



ARM Facility Engagement

JIM MATHER

ARM Director

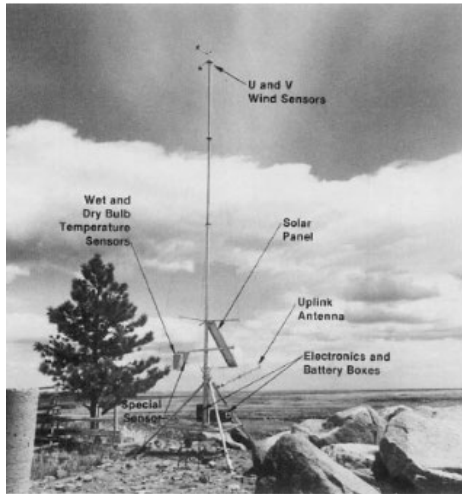
2022 ARM/ASR Joint Meeting

About ARM: Future Directions



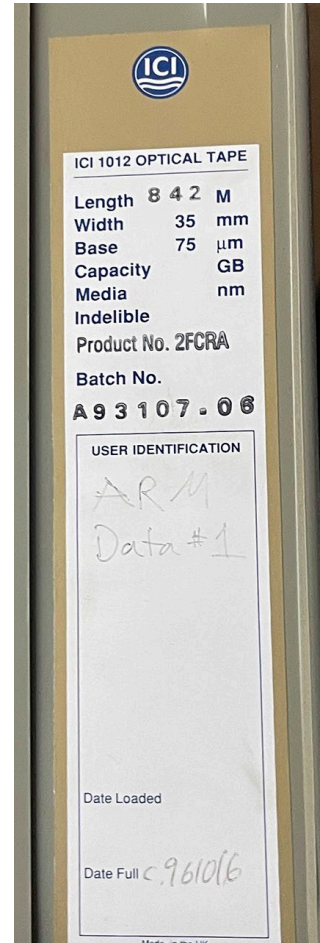
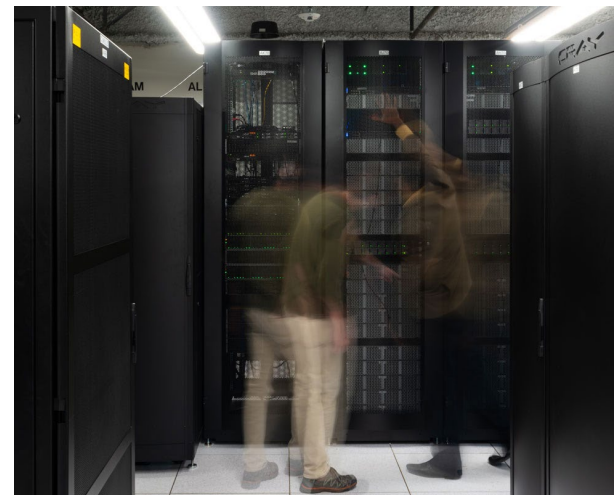
ARM has been providing measurements for 30 years and continues to evolve.

<https://www.arm.gov/about/history/arm30>



Portable Automated Mesonet (Brock et al., 1986)

U.S. DEPARTMENT OF ENERGY



2020 ARM Decadal Vision




MEASUREMENTS

Supporting research of complex science issues through advanced measurements and flexible deployment strategies



DATA ANALYTICS

Providing rigorous constraints on atmospheric processes with highly characterized measurements and multivariable analytics



DATA SERVICES

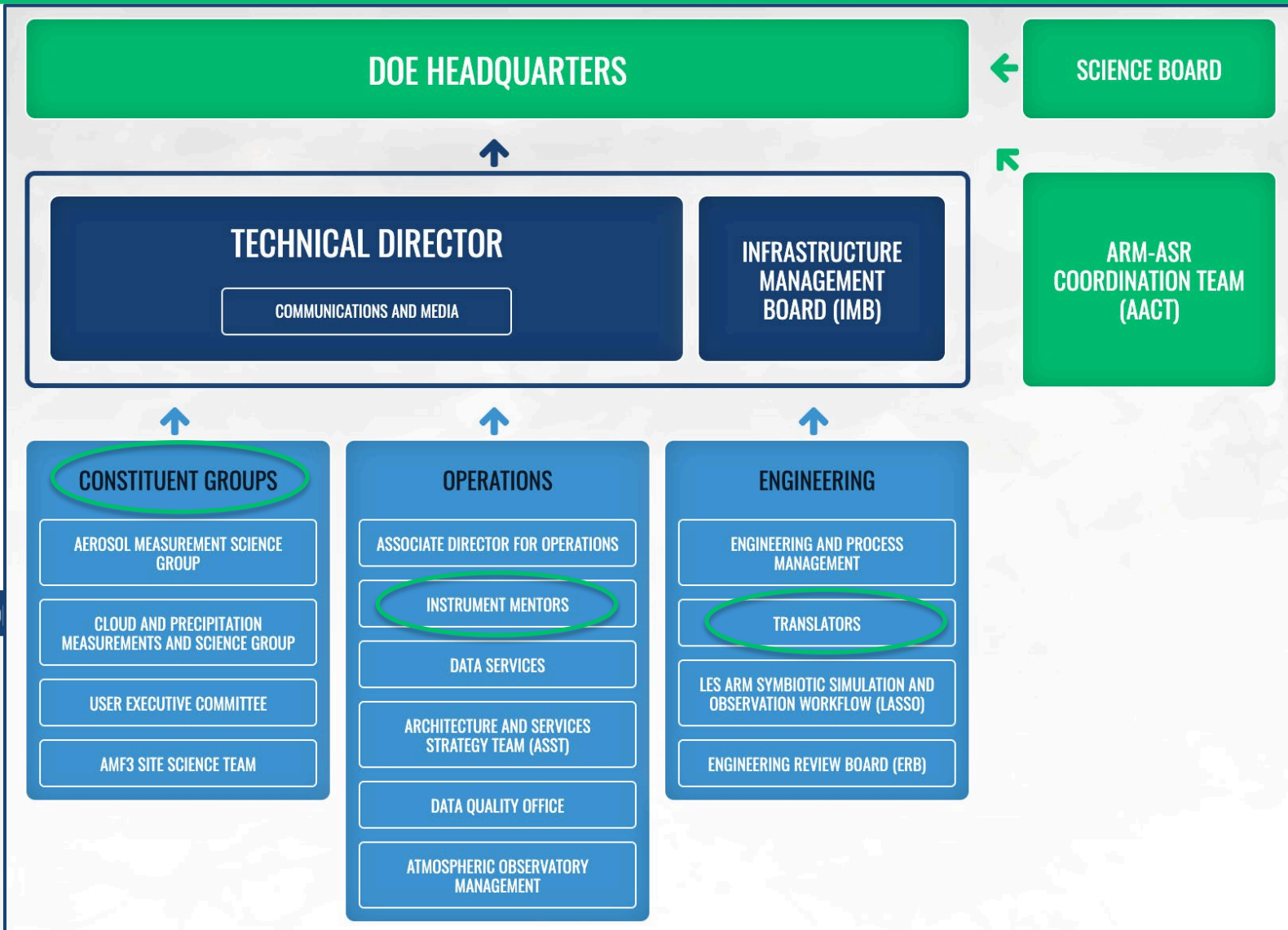
Providing powerful and adaptable computing resources to meet data analysis challenges



OBSERVATIONS TO MODELS

Supporting frameworks and cross-discipline collaboration to enable strong links between ARM measurements and large-scale models

Connecting with ARM



ATMOSPHERIC RAD

CONNECT WITH ARM

CREATE ACCOUNT

ORGANIZATION



POLICIES

DATA POLICIES

CAMPAIGN GUIDELINES

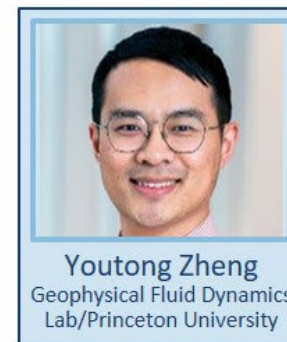
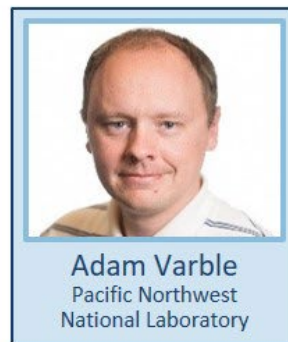
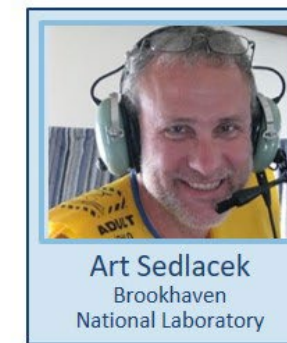
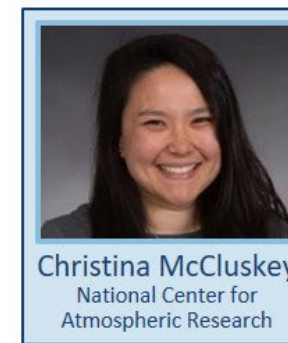
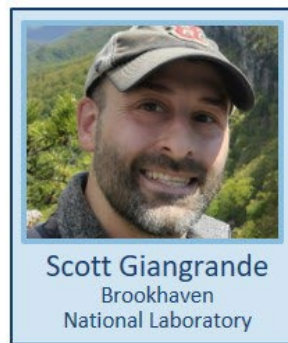
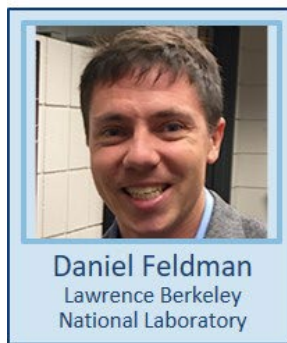
LINKING POLICIES

DIVERSITY, EQUITY, & INCLUSION

PRIVACY & SECURITY NOTICE

User Executive Committee

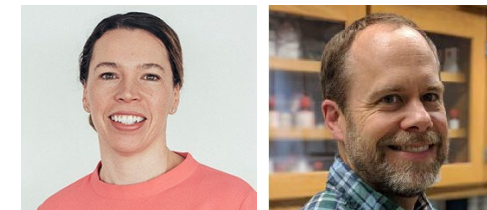
- ▶ Represents user community to the ARM facility
- ▶ Current focus areas
 - Calibration communication & measurement uncertainties
 - Engaging with modeling and satellite communities
 - Outreach including early career and expanding diversity
- ▶ Engage to discuss questions, concerns and suggestions
- ▶ Networking session: Lunch today



Aerosol and Cloud Constituent Groups

- ▶ Aerosol: chaired by Gannet Hallar and Tim Onasch
 - Workshop report available at <https://arm.gov/about/constituent-groups/amsg>
 - Group reorganizing under for sub-areas: measurement techniques, quality, sampling and modeling
 - Session on measurements led by Allison McComiskey

- ▶ Cloud: chaired by Christine Chiu
 - Workshop report available at <https://arm.gov/about/constituent-groups/cpmsg-group>
 - Group currently organized around meteorological regimes, several specific data product types, and modeling
 - Session on boundary layer products
 - Radar measurements



Capability Needs Template

Problems & Roadblocks	Impact	Research Elements	Maturity/ Readiness	Solution/ Recommendation	Roadmap to modelling
Uncertainties in retrievals of velocity and microphysical properties.	Accurate observational estimates of convective velocity and microphysics are needed to improve understanding of underlying convective processes, model validation and parameterization development. This is a significant shortcoming for interpreting convective simulations.	Multi- λ radar observations (VPT, scanning, polarimetric, spectral).	Research platforms are mature, but continuous operation remains a challenge. (Medium)	Focus on fewer, high quality radar platforms. (3 months) Calibration needed for quantitative data and products. (6 months)	High-quality, quantitative retrievals are necessary for process study analysis and model evaluation.
		Retrievals of vertical velocity	Historical methods are mature but may have uncertainties that are too large for target process studies. Validation difficult. (Medium)	Prioritize VAPS and follow-on analysis of existing retrieval algorithms. (6 months) Data assimilation approaches, e.g. through LASSO may be required. Doppler lidars can play a role for sub-cloud motions. (6 months)	Long-term datasets (statistics) of convective vertical velocity is an important target for large-scale models. Accurate retrievals are needed for evaluation of high-resolution models. Need regime-based evaluation.

About ARM: Future Directions

- ▶ Collect input
- ▶ Refine input through discussion
- ▶ Assess science impact and costs
- ▶ Review against other requests
- ▶ Develop implementation plan
- ▶ Communicate outcomes

ARM works with scientific users to continually evolve to enable the next generation of scientific inquiry.

2020 ARM User Facility Decadal Vision

The Atmospheric Radiation Measurement (ARM) user facility is continually changing in response to evolving science, user needs, and available technology. ARM engages with users through its constituent groups, with Atmospheric System Research (ASR) scientists (especially with the annual Joint ARM User Facility/ASR Principal Investigators Meeting), and the broader community through workshops, conferences, and collaborative activities.

In addition to interactions with the scientific community, the direction of ARM is governed by the [strategic direction set by DOE](#).

A NEW VISION FOR ARM

Through community engagement, ARM in 2020 developed a new Decadal Vision document to address increasingly complex science challenges related to the facility's mission over the next five to 10 years. The updated vision statement is: **to provide the research community with the best array of field observations and supporting state-of-the-art data analytics to significantly improve the representation of challenging atmospheric processes in earth system models.**

This vision will be sustained by activities organized within the following four themes:

MEASUREMENTS

Provide comprehensive and impactful field measurements to support scientific advancement of atmospheric process understanding. ARM strives to deliver the highest level of information possible at its observatories. To maximize its science impact, ARM plans to deploy observatories where the science community most needs them, provide the most comprehensive and useful measurements possible, and expand the spatial footprint of ARM measurements.

DATA ANALYTICS

Achieve the maximum scientific impact of ARM measurements through increased engagement with observational data by ARM staff, including the application of advanced data analytical techniques. In addition to exploring new measurement opportunities, ARM is considering how it can extract additional benefit from existing measurements through a focus on data analysis. ARM is looking at fundamental work that needs to be done with ARM data as well as potential applications of advanced data analytics.

DATA SERVICES

2020 DECADAL VISION

Read the report that sets forth ARM's path for the next five to 10 years.

DECADAL VISION NEWS

Read all articles related to the current ARM Decadal Vision.

HOW CHANGE HAPPENS

ARM is always changing in response to new science and user needs, and available technology. [Change starts with users.](#)

[View the Priorities](#)
Users can view current and completed high-priority ARM activities.

[Request for New ARM Capabilities](#)
Have an idea or suggestion for a new measurement, data product, or data service for ARM? Tell ARM about it.

Request for New ARM Capabilities



POINT OF CONTACT

Enter your last name and click search. Select the name of the appropriate match. If your name does not appear, please create an ARM account.

SELECT CONTACT

PROBLEMS AND ROADBLOCKS

Identify the issue you are trying to address. For example, the need to characterize uncertainties of cloud microphysical retrievals

...

IMPACT

What would be the scientific benefit if this issue would be addressed? Who would be the community that would benefit from addressing this issue?

...

COMMUNITY REPRESENTED

If you are representing a particular group, e.g., an Atmospheric System Research working group or NASA satellites, modeling, GEWEX, etc., in submitting this request, please identify that group here along with your role in representing that community. If you represent a commercial interest, ARM has a separate process for industry to follow. [Contact us](#) for more information.

...

RESEARCH ELEMENTS

Describe the specific measurements or parameters that are required to address the challenge. If you are not familiar with what ARM currently collects for measurements, please go to our [Data Sources page](#).

...

SOLUTION/RECOMMENDATIONS

Provide your thoughts on how to improve the execution of the research elements to address the underlying problem or roadblock.

...

MATURITY/READINESS

Characterize the state of technology and science understanding that is required to implement the recommended course of action. If there are references that provide details on a solution, please include those here.

...

ROADMAP TO MODELING

If relevant, describe how implementing this capability could result in improvements to earth system models or indicate that it is not applicable.

...

- ▶ Host web form on www.arm.gov website to solicit input
- ▶ Periodically post invitations to submit ideas (e.g. via newsletter)
- ▶ Impact should include reference to affected community – but anyone can enter ideas
- ▶ Recommendations could also come through organized activities such as workshops (should ask for same information)
- ▶ Post recommendations via mechanism that enables public comment

<https://www.arm.gov/about/future-directions/request-arm-capability>

Opportunities to Engage

- ▶ Reach out to ARM staff
- ▶ Reach out to members of the UEC and members of the aerosol and cloud groups
- ▶ Reach out to ARM on-line using the “Ask Us” or “Feedback” links
- ▶ Submit a capability gaps form
- ▶ Complete an ARM user survey!
- ▶ Come to the UEC lunch today!

Feedback

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HELP

ASK US

DATA QUESTIONS

FAQS

ACCOUNT MANAGEMENT

Reviewed September 2020

How well is ARM supporting your research?
TAKE THE ARM USER SURVEY
and be entered to win an ARM water bottle