



ARM Facility Updates

JIM MATHER

ARM Technical Director

2021 ARM/ASR Virtual Joint Meeting

Data Products



COVID-19 Update as of February 16, 2021: Start of TRACER campaign delayed; observatories remain operational. [Read the announcement.](#)

The world's premier ground-based observations facility advancing atmospheric and climate research

FROM COMBLE, A BOOM OF BIG PLANS
 A year after wrapping up in Norway, the Cold-Air Outbreaks in the Marine Boundary Layer Experiment (COMBLE) is the focus of multiple modeling efforts.

END OF DLIKTOK POINT DEPLOYMENT NEARS
 On June 1, the third ARM Mobile Facility (AMF3) will begin to cease operations after almost eight years in Alaska. AMF3's next extended stay will be in the Southeastern United States.

ARM GOING BACK TO CALIFORNIA
 A new mobile facility campaign focused on the properties of stratocumulus clouds is coming to Southern California in 2023.



ATMOSPHERIC OBSERVATORIES



[Data Discovery](#)
[Data Sources](#)
[Work with ARM Data](#)
[Understanding Data Quality](#)

DATA Atmospheric Radiation Measurement (ARM) user facility data are collected through routine operations and scientific field experiments.

ARM focuses on obtaining continuous measurements—supplemented by field campaigns—and providing data products that promote the advancement of climate models. Serving users worldwide, the ARM Data Center collects and archives approximately 20 terabytes of data per month. Datastreams are generally available for download within 48 hours.

ABOUT ARM DATA

ARM data include routine data products, value-added products (VAPs), field campaign data, complementary external data products from collaborating programs, and data contributed by ARM principal investigators for use by the scientific community. Data quality reports, graphical displays of data availability/quality, and data plots are also available from the ARM Data Center.

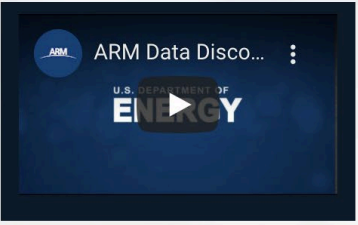
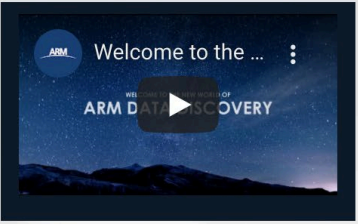
As a U.S. Department of Energy national scientific user facility, ARM welcomes users from all institutions and nations. A free ARM user account is needed to access ARM data, a requirement of the Office of Management and Budget.

[CREATE ACCOUNT](#)
[UPDATE ACCOUNT](#)

FINDING AND USING ARM DATA

All data obtained through ARM are monitored for quality and made available **free of charge** through the ARM Data Center via [Data Discovery](#).

[GET ARM DATA](#)



FEATURED DATA

Ka-Band ARM Zenith Radar Product Resumes for 2 Sites
 19 May 2021

Data Products



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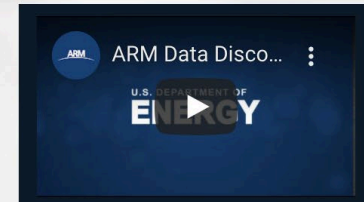
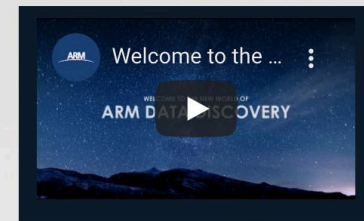
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CREATE ACCOUNT UPDATE ACCOUNT



Data Quality Office: **Alyssa Sockol**

Open source tools for working with ARM data

■ Atmospheric data Community Toolkit (ACT): **Adam Theisen**

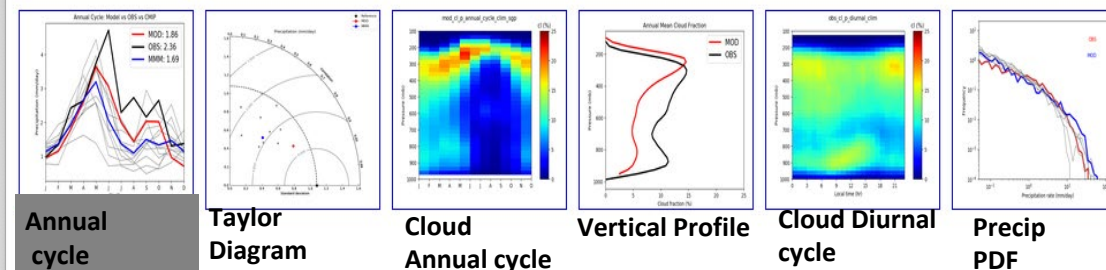
■ Py-ART python radar software: **Zach Sherman**

Value Added Product (VAP) Updates

Cloud Modeling (Translator: Shaocheng Xie)

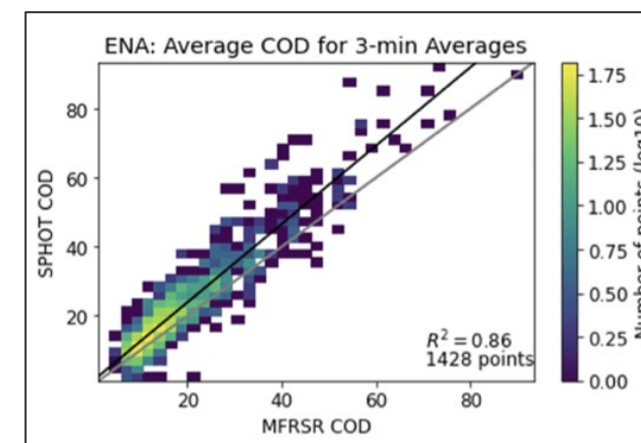
- ▶ **ARM Diagnostics package** (ARM Diags) integrated into E3SM (**C. Zhang**)
- ▶ Other advances for cloud modeling including forcing data for AWARE and CACTI (**C. Tao**)

Click on Plot Type



Cloud Products (Translator: Scott Giangrande)

- ▶ **ARSCL** and **SACRGrid** available for COMBLE and MOSAiC (**Johnson**)
- ▶ **Microbasekaplus** adds uncertainty estimates to Microbase using OGRE (**M. Wang**)
- ▶ Automated cloud properties from sun photometer undergoing testing (**Fairless**)



Value Added Product (VAP) Updates

Aerosol Products (Translator: John Shilling)

- ▶ **ACSM** real-time products at SGP and ENA. Historical processing underway (**Zawadowicz**)
- ▶ **QCAOD** (aerosol optical depth) VAP extended from 1997 through end of 2018 (**Kassianov**)
- ▶ **CCN Kappa** evaluation data are available at SGP (April 2017 - Feb 2021)
- ▶ *More on aerosol VAP activities in the Thursday aerosol measurements breakout*

Boundary Layer Processes (Translator: Damao Zhang)

- ▶ **AERl0e** routine processing at SGP CF and 3 EFs (E32, E37, E39) underway
- ▶ **MPLCMASK-Machine Learning** run for several sites, expect release soon (**Cromwell**)
- ▶ **PBL Height best estimate** under development using multiple lidars (**Zhang**)

For information on data releases: <https://www.arm.gov/news-events/data-announcements>

ARM Data Discovery Interface

- ▶ Intelligent search based on user's comfort area with advanced metadata and cutting-edge technologies
- ▶ Recommended data streams and data tagging (*Maggie Davis*)
- ▶ Newly developed spatiotemporal viewer ("Location Search") for ARM field campaign data
- ▶ Tutorial videos @ <https://www.arm.gov/data/>
- ▶ Poster: *Kavya Guntupally*
- ▶ Also check out the ARM data booth Slack Channel: **# arm-data-booth**

Capabilities

ARM

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ATMOSPHERIC OBSERVATORIES



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Atmospheric Observatories

Instruments

VAPs

Modeling

Computing Resources

CAPABILITIES

Scientists from around the world have access to a wide range of ARM resources to conduct research on Earth's climate.

ATMOSPHERIC OBSERVATORIES

Three fixed-location atmospheric observatories operate continually to measure cloud and aerosol properties and their impacts on Earth's energy balance. Scientists use these observatories, along with the ARM mobile and aerial observatories, to obtain long-term and episodic measurements of radiative fluxes, cloud and aerosol properties, precipitation, and related atmospheric characteristics in diverse climate regimes.

EXPLORE ATMOSPHERIC OBSERVATORIES

INSTRUMENTS

A comprehensive suite of cutting-edge instrumentation deployed at ARM atmospheric observatories is designed specifically to measure clouds, aerosols, radiation, and the interactions among them.

In addition to ARM's extensive collection of instruments, some information is provided about guest and external instruments owned and operated by other programs. All instruments are categorized by:

[Aerosols](#)

[Airborne Observations](#)

[Atmospheric Carbon](#)

[Atmospheric Profiling](#)

[Cloud Properties](#)

[Derived Quantities and Models](#)

[Radiometric](#)

[Satellite Observations](#)

[Surface Meteorology](#)

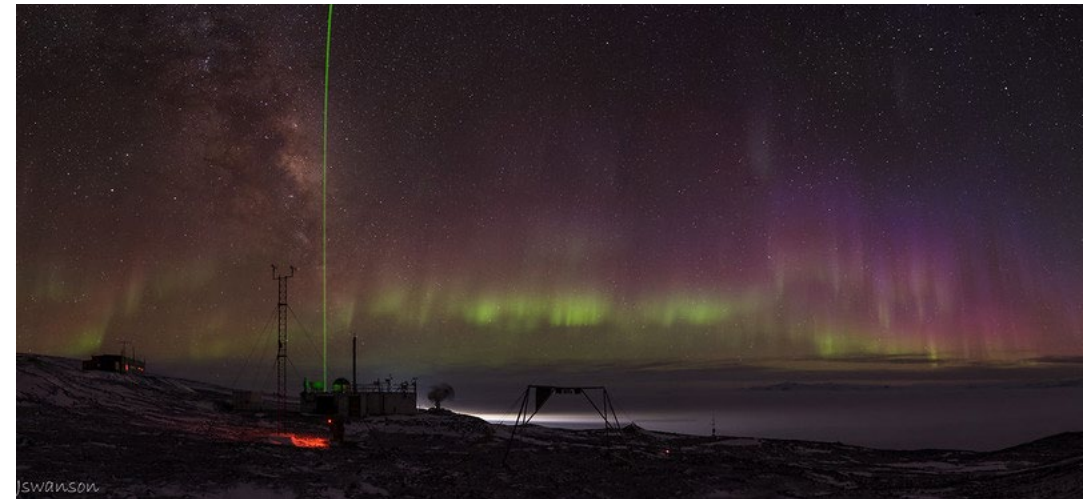
[Surface/Subsurface Properties](#)

DISCOVER INSTRUMENTS

Recent and Upcoming Instrument Additions and Upgrades



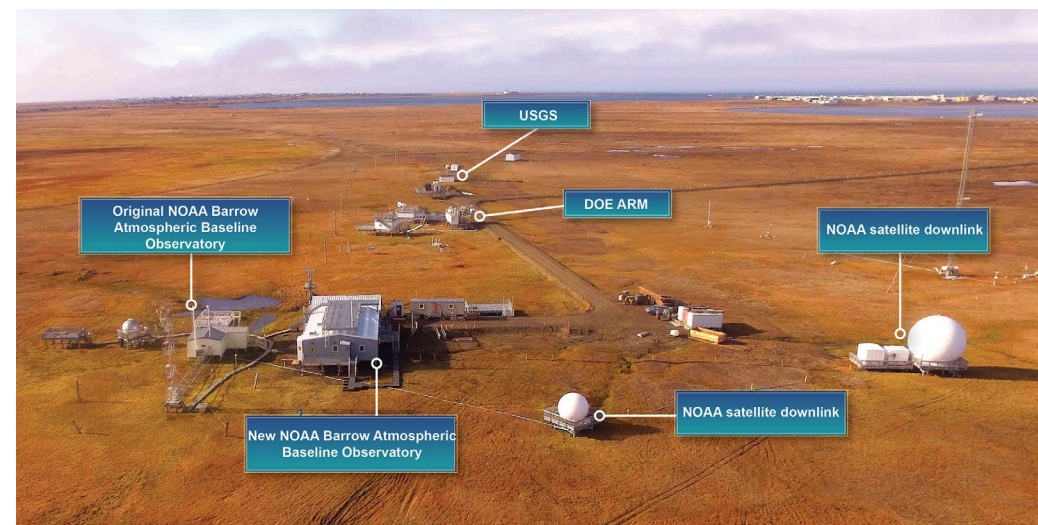
- ▶ Deployed 2- λ (532/1064 nm) HSRL to SGP and preparing to upgrade second system (**Ray Bambha**)
- ▶ Collecting Ice Nucleating Particle (INP) filter on routine basis. SGP + Oliktok (\rightarrow TRACER in 2021) (Jessie Creamean and **Tom Hill**)
- ▶ Aerosol size distributions (Chongai Kuang)
 - SMPS for AMF2, AMF3, planning ENA in FY22
 - OPC (coarse mode) 3 systems: 2 for TRACER & 1 for ENA (**Singh**)
- ▶ ToF-ACSM for AMF2 (**Maria Zawadowicz**)
- ▶ EMSL Size/time-resolve filter sampler (STAC) for tethered balloon system and joint ARM/EMSL call for proposals



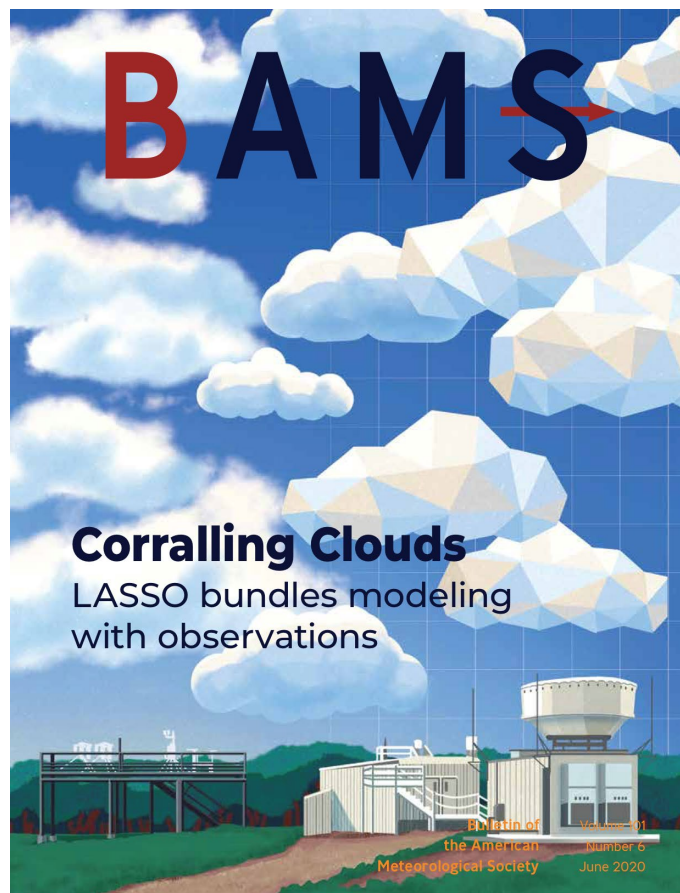
- ▶ Instrument refresh activities including:
 - Version2 (circa 2000) AERIs
 - Microwave Radiometers
 - Wind profilers
 - Doppler lidars
 - Broadband radiometers

Activities and Opportunities at SGP and NSA

- ▶ Construction is underway at the SGP for a new and expanded Guest Instrument Facility (GIF) that will ~double space for guest activities.
- ▶ In the process of obtaining an upgraded automatic balloon launcher that will significantly expand the capacity of sonde launches.
- ▶ NOAA has completed it's significantly expanded Barrow Atmospheric Baseline Observatory.



The LES ARM Symbiotic Simulation & Observation (LASSO) Activity



Gustafson et al. *BAMS* 2020.

- ▶ LASSO-CACTI: preparing to start simulations (*Gustafson*)
- ▶ Have recently created a forum to engage with the community on LASSO topics: <https://discourse.adc.arm.gov>
- ▶ Beginning to look at ACE-ENA simulation configurations
- ▶ Recently held a LASSO tutorial. Materials from the webinar will be on-line soon: <https://www.arm.gov/data/work-with-arm-data/>
- ▶ Five seasons of SGP shallow cumulus simulations available (*Vogelmann*). Most recent simulations include stereo camera diagnostics (*Fairless*)
- ▶ LASSO data are available at the ARM Data Center: <https://adc.arm.gov/lassobrowser>

ARM Community HPC Computing Resources

- ▶ Applications of ARM cluster
 - Operational processing (e.g. radar, complex VAPs)
 - HPC ecosystem for LASSO
 - Support user projects involving data-intensive analysis of ARM data
- ▶ New Cumulus cluster is currently under development
 - Phase I will have 7000 compute cores (July 21)
 - Phase II will have total of 16, 000 cores (Q1 FY22)
 - Will support LASSO and other science use cases
 - GPUs for ML/AI based data analytics
- ▶ Poster: ***Jitendra Kumar***



Connecting with ARM




ASK US ✕

! I need help with... ▾

! Name

! Email

! Please describe your question here in detail.

I'm not a robot  reCAPTCHA
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ATMOSPHERIC RADIATION MEASUREMENT USER FACILITY

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ORGANIZATION



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CAMPAIGN GUIDELINES

LINKING POLICIES

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HELP

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DATA QUESTIONS

FAQS

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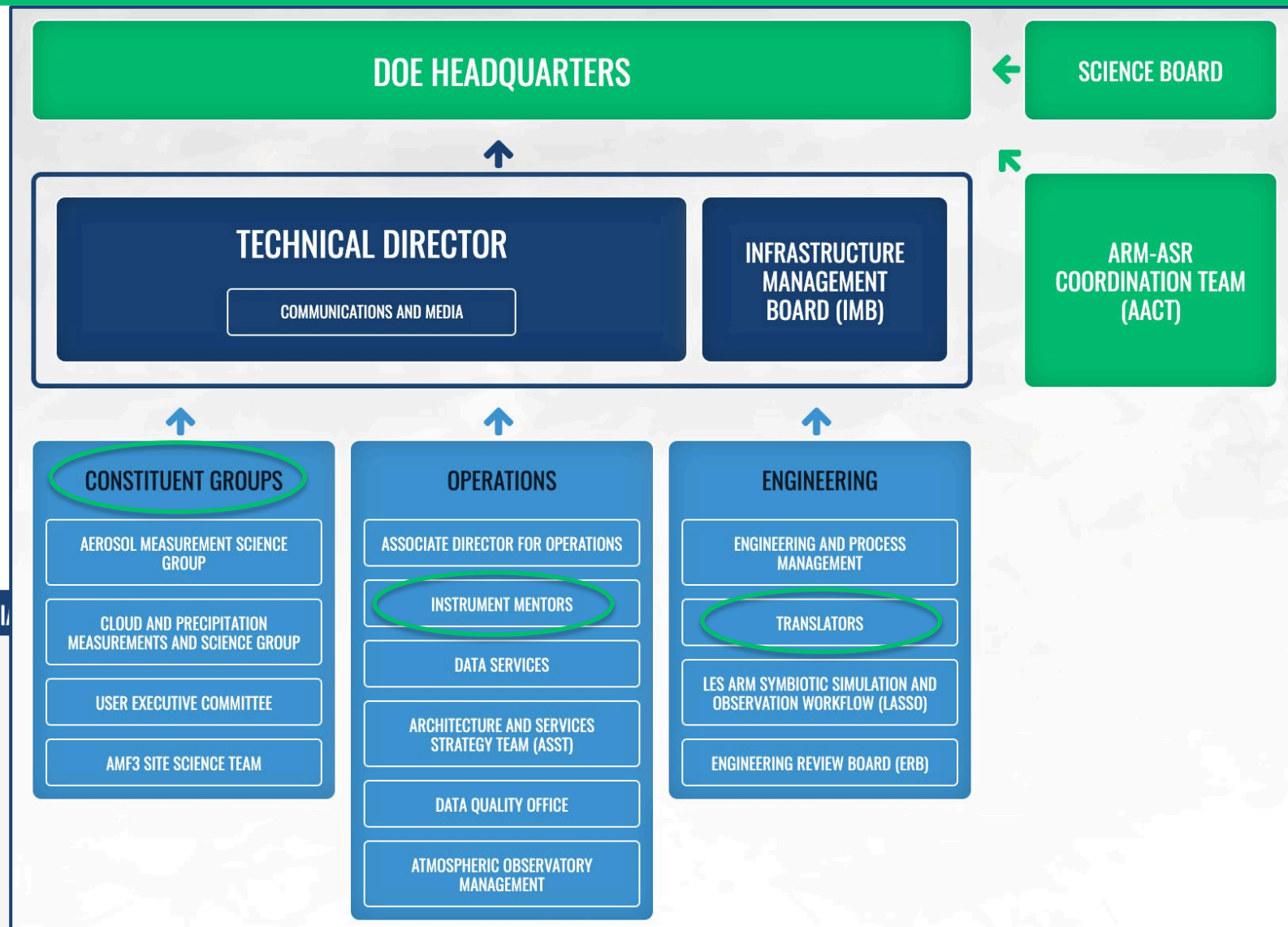
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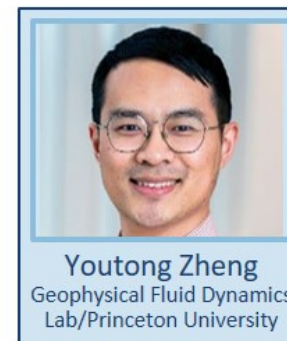
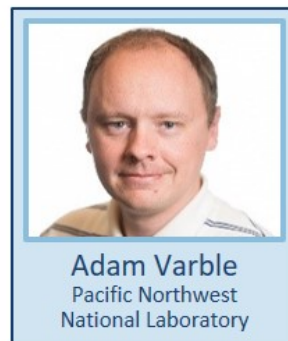
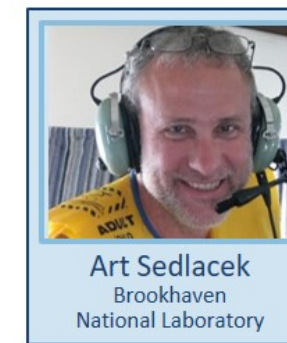
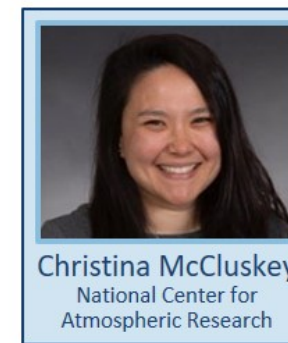
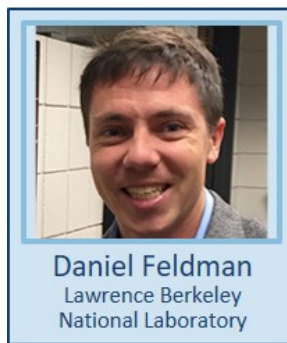
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User Executive Committee



- ▶ Represents user community to the ARM facility
- ▶ Current focus areas
 - Calibration communication & measurement uncertainties
 - Engaging with modeling and satellite communities
 - Engaging with students
- ▶ Engage to discuss questions, concerns and suggestions
- ▶ Networking session: Today at 4:15 EDT
- ▶ Poster: **Aiken** (Tuesday)



About ARM: Future Directions



- DATA ▾
- CAPABILITIES ▾
- RESEARCH ▾
- NEWS & EVENTS ▾
- ABOUT ▾**

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- DATA ▾
- CAPABILITIES ▾
- RESEARCH ▾
- NEWS & EVENTS ▾
- ABOUT**

- Management Structure
- Facility Documents
- History
- Future Directions**
- Facility Usage

ABOUT *ARM is the world's premier ground-based observations facility advancing atmospheric and climate research.*

The Atmospheric Radiation Measurement (ARM) user facility is a multi-laboratory, U.S. Department of Energy (DOE) scientific user facility, and a key contributor to national and international climate research efforts.

[READ THE ARM MISSION AND VISION](#)

ATMOSPHERIC DATA COLLECTION

ARM data are currently collected from three atmospheric observatories—Southern Great Plains, North Slope of Alaska, and Eastern North Atlantic—that represent the broad range of climate conditions around the world, as well as from the three ARM mobile facilities and ARM aerial facilities. Data from these atmospheric observatories, as well as from past research campaigns and the former Tropical Western Pacific observatory, are available at no charge through the ARM Data Center via [Data Discovery](#).

[EXPLORE ARM ATMOSPHERIC OBSERVATORIES](#)

ARM MANAGEMENT STRUCTURE

[Nine DOE national laboratories](#) share the responsibility of managing and operating ARM. Along with these laboratories, several [constituent groups](#) help provide scientific guidance and develop [ARM priorities](#). ARM also collaborates with many national and international partners.

[VIEW THE ARM ORGANIZATION CHART](#)

[VIEW CONSTITUENT GROUPS](#)

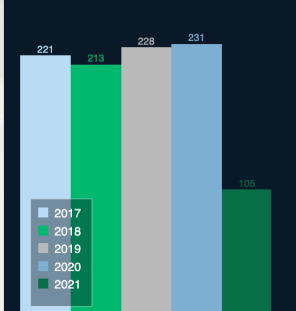
FACILITY DOCUMENTS

Along with [scientific publications](#), ARM has three main types of operational documents:

- Program documents**, which include the [Facility Management Plan](#), [Decadal Vision planning document](#), and [Decadal Vision progress report](#).
- Science reports**, which include science plans, field research campaign final reports, and workshop reports.
- Technical reports**, which describe how ARM data products are created and ARM scientific instruments are used.

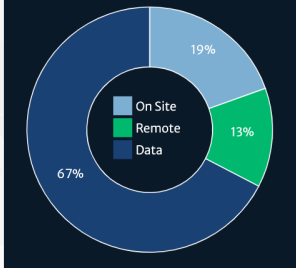
FACILITY USAGE

ARM JOURNAL PUBLICATIONS
For the period of 2017 to 2021



ARM SCIENTIFIC USERS

For the the last 4 quarters reported



Decadal Vision: Observations and Analyses for Understanding of Atmospheric Processes and Model Improvement



Measurements



- ▶ Transparent user engagement
- ▶ Implement major projects
 - Challenger 850
 - AMF3 move to southeast US
- ▶ Expand modes of operation
- ▶ Coordinated IOPs
 - Linking to large scale
 - Data Services

Data Services



- ▶ Continue to develop computational hardware infrastructure
- ▶ Expand analysis tools to meet community needs
- ▶ Enable open-source development to accelerate code development

Data Analysis



- ▶ Increase focus on data characterization by ARM staff
- ▶ Work toward improved efficiency and efficacy of analyses through application of ML/AI techniques

Linking to Models



- ▶ Expand LASSO to other regimes
- ▶ Develop metadata to organize data around periods of interest
- ▶ Identify opportunities for joint projects

News & Events



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DATA CAPABILITIES RESEARCH **NEWS & EVENTS** ABOUT

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SGP NSA ENA AAF AMF

Website Poster: *Rolanda Jundt*



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Data Announcements Features News Field Notes Events

NEWS & EVENTS

ARM produces news and features, data announcements, event announcements, and highlights about its activities to keep users informed.

LATEST NEWS

Blog, Field Notes, SAIL
SAIL Group Makes Snow Trek to Survey Sites in Colorado
Published: 16 June 2021

Blog, Field Notes, From the UEC
From the User Executive Committee (UEC) Chair
Published: 9 June 2021

Facility News
ARM's 2021 EGU Meeting Highlights Include MOSAiC Insights
Published: 12 June 2021

Blog, Field Notes
How to ACT with ARM's Data Quality Information!
Published: 9 June 2021

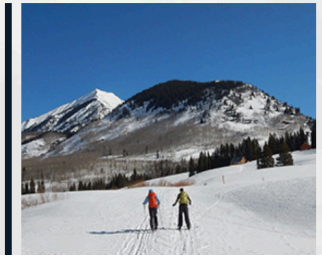
Facility News, Publications
Updated Decadal Vision Captures ARM's Long-Term Priorities
Published: 18 May 2021

Facility News
2021 ARM/ASR Joint Meeting Breakout Sessions
Published: 24 May 2021

Facility News
Ka-Band ARM Zenith Radar Product Resumes for 2 Sites
Published: 19 May 2021

Facility News
Nomination Deadline Extended for 2021 ARM Service Awards
Published: 24 May 2021

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SAIL GROUP MAKES SNOW TREK TO SURVEY SITES IN COLORADO
Published: 16 June 2021
[Blog, Field Notes, SAIL](#)
Dan Feldman, the principal investigator for the upcoming Surface Atmosphere Integrated Field Laboratory (SAIL) field campaign, shares what is new as preparations ramp up for the instrument installation in Colorado.

DATA ANNOUNCEMENTS
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19 May 2021
[New Cloud Radar Products Available From COMBLE Campaign](#)
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