Representativeness Experiment (DARE) is taking place from December 2009–December 2011 at Gunn Point, Australia. Beginning in May 2010, the Integrated Characterization of Energy, Clouds, Atmospheric State, and Precipitation over Summit (ICECAPS) project, funded through the National Science Foundation’s Arctic Observing Network, is deploying a suite of remote sensors at Summit, Greenland, for four years. ARM is contributing to this campaign with a micropulse lidar (MPL) and Vaisala ceilometer to gather information about optically thin clouds commonly found above the Summit site. The users statistics of RHUBC-II, DARE, ICECAPS, and other off-site campaigns were included with the AMF tally.

**Table 2.** Summary of ARM Scientific Users for the Period October 1, 2009–September 30, 2010.

<b>ARM Facility Component</b>	<b>Unique Scientific Users</b>	<b>Unique Non-Scientific Users</b>
AMF1 (Azores)	16	13
AMF2 (Colorado)	14	3
Off-Site Campaigns	2	4
NSA	33	38
SGP	60	63
TWP	22	21
DMF	27	56
Archive	744	69
<b>Total</b>	<b>918</b>	<b>267</b>

### 3.0 Safety

For reporting purposes, the three ARM sites and the two AMFs operate 24 hours per day, 7 days per week, and 52 weeks per year. Time is reported in days instead of hours. If any lost work time is incurred by any employee, it is counted as a workday loss. Table 3 reports the consecutive days since the last recordable or reportable injury or incident causing damage to property, equipment, or vehicles for the period July 1–September 30, 2010. AMF2 is included in this report because prep work was underway in preparation for deployment to Storm Peak. There were no recordable lost workday cases or reportable injury or incidents causing damage to property, equipment, or vehicles reported for the fourth quarter of FY2010.



**Table 3.** Consecutive Days of Injury-Free Operation,\* July 1–September 30, 2010.

ES&H Category	NSA	SGP	TWP	AMF
Days Worked without a Lost-Time Incident	92	92	92	92
Days Worked without a Recordable Accident	92	92	92	92
Days Worked without a Property Damage Incident	92	92	92	92
Days Worked without a Reportable Loss to Vehicles	92	92	92	92
*“Injury-free” is defined as days without a recordable lost-time incident or property damage incident.				

Table 4 reports consecutive days since the last recordable lost time incident or property damage incident, for the fixed sites for the period October 1, 1998–September 30, 2010; for AMF1 for the period January 1, 2004–September 30, 2010; and for AMF2 for the period July 1, 2010–September 30, 2010.

**Table 4.** Consecutive Days Since the Last Recordable Lost Time Incident or Property Damage Incident for NSA, SGP, and TWP from October 1, 1998–September 30, 2010; for AMF1 from January 1, 2004–September 30, 2010; and for AMF2 from July 1, 2010–September 30, 2010.

ES&H Category	NSA	SGP	TWP	AMF1	AMF2
Days Worked without Lost Time Incident	4380	1147	4380	2463	92
Days Worked without a Recordable Accident	4380	1147	4380	2463	92
Days Worked without a Property-Damage Incident	4380	4380	4380	2463	92
Days Worked without a Reportable Loss to Vehicles	4380	4380	4380	2463	92

SGP has had four lost work day cases and one recordable medical case to date:

FY 1998: 2 lost days restricted work for lower back sprain;

FY 1999: 14 lost days for fracture of wrist (slipped and fell on ice after hail storm);

FY 2000: 162 lost days and 130 restricted days due to an alleged injury from a congenital defect to back.

SGP FY 2006: Recordable medical treatment cases: (1) A technician sustained a tick bite in April 2006, was seen by a physician, and was treated with an antibiotic. There was no lost time from this incident.

SGP FY2007–2008: 45 lost days and 10 restricted days due to an alleged back injury. A technician alleged that he injured his back when he stepped in a hole at a remote field site. An additional 125 lost days have been added for FY2008 for a total of 180 days lost. Said technician continues to be off work pending disposition by Workman’s Compensation. No change as of March 31, 2010. Note: The SGP site is under new management; thus, this incident has been closed out effective July 1, 2010.

## 4.0 Publications

As an additional measure of performance, this quarterly report includes the number of publications that are based on ARM data, with emphasis on this year’s contribution but also summarizing historical data, collection of which began in 1990. The publication categories are (1) abstracts or presentations at conferences, (2) technical reports, (3) books, (4) book chapters, (5) journal articles, and (6) papers in conference proceedings.

Table 5 shows the number of publications by category for 1990 through September 2009, the number of publications for FY2010, and the total of publications for 1990 through September 2010. Publications numbers may vary from year to year as items are added retroactively to the database. Therefore, the most current report reflects the most accurate tally of publications.

**Table 5.** Number of Publications that Use ARM Data.

<b>CATEGORY</b>	<b>1990– SEPTEMBER 2009</b>	<b>FY 2010</b>	<b>1990– SEPTEMBER 2010</b>
Abstracts or Presentations	2,271	271	2,542
Technical Reports	317	21	338
Books	12	0	12
Book Chapters	57	2	59
Journal Articles	2,234	192	2,426
Conference Papers	1,989	14	2,003



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