



ARM

CLIMATE RESEARCH FACILITY

Current Activities, Setting and Managing Priorities, and Using ARM Resources

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ARM Technical Director

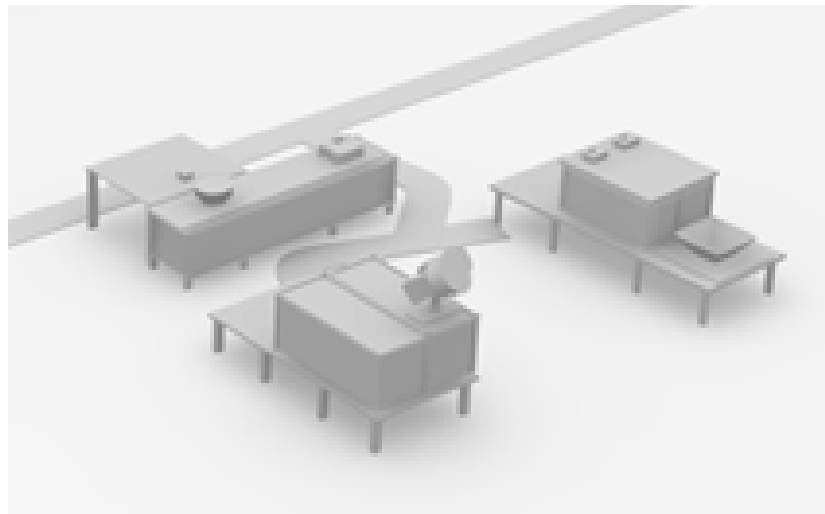
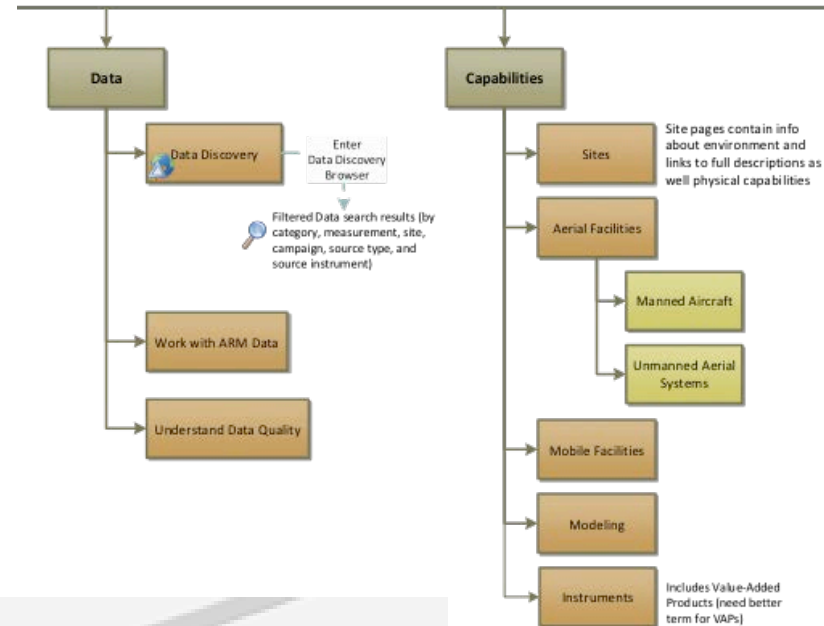
ARM/ASR Joint User Facility PI Meeting
Vienna, VA
May 3, 2016

Sources of Community Input

- DOE workshops (e.g., the recent ARM-ASR-ACME workshop)
- ASR meetings
 - SISC
 - Breakouts
 - Individuals
 - (note – need to have written requests)
- Formal Reviews (e.g., the triennial review)
- Advisory Committees
 - User Executive Committee
 - Subject-specific panels: currently radar, aerosol, UAS, high-resolution modeling
- External Sources (e.g., interagency collaborators, GEWEX)

Activities: Website

- New navigation developed – site design underway
- NSA virtual tour is published, ENA will be developed this summer
- Overhauling the publication process including simplification of small campaign reports
- Investigating redesign of instrument handbooks



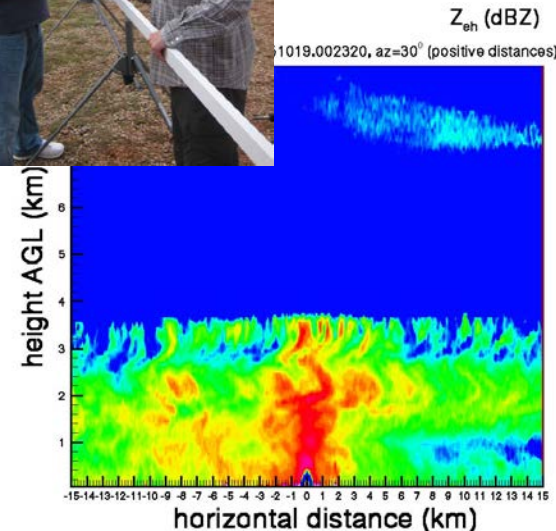
Activities: Aerosols

- Inlet evaluation carried out at BNL – analysis underway (Wednesday talk)
- 3- λ lidar technique for aerosol profiling tested using observations from SGP (Raman + HSRL; CHARMS)
- Reviewing AOS core configuration/MAOS (Thursday morning breakout)
- AOS Harmonization
 - Operational: 46 a1-level/12 b1-level
 - Under development: 20 a1-level/38 b1-level + GHG products



Activities: Radars/Clouds

- Intensive engineering review (“CGA”) of Oliktok radars (ENA review planned next)
- SACR upgrades including:
 - Pedestal overhauls
 - Software upgrades to permit solid-state drives
 - W-band RF upgrades
- XSAPR transmitters stable, radar control processor upgrades underway
- Facility-wide health and status monitoring software (“WARNO”) development underway
- Training session at SGP for radar technical team
- KAZR ARSCL released; about 5 years’ historic data processed; expect ~ 4-month lag going forward
- SACRCOR (corrected moments with cloud mask) released for evaluation
- Developing photogrammetry measurements at SGP





Activities: Precipitation, Soil Moisture, Boundary-Layer T/RH/Wind

In addition to boundary-layer profiling infrastructure, a variety of other projects are underway:

- Procurements for improved liquid and solid precipitation measurements
- MASC instrument and processing software
- Operational T/RH profiles from AERIs
- Improved winds from Radar Wind Profilers
- New soil moisture sensor network at SGP
- Soil moisture processing of Oklahoma Mesonet soil moisture

Measurement/Retrieval Challenges

- Frozen precipitation – e.g., impacts of blowing snow
- Ice nuclei, fall velocity, density
- Aerosol measurement strategy for chemical composition, mixing state, SOA, absorption
- Retrievals
 - Deep Convection – e.g., microphysics and dynamics
 - Separation of drizzle and cloud properties
 - Cloud phase
 - Comprehensive vertical velocity



Sources of Community Input: Advisory Committees

- User Executive Committee
- Subject-specific panels: currently
 - Radar
 - Aerosol
 - Unmanned Aerial Systems (UAS)
 - High-resolution modeling

Central message from both the UEC and the radar group: set priorities that focus on high-quality data for core set of measurements.



Managing Priorities

As ARM has expanded, it has become important to carefully manage tasks to ensure that efforts are optimized to address science priorities.

Recent steps include:

- Implementing an annually updated and continuously tracked list of high-priority tasks and milestones
- Implementing an organization to clarify roles and responsibilities and facilitate communications
- Replacing our task tracking system with software more capable of project management (ServiceNow)

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ARM Priorities

The current process for recommending new data products and instruments to ARM management lacks a certain transparency, particularly for new ARM users. This website was created in an effort to improve communication with the broader community regarding current priorities and provide a forum for recommending and discussing new activities. The process for recommending or starting a discussion concerning new data products or instruments should be transparent and include input from ASR, ARM, and the broader community.

Current Priorities

Science Products

Instrument Engineering

SN ID	Title	State	Engineering Area	Projected End Date	Date Completed
ENG0000909	AOS Units for Azores and Oliktok Pt. (Show Details)	In Progress	Aerosol Instruments	2016.10.31	
ENG0001060	Update Uncertainty Report to Include all Instruments and Resolution of "Other" Category (Show Details)	In Design	Instrument Engineering	2014.03.14	
ENG0001119	Development of an SGP T/RH/U Profiling Network (Show Details)	In Progress	General Instruments	2014.12.25	
ENG0001168	Provide an SGP replacement AOS (Show Details)	In Design	Aerosol Instruments	2015.05.14	
ENG0001201	New precipitation measurement strategy (Hide Details)	In Progress	General Instruments	2017.11.30	

The current plans to 1) reposition the Southern Great Plains Site (SGP) for contributions to LES model studies, 2) redeploy equipment from Tropical Western Pacific (TWP) sites, 3) improve/upgrade the unsatisfactory performance of some ARM precipitation sensors and 4) upgrade precipitation observations at NSA make this an appropriate time to revise the ARM strategy for observing rainfall, frozen precipitation and the rainfall drop size distribution. Site by site recommendations, costs and priority should be part of the work carried out within this ECR. The need for a new data product that would integrate observations from multiple rain gauges/disdroimeters at each site as well as provide a larger number of derived values from the disdroimeter data should also be discussed so that all interested parties have a chance to comment.

Facilities & Infrastructure

Data Services & System Engineering

Technical Coordination

Aerial Facility

ARM Priorities Links

- >> [ARM Data Archive](#)
- >> [Value-Added Products](#)

Priorities

- >> [All Open](#)
- >> [All \(Open & Closed\)](#)

Completed Priorities

- >> [2016](#)
- >> [2015](#)



Under Development



Data Quality Reporting

- Automated quality checks (embedded in data files)
- Handbooks and technical reports
- Data Quality Reports:
 - Manual, but can now be used to filter data
 - Usually submitted by mentor – but anyone can initiate
 - Quality “level”: Good (green), Suspect (yellow), Bad (red), Missing (black)
 - Data notes can be used to describe general issues that don’t specifically impact quality
 - Now used at the archive to optionally filter data
 - In process of cleaning up historic reports
 - Available to anyone via web services

DQR Web Service

Information on using the DQR web service (general documentation, code snippets etc) available at (and GitHub link therein):

<http://www.archive.arm.gov/dqrws/>

Example code to imput DQR using Python; other examples in IDL, Matlab, Perl, R)

```
import urllib
url =
"http://www.archive.arm.gov/dqrws/ARMDQRdatastream=sgplssondeC1.c1&varname=r
h"
response = urllib.urlopen(url)
print "status code is: ", response.getcode()

# create a list to store each start and end time
timeblocks = []

#loop over each line returned from the object and parse
for line in response.readlines():
    timeblocks.append(line.replace('\r\n',"").split('|'))
```

Data Discovery Tool

The screenshot displays the ARM Data Discovery Tool interface. At the top, the browser address bar shows 'archive.arm.gov'. The page header includes the ARM logo (Climate Research Facility) and the 'DATA DISCOVERY' title. A search bar contains the text 'soil moisture', with fields for '(Start date)', '(End date)', and a 'GO' button. A link for 'How to take a screenshot on your Mac - Apple Support' is visible in the top right. Below the header, navigation icons for home, menu, and cart are present, along with links for 'ARM ARCHIVE // HELP // FEEDBACK'.

The left sidebar is divided into three sections: 'CATEGORIES' (5 items), 'MEASUREMENTS' (6 items), and 'SITES' (20 items). The 'CATEGORIES' section includes Surface Properties (305), Radiometric (17), Atmospheric State (15), Cloud Properties (11), and Atmospheric Carbon (7). The 'MEASUREMENTS' section includes Soil moisture (292), Soil moisture flux (23), Atmospheric moisture (4), Surface condition (1), Soil characteristics (1), and Soil surface temperature (1). The 'SITES' section includes Southern Great Plains (169), Tropical Western Pacific (29), North Slope Alaska (28), Oliktok Point, Alaska (15), Point Reyes CA, USA; Mobile Facility (12), AWARE (ARM West Antarctic Radiation Experiment) (6), and Manacapuru, Amazonas, Brazil; Mobile Facility (5).

The main content area is titled 'Search Results' and provides instructions: 'To search for and request data, select a category, measurement, site, or source. Use the Start Date and End Date below to limit the data results timeline. Use the checkboxes below to add a data product to the Data Cart.' Below this, there are filter buttons for 'ROUTINE DATA' (checked), 'PI / CAMPAIGN DATA' (checked), 'DATA UNRELIABLE', 'DATA QUESTIONABLE', 'DATA MISSING', and 'DATA NOTE'. A timeline view shows the search period from 1995-02-13 to 2016-04-17, with a 'Showing 1-20 of 322 measurements' indicator and a 'Sort by: Priority' dropdown. The 'Page Size' is set to 20. The search results are displayed in a table with columns for year (1995, 2000, 2005, 2010, 2015) and measurement details. The first result is 'SWATS b1 @ SGP E1 // SOIL WATER AND TEMPERATURE PROFILING SYSTEM (SWATS): SOIL TEMP & WATER PROFILES', which includes two sub-entries for 'Soil moisture // Volumetric Water Content, West Profile' and 'Soil moisture // Volumetric Water Content, East Profile'. The second result is 'SWATS b1 @ SGP E18 // SOIL WATER AND TEMPERATURE PROFILING SYSTEM (SWATS): SOIL TEMP & WATER PROFILES', which includes two sub-entries for 'Soil moisture // Volumetric Water Content, East Profile' and 'Soil moisture // Volumetric Water Content, West Profile'. The third result is 'SWATS b1 @ SGP E19 // SOIL WATER AND TEMPERATURE PROFILING SYSTEM (SWATS): SOIL TEMP & WATER PROFILES', which includes one sub-entry for 'Soil moisture // Volumetric Water Content, East Profile'. Each sub-entry has a star icon and a bar chart showing data availability over time.

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The navigation bar includes a home icon, a menu icon, and a shopping cart icon. On the right side of the navigation bar, there are links for "ARM ARCHIVE // HELP // FEEDBACK".

The left sidebar contains a "CATEGORIES" section with 5 items: "Surface Properties" (305), "Radiometric" (17), "Atmospheric State" (15), "Cloud Properties" (11), and "Atmospheric Carbon" (7). Below this is a "MEASUREMENTS" section with 6 items: "Soil moisture" (292), "Soil moisture flux" (23), "Atmospheric moisture" (4), "Surface condition" (1), "Soil characteristics" (1), and "Soil surface temperature" (1). At the bottom of the sidebar is a "SITES" section with 20 items, including "Southern Great Plains" (169), "Tropical Western Pacific" (29), "North Slope Alaska" (28), "Oliktok Point, Alaska" (15), "Point Reyes CA, USA; Mobile Facility" (12), "AWARE (ARM West Antarctic Radiation Experiment)" (6), and "Manacapuru, Amazonas, Brazil; Mobile Facility" (5).

The main content area is titled "Search Results". Below the title, there is a text box that reads: "To search for and request data, select a category, measurement, site, or source. Use the Start Date and End Date below to limit the data results timeline. Use the checkboxes below to add a data product to the Data Cart." Below this text are several filter buttons: "ROUTINE DATA" (checked), "PI / CAMPAIGN DATA" (checked), "DATA UNRELIABLE", "DATA QUESTIONABLE", "DATA MISSING", and "DATA NOTE".

The search results are displayed in a timeline view. The timeline shows years from 1995 to 2015. The current view is for the period from 1995-02-13 to 2016-04-17. The results are sorted by "Priority". The first result is "SWATS b1 @ SGP E1 // SOIL WATER AND TEMPERATURE PROFILING SYSTEM (SWATS): SOIL TEMP & WATER PROFILES". This result has two sub-entries: "Soil moisture // Volumetric Water Content, West Profile" and "Soil moisture // Volumetric Water Content, East Profile". The "East Profile" entry is marked as the "Primary Source". The second result is "SWATS b1 @ SGP E18 // SOIL WATER AND TEMPERATURE PROFILING SYSTEM (SWATS): SOIL TEMP & WATER PROFILES", which also has two sub-entries: "Soil moisture // Volumetric Water Content, East Profile" and "Soil moisture // Volumetric Water Content, West Profile". The third result is "SWATS b1 @ SGP E19 // SOIL WATER AND TEMPERATURE PROFILING SYSTEM (SWATS): SOIL TEMP & WATER PROFILES", which has one sub-entry: "Soil moisture // Volumetric Water Content, East Profile".

Data Discovery Tool

The screenshot displays the ARM Data Discovery Tool interface. At the top, the browser address bar shows 'archive.arm.gov'. The page header includes the ARM logo (Climate Research Facility) and the 'DATA DISCOVERY' title. A search bar contains the text 'soil moisture', with fields for '(Start date)', '(End date)', and a 'GO' button. To the right, there are links for 'ARM ARCHIVE', 'HELP', and 'FEEDBACK'. Below the header, a 'Search Results' section is visible, featuring a 'CAMPAIGN DATA' filter and buttons for 'DATA UNRELIABLE', 'DATA QUESTIONABLE', 'DATA MISSING', and 'DATA NOTE'. A timeline view shows data from 2000 to 2015, with a 'Sort by: Priority' dropdown and a 'Page Size: 20' setting. A detailed view of a search result is shown in a pop-up window, listing 'Campaign Product > swats', 'SOIL WATER AND TEMPERATURE PROFILING SYSTEM (SWATS): SOIL TEMP & WATER PROFILES', and 'Southern Great Plains // Larned, KS (Extended) 1996-06-25 → 2009-10-15'. The main search results list includes entries for 'SWATS b1 @ SGP E1' and 'SWATS b1 @ SGP E18', each with sub-entries for 'Soil moisture // Volumetric Water Content, West Profile' and 'Soil moisture // Volumetric Water Content, East Profile'. The interface also features a left sidebar with 'CATEGORIES' and 'MEASUREMENTS' sections, and a 'SITES' section at the bottom left.

Citing Data/DOIs

ARM datastreams are now tagged with Digital Object Identifiers (DOIs)

<http://www.arm.gov/data/docs/doi-guidance>

- Provides a mechanism to uniquely identify the data used in a publication and point to source
- Provides credit to the people who worked on the data
- Available for standard as well as PI and field campaign data
- Provided with data orders (embedded in the notification email)

Atmospheric Radiation Measurement (ARM) Climate Research Facility. 1996, updated hourly. Sky Radiometers on Stand for Downwelling Radiation (SKYRAD60S). 2016-02-01 to 2016-02-07, 77.85011 S 166.73011 E: ARM Mobile Facility (AWR) McMurdo Station Ross Ice Shelf, Antarctica; AMF2 (M1). Compiled by V. Morris, M. Sengupta, Y. Xie, A. Habte, I. Reda, M. Dooraghi, V. Morris, A. Andreas and M. Kutchenreiter. Atmospheric Radiation Measurement (ARM) Climate Research Facility Data Archive: Oak Ridge, Tennessee, USA. Data set accessed 2016-04-29 at <http://dx.doi.org/10.5439/1025281>

Citing Data/DOIs

ARM.gov >> Data >> Instrument Datastreams >> skyrad60s

Datastream

Sky radiation

Active Date

1996.10.09 -

Measurement

Radiometric

Originating

Sky Radiometer

Generate Citation

Datastream Name **SKYRAD60S**

Author	Atmospheric Radiation Measurement (ARM) Climate Research Facility	
Original Publication Date	1996	
Update Period	hourly	
Location Accessed	Site	Eastern North Atlantic (ENA)
	Facility	<input type="checkbox"/> Graciosa Island, Azores, Portugal (C1)
	Dates Used	Start: <input type="text"/> End: <input type="text"/>
Editor(s) or Compiler(s)	V. Morris, M. Sengupta, Y. Xie, A. Habte, I. Reda, M. Dooraghi, V. Morris, A. Andreas and M. Kutchenreiter	
Date Accessed	<input type="text"/>	
Citation(s)	<input type="text" value="Add citation for another site or time"/>	

Atmospheric Radiation Measurement (ARM) Climate Research Facility. 1996, updated **hourly**. Sky Radiometers on Stand for Downwelling Radiation (SKYRAD60S). << start date used >> to << end date used >>, << site >> << facility >>. Compiled by V. Morris, M. Sengupta, Y. Xie, A. Habte, I. Reda, M. Dooraghi, V. Morris, A. Andreas and M. Kutchenreiter. Atmospheric Radiation Measurement (ARM) Climate Research Facility Data Archive: Oak Ridge, Tennessee, USA. Data set accessed << date accessed >> at <http://dx.doi.org/10.5439/1025281>

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Engaging with ARM Staff

If you suspect a problem with data, have a question about data, or some other measurement-related observation ...

Contact the appropriate instrument mentor (listed on instrument pages) or for Value-Added Products—the responsible translator or product developer (listed on Value-Added Product pages)

- Has potential to add value to your analysis
- Feeds back issues to the larger community

And if you do actively engage with ARM staff—consider including them as a collaborator.



Engaging with ARM Here and Later

Breakouts designed to solicit facility feedback (in addition to the sessions last night)

- Field campaigns: MARCUS, CACTI, ACE-ENA, MOSAIC
- Unmanned Aerial Systems (UAS) and Tethered Balloon Systems (TBS)
- Broadband radiometric measurements
- LES pilot pilot project (LASSO) update
- Tools for bridging observations and models
- Aerosol measurements
- Radar science and operations

- Data table: sign up or stop by to discuss data quality tools, data discovery tool, new website, submitting data ...
- Contact us at www@arm.gov; ServiceNow-based help system in beta—expect release soon