Connecting DOE SBIR Awardees with ARM and ASR to Enhance Atmospheric Research

ADAM THEISEN, GAVIN MCMEEKING, TIM ONASCH

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Agenda

Time (ET)	Description	Presenter (s)
10:45-11:15	Overview of the ARM User Facility Capabilities and Q&A	Adam Theisen, Nicki Hickmon
	Lightning Talks	
11:15-11:20	Coupled Aerodynamic and Optical Sizing for Coarse Particles	Stavros Amanatidis
11:20-11:25	Adaptive Measurement of Nuclei Particle Size and Concentration	Stavros Amanatidis
11:25-11:30	Measurement of atmospheric sulfuric acid concentration using a water-based condensation particle counter	Arantzazu Eiguren
11:30-11:35	Instantaneous Aerosol Mobility Sizing	Steven Spielman
11:35-11:40	Low-Cost Aerosol Size Distribution and Light Absorption Instruments for Urban Monitoring Applications	Fredrick Brechtel
11:40-11:45	A Low-Cost Holographic Sensor for Urban Aerosol Characterization	Matthew Freer
11:45-11:50	A low-cost, networkable fluorescence spectrometer for automatic identification of pollen and other coarse mode aerosols found in urban environments	Ben Swanson, Gavin McMeeking
11:50-11:55	Small-footprint mass spectrometry based chemical sensors for urban monitoring	Wade Rellergert, Scott Sullivan
11:55-12:00	Mobile Urban Aerosol Composition using a Robust Multi-pass Cell and Mid-infrared Fingerprint Region Spectroscopy	Brian Leen
12:00-12:05	Miniaturized weather station with rapid switching between precipitation and meteorological measurement modes	Allan Reaburn
12:05-12:25	**Lightning Talk Q&A**	

Atmospheric Radiation Measurement User Facility

ADAM THEISEN

Instrument Operations Manager

Slides and content provided by Jim Mather, Beat Schmid, and Andy Glen

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The World's Foremost Ground-based Atmospheric Observing Facility

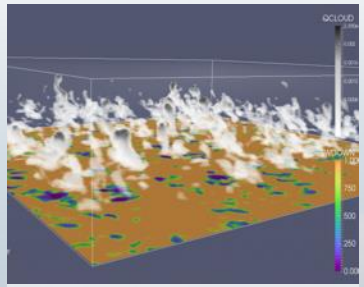
Measurements of clouds, aerosols, precipitation, radiation, surface properties, and the atmospheric state since 1992

Support for process studies and model and satellite development

Network of three fixed-location and three mobile observatories

Piloted and uncrewed aerial measurement platforms

Extensive data management infrastructure; data freely available



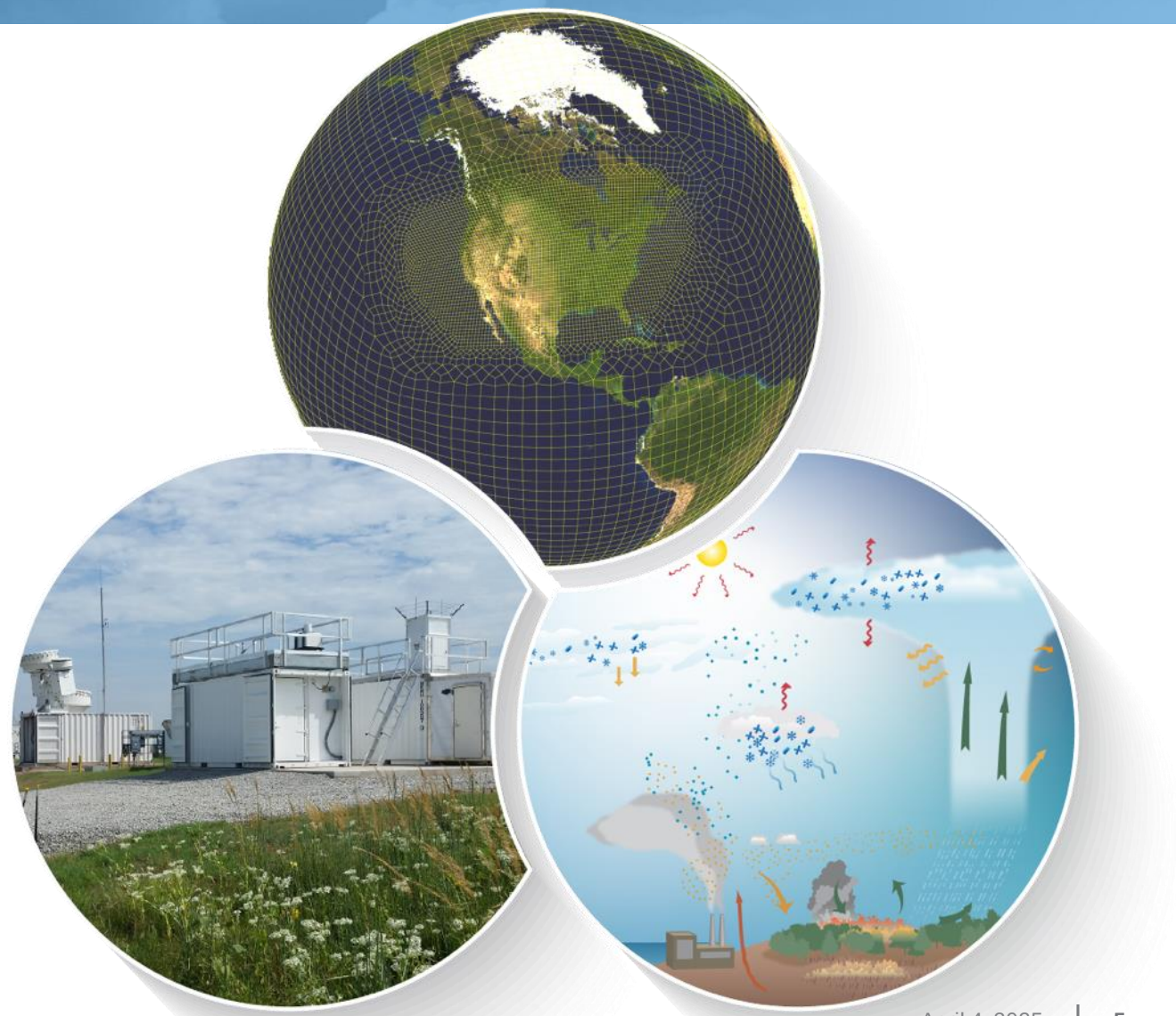
Large-eddy simulation (LES) model simulations and analysis tools

Support for field campaigns ranging from guest instruments to facility deployments

Observations Support Atmospheric Research

MISSION:

Provide the research community with strategically located atmospheric observatories to improve the understanding and representation in earth system models of clouds and aerosols and their interactions with the Earth's surface.



Unique Measurement Capabilities Deployed in Diverse Climate Regimes

Southern Great Plains

- N. Central Oklahoma

North Slope of Alaska

- Utqiaġvik, AK

Eastern North Atlantic

- Graciosa Island, Azores

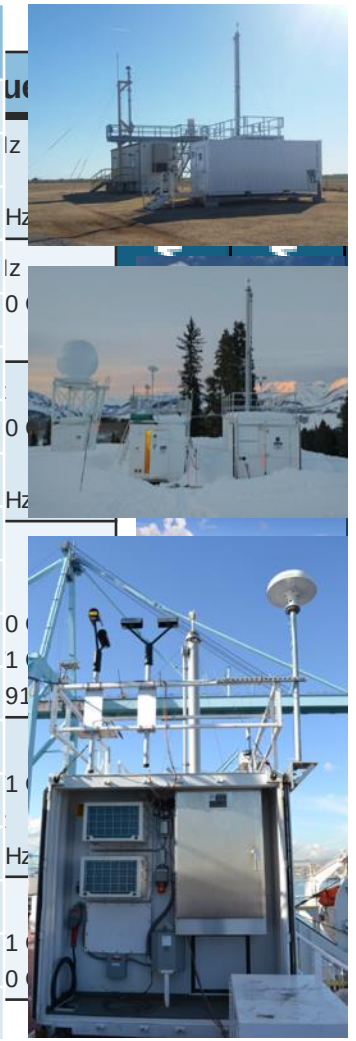
ARM Mobile Facilities

- AMF1 – Baltimore, MD
- AMF2 – Tasmania, Australia
- AMF3 – Bankhead National Forest, AL

Advancing Atmospheric Insights with Comprehensive Ground-based Observations

- Operate 379 ground-based instrument systems run in tandem with each other to provide a comprehensive view of the atmosphere
- Diverse set of lidars across all observatories
- Extensive radar capabilities
  - 32 radars across 9 different frequencies
- Aerosol Observing Systems deployed at each observatory
  - NSA aerosol measurements are a collaboration between NOAA and ARM
  - ARM deployed aerosol chemical speciation monitor, aerodynamic particle sizer, and single-particle soot photometer to the NOAA facility

Measurements (Instrument)	AMF1	AMF2	AMF3	SGP	ENA	NSA
Aerosol Absorption Continuous Light Absorption Photometer						X*
Aerosol Extinction Cavity Attenuated Phase Shift Extinction Monitor			X			
Aerosol Number Concentration 0.003-3µm Condensation Particle Counter Ultrafine	X	X	X	X		
Aerosol Number Concentration 0.01-3µm Condensation Particle Counter Fine	X	X	X	X	X	X*
Aerosol Scattering Nephelometer	X	X	X	X	X	X*
Aerosol Size Distribution 0.002-0.15µm Nano Scanning Mobility Particle Sizer				X		
Aerosol Size Distribution 0.01-0.5µm Scanning Mobility Particle Sizer			X	X	X	
Aerosol Size Distribution 0.06-1 µm Ultra-high-sensitivity Aerosol Spectrometer	X	X	X	X	X	
Aerosol Size Distribution 0.5-20 µm Aerodynamic Particle Sizer	X	X	X	X	X	X
Black Carbon Concentration Aethalometer - Filter	X					X*
Black Carbon Concentration Single-particle Soot Photometer - Laser	X**	X**	XR			XR
Carbon Monoxide Concentration CO Analyzer	X	X	X		X	
Chemical Composition Aerosol Chemical Speciation Monitor	X		X	X		X
Cloud Condensation Nuclei Concentration Cloud Condensation Nuclei Particle Counter	X	X	X	X	X	
Hygroscopicity Humidified Tandem Differential Mobility Analyzer	X		X			
Ice-Nucleating Particle Concentrations Ice Nucleation Spectrometer – Filter	X	X	X	X		
Ozone Concentration Ozone Monitor	X	X	X	X	X	
Sulfur Dioxide Concentration Sulfur Dioxide Monitor	X		X	X		



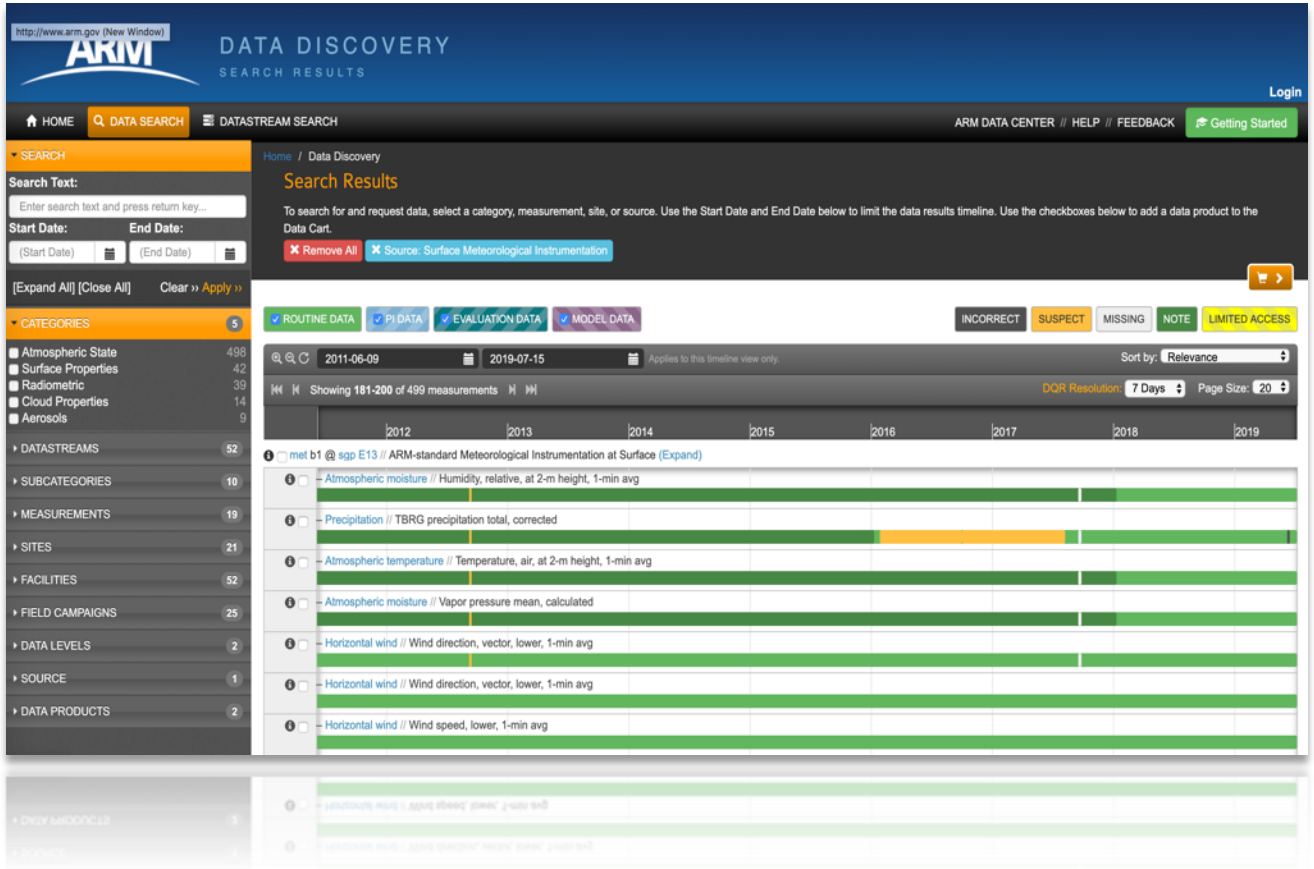
ARM Aerial Facility (AAF)

- Platforms
  - Bombardier Challenger 850 (CL850) regional jet
    - Under modification
  - Navmar ArcticShark uncrewed aerial system (UAS)
  - Instruments/measurements
    - Over 90 in house (Challenger 850 and ArcticShark)
    - Atmospheric thermodynamics, clouds, aerosols, precursor and trace gases, radiation, surface properties
- Tethered Balloon Sonde (TBS)
  - Typical maximum flight altitude: 1.5 km
  - Aloft wind speed cutoff: 14 m/s
  - ADS-B out transponder
  - Night flights are currently permitted at SGP; others could be possible

Accessing ARM's Data

- **Free** to anyone that wants to use it!
- Register with ARM for an account to start accessing data
- Open-source Python software available for working with ARM's data
  - Atmospheric data Community Toolkit (ACT)
  - Python ARM Radar Toolkit (Py-ART)

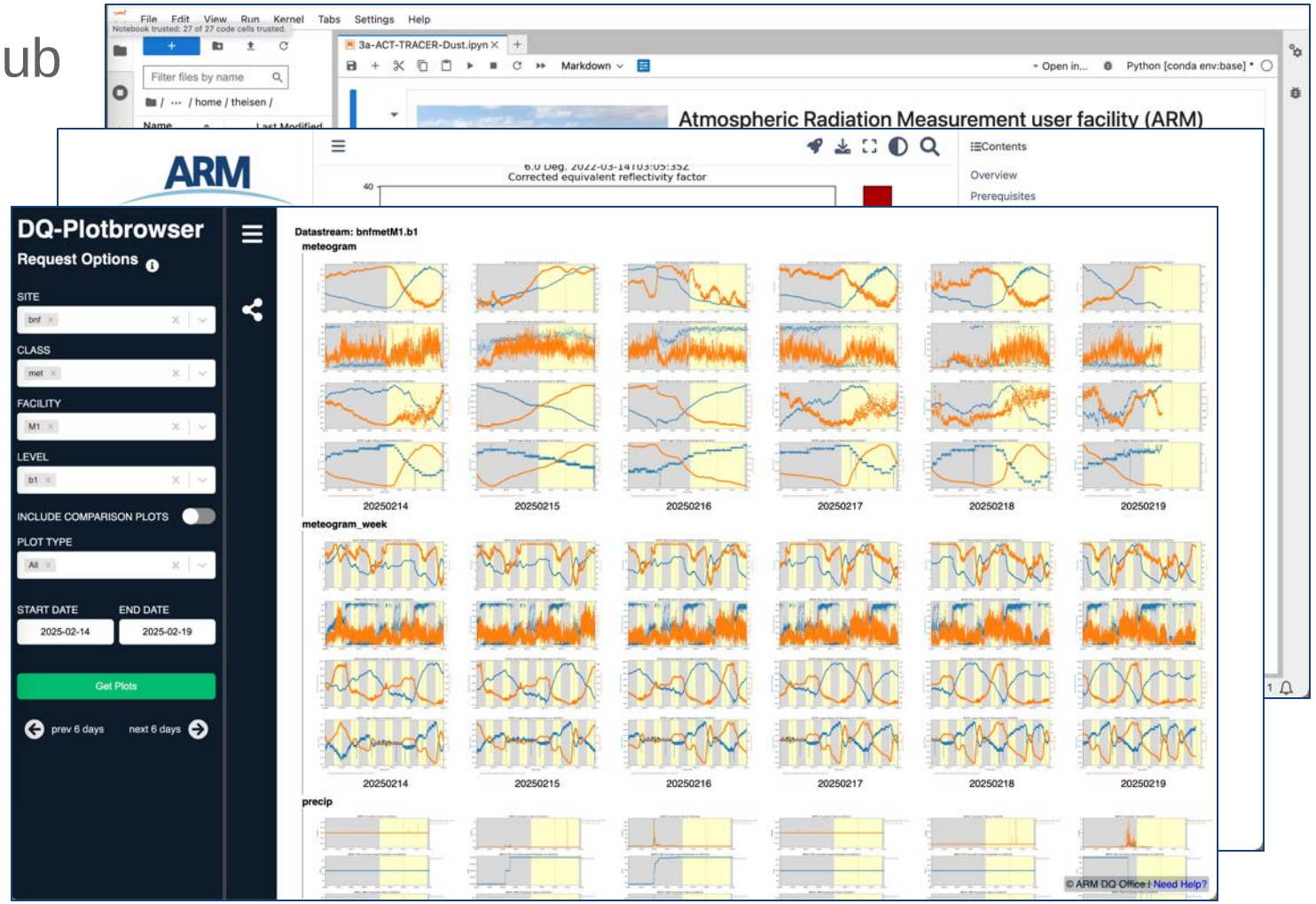
~7+ Petabytes



https://arm.gov/

Additional Resources

- ARM's Data Workbench/JupyterHub
- ARM-Notebooks Repository
- Data Quality Office Quicklooks



Leveraging ARM Facilities Field Campaign Process & Operations

NICKI HICKMON

ARM Associate Director for Operations

Argonne National Laboratory (ANL)

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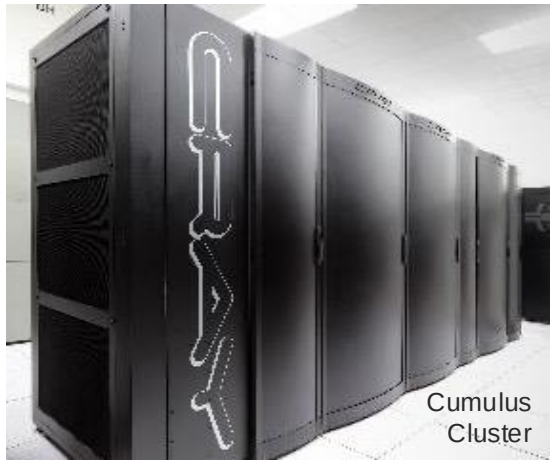
Types of Field Campaigns

- Year-round submission
  - Guest instruments at fixed or long-term sites
  - Modification or focused periods
  - Coordination with external field campaigns
  - High-performance computing cluster


Cumulus Cluster

Types of Field Campaigns

- Specific calls
  - ARM Mobile Facility
  - ARM Aerial Facility
  - ARM-EMSL FICUS

EMSL Environmental Molecular Sciences Laboratory
A DOE OFFICE OF SCIENCE USER FACILITY

MENU

Home / Calls For Proposals / Call For FICUS Research Proposals With ARM and EMSL, FY 2024

Call for FICUS Research Proposals with ARM and EMSL, FY 2024 **[Closed]**

Timeline

February 9, 2023
Letters of intent due

February 22, 2023
Invitation of proposals

March 23, 2023
Full proposals due

July 31, 2023
Decision notices sent

October 1, 2023
Projects start

October 1, 2023
Projects start

The Atmospheric Radiation Measurement (ARM) user facility and Environmental Molecular Sciences Laboratory (EMSL) are seeking collaborative research applications through the Facilities Integrating Collaborations for User Science (FICUS) program. The FICUS program was established in 2014 to encourage and enable ambitious research projects, integrating the expertise and capabilities of multiple user facilities.

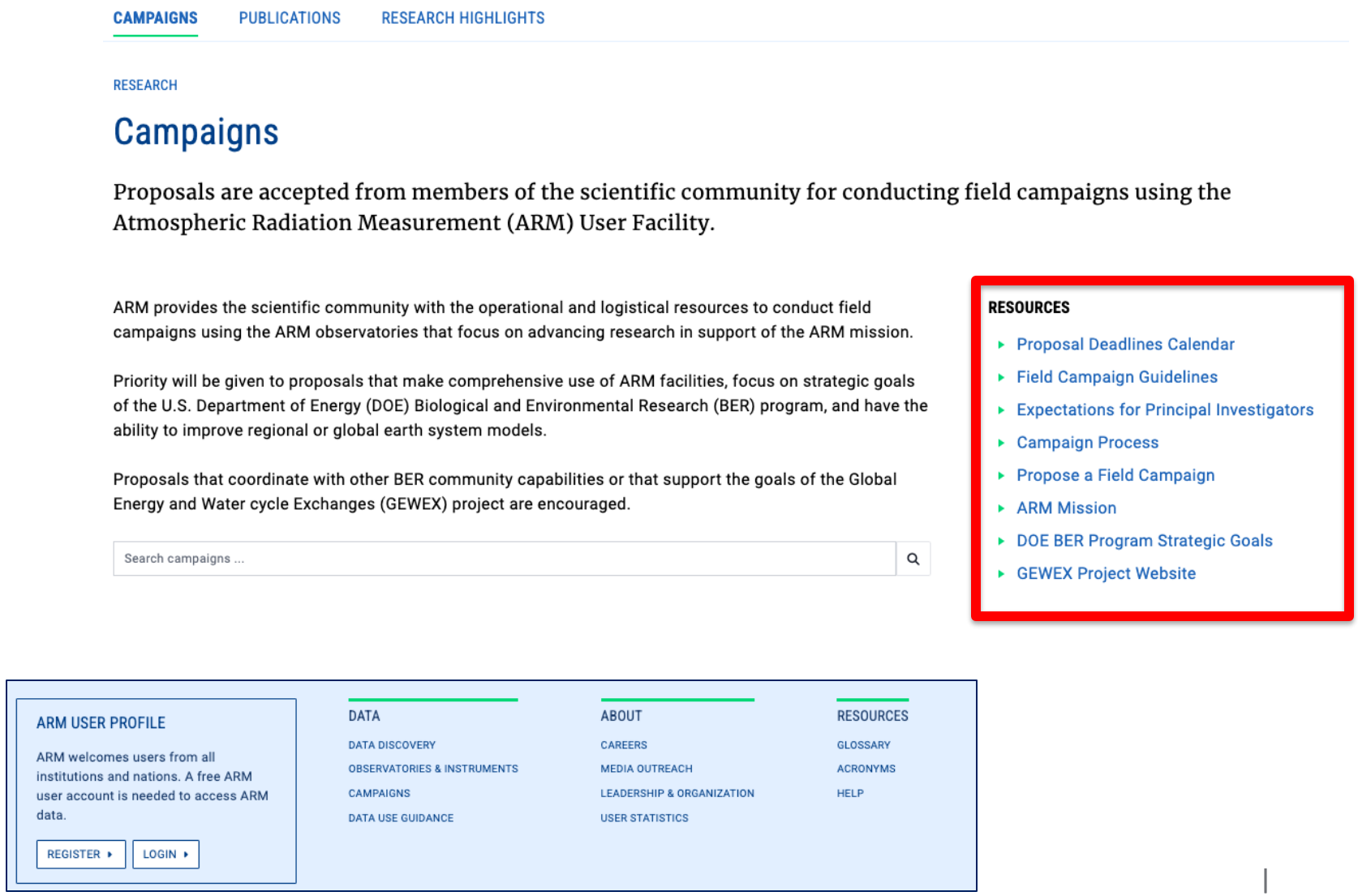
ARM Campaign Webpage

Reviews Require

- Proposal
- Instrument Support Request (ISR) for Guest Instruments

Keys to Successful Proposals

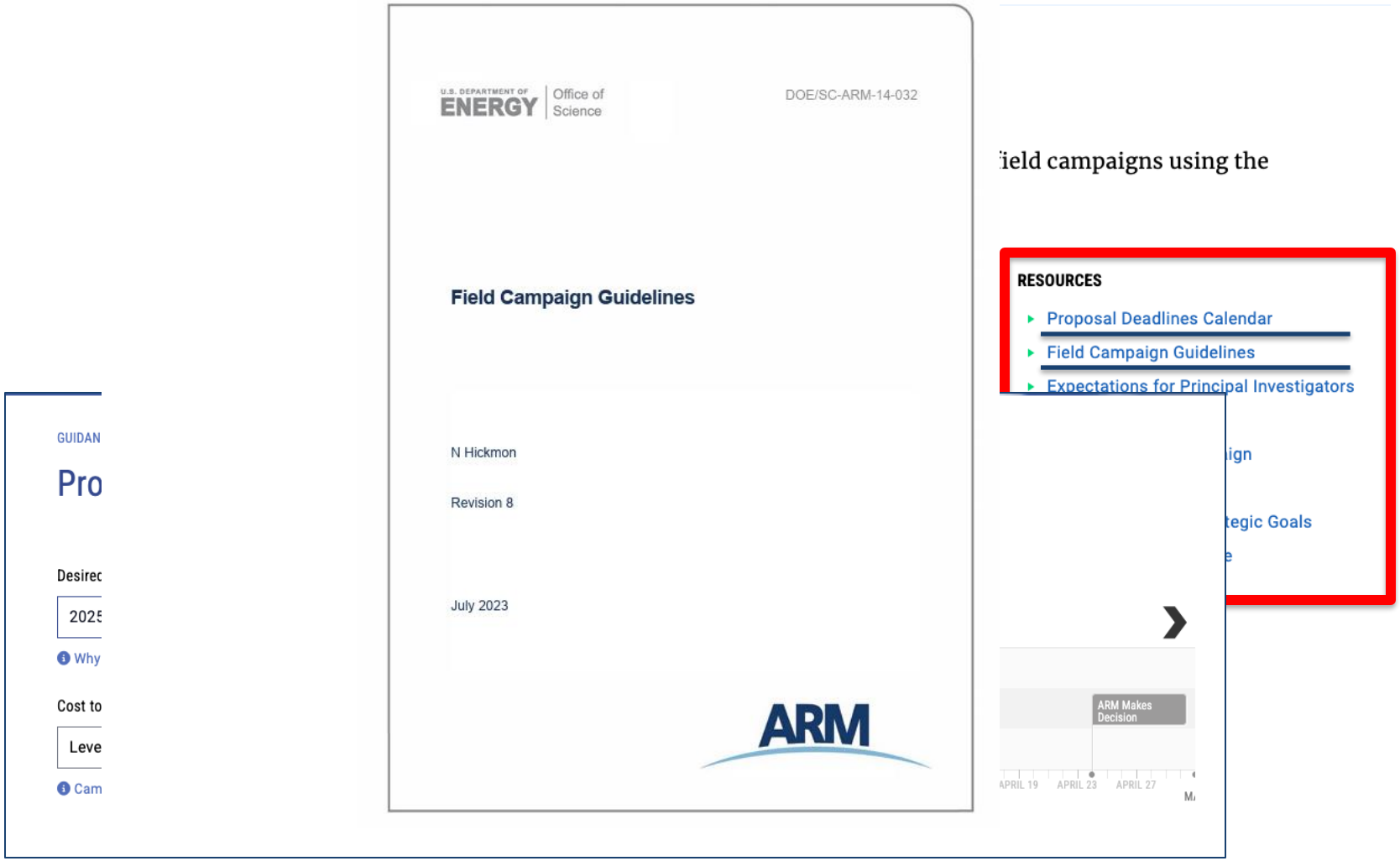
- Submit on time
- Read the instructions
- Align with ARM Mission & DOE Goals
- Communicate with ARM



ARM Campaign Webpage

Details Provided

- Deadlines
- Guidelines
- Links



ARM Campaign Webpage

Details Provided

- Announcements

Updated: Propose for ARM FY2026 Tethered Balloon System Missions

Published: 3 January 2025

Editor's note (February 11, 2025): *The calls below are both* ***CLOSED****.*

Scientists can propose for new missions or request to analyze aerosol samples collected on flights

The Atmospheric Radiation Measurement (ARM) User Facility has two proposal calls open simultaneously for its tethered balloon systems (TBS).

For fiscal year 2026 (FY2026), ARM is now accepting preliminary proposals for TBS missions while also participating in a joint call with the Environmental Molecular Sciences Laboratory (EMSL). Like ARM, EMSL is a U.S. Department of Energy Office of Science user facility.

The ARM/EMSL call is supported through the Facilities Integrating Collaborations for User Science (FICUS) program. At no cost to them, FICUS awardees can use world-class ARM and EMSL resources and collaborate with scientific staff from both user facilities.

Through the new FICUS call, researchers can apply to use EMSL instruments to collect samples of aerosols and volatile organic compounds on ARM TBS flights and then conduct analysis using advanced laboratory techniques at EMSL. For information about the EMSL instruments available for this call, read the ARM/EMSL FICUS FY2026 solicitation.

FICUS applicants may propose to analyze samples from past TBS missions or from planned missions at ARM's Bankhead National Forest (BNF) atmospheric observatory in northwestern Alabama or as part of ARM's Coast-Urban-Rural Atmospheric Gradient Experiment (CoURAGE) in Baltimore, Maryland.

The ARM-only call is for projects that **do not** require EMSL instruments and sample analysis.

In June 2024, an ARM tethered balloon system flies in the early morning during a campaign at the Southern Great Plains atmospheric observatory in Oklahoma. Photo is by Brent Peterson, Sandia National Laboratories.

ARM's Southern Great Plains observatory in north-central
ospheric Monsoon (DUSTIEAIM) field campaign in Phoenix,

re expected. Learn about parameters for proposing new

2025.

L FICUS FY2026 solicitation.

nsure alignment of proposals to ARM and EMSL missions
requirements is available on this FICUS guidance web page.

Proposals for the ARM-only call will follow the review procedure outlined for ARM TBS field campaigns and **must be submitted through ARM's Propose a Field Campaign page**.

The due date to submit preproposals for TBS missions through the ARM-only call is the same as the deadline to submit letters of intent for the FICUS call: **Tuesday, February 4, 2025**.

Get More Information: ARM TBS Webinar

For people interested in participating in either call and/or using TBS data in their research, ARM hosted a TBS webinar in January 2024. The webinar included information about ARM's TBS capabilities and data. Watch the webinar recording now.

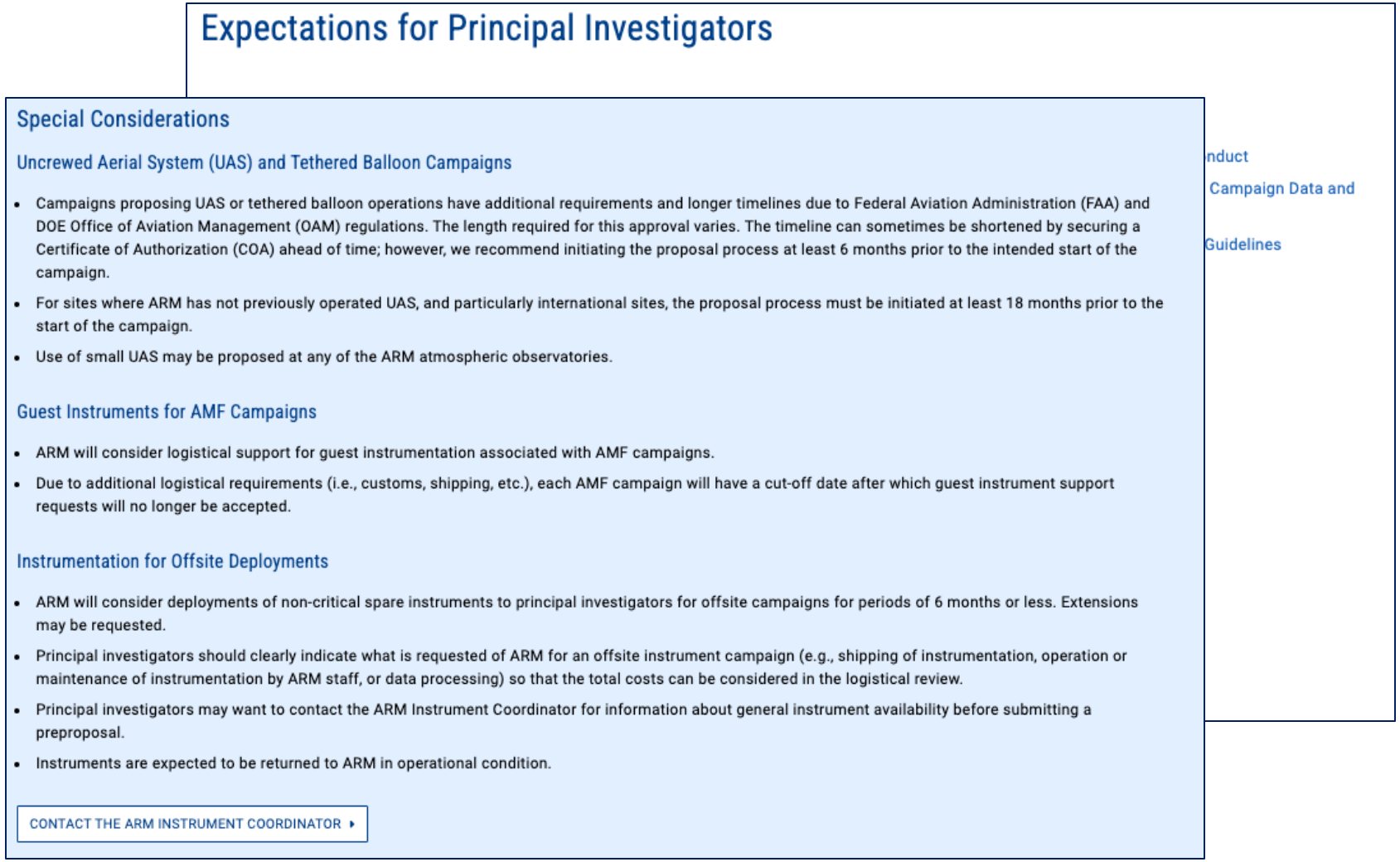
ARM Campaign Proposals – For Overachievers

Details Provided

- Announcements
- Expectations

Consequences

- Final Campaign Report
- Guest Instrument Data



Expectations for Principal Investigators

Special Considerations

Uncrewed Aerial System (UAS) and Tethered Balloon Campaigns

- Campaigns proposing UAS or tethered balloon operations have additional requirements and longer timelines due to Federal Aviation Administration (FAA) and DOE Office of Aviation Management (OAM) regulations. The length required for this approval varies. The timeline can sometimes be shortened by securing a Certificate of Authorization (COA) ahead of time; however, we recommend initiating the proposal process at least 6 months prior to the intended start of the campaign.
- For sites where ARM has not previously operated UAS, and particularly international sites, the proposal process must be initiated at least 18 months prior to the start of the campaign.
- Use of small UAS may be proposed at any of the ARM atmospheric observatories.

Guest Instruments for AMF Campaigns

- ARM will consider logistical support for guest instrumentation associated with AMF campaigns.
- Due to additional logistical requirements (i.e., customs, shipping, etc.), each AMF campaign will have a cut-off date after which guest instrument support requests will no longer be accepted.

Instrumentation for Offsite Deployments

- ARM will consider deployments of non-critical spare instruments to principal investigators for offsite campaigns for periods of 6 months or less. Extensions may be requested.
- Principal investigators should clearly indicate what is requested of ARM for an offsite instrument campaign (e.g., shipping of instrumentation, operation or maintenance of instrumentation by ARM staff, or data processing) so that the total costs can be considered in the logistical review.
- Principal investigators may want to contact the ARM Instrument Coordinator for information about general instrument availability before submitting a preproposal.
- Instruments are expected to be returned to ARM in operational condition.

CONTACT THE ARM INSTRUMENT COORDINATOR ▸

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Campaign Data and

Guidelines

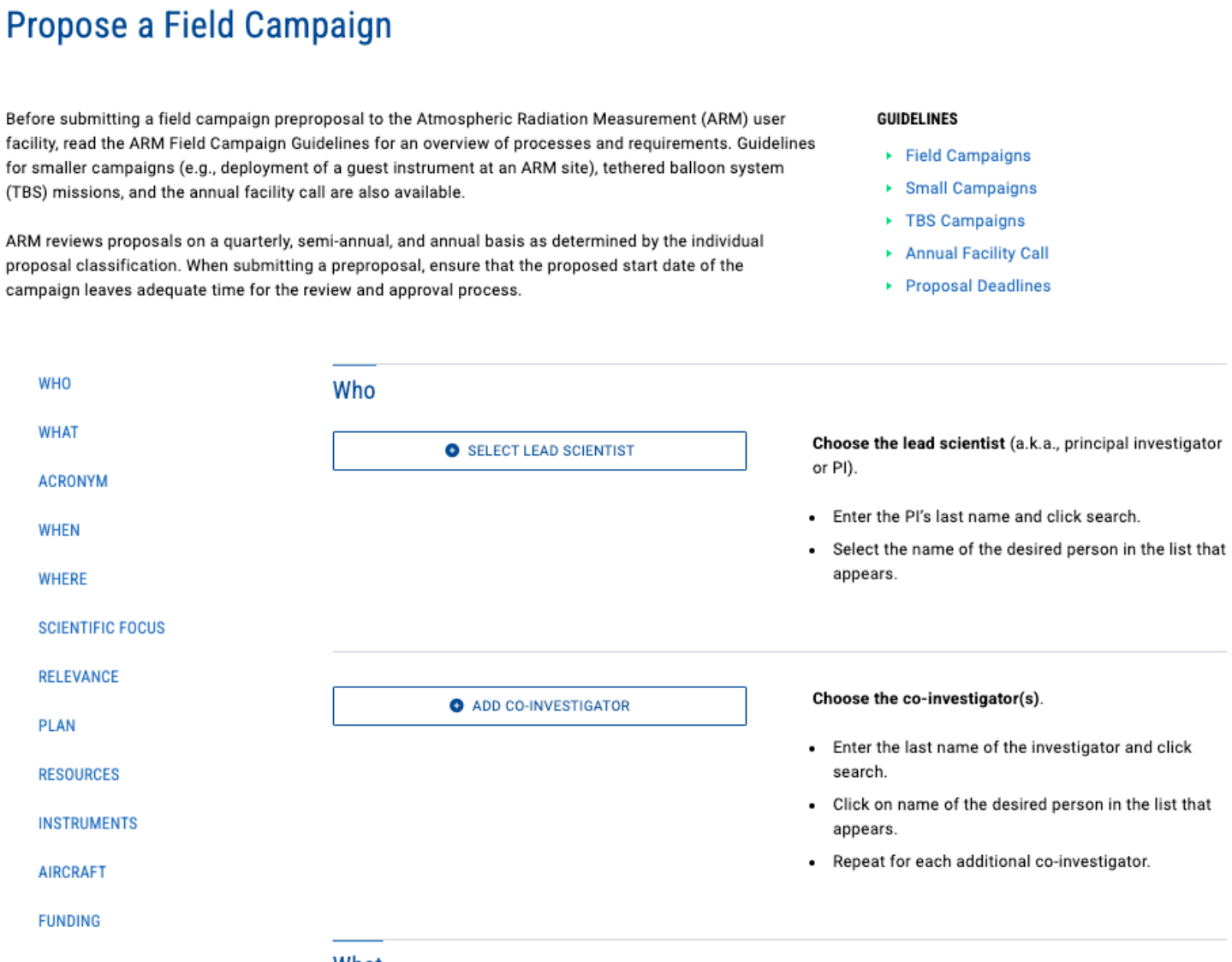
Proposal Form

Details Provided

- Announcements
- Expectations

Consequences

- Final Campaign Report
- Guest Instrument Data



Propose a Field Campaign

Before submitting a field campaign preproposal to the Atmospheric Radiation Measurement (ARM) user facility, read the ARM Field Campaign Guidelines for an overview of processes and requirements. Guidelines for smaller campaigns (e.g., deployment of a guest instrument at an ARM site), tethered balloon system (TBS) missions, and the annual facility call are also available.

ARM reviews proposals on a quarterly, semi-annual, and annual basis as determined by the individual proposal classification. When submitting a preproposal, ensure that the proposed start date of the campaign leaves adequate time for the review and approval process.

GUIDELINES

- Field Campaigns
- Small Campaigns
- TBS Campaigns
- Annual Facility Call
- Proposal Deadlines

WHO
WHAT
ACRONYM
WHEN
WHERE
SCIENTIFIC FOCUS
RELEVANCE
PLAN
RESOURCES
INSTRUMENTS
AIRCRAFT
FUNDING

Who

SELECT LEAD SCIENTIST

Choose the lead scientist (a.k.a., principal investigator or PI).

- Enter the PI's last name and click search.
- Select the name of the desired person in the list that appears.

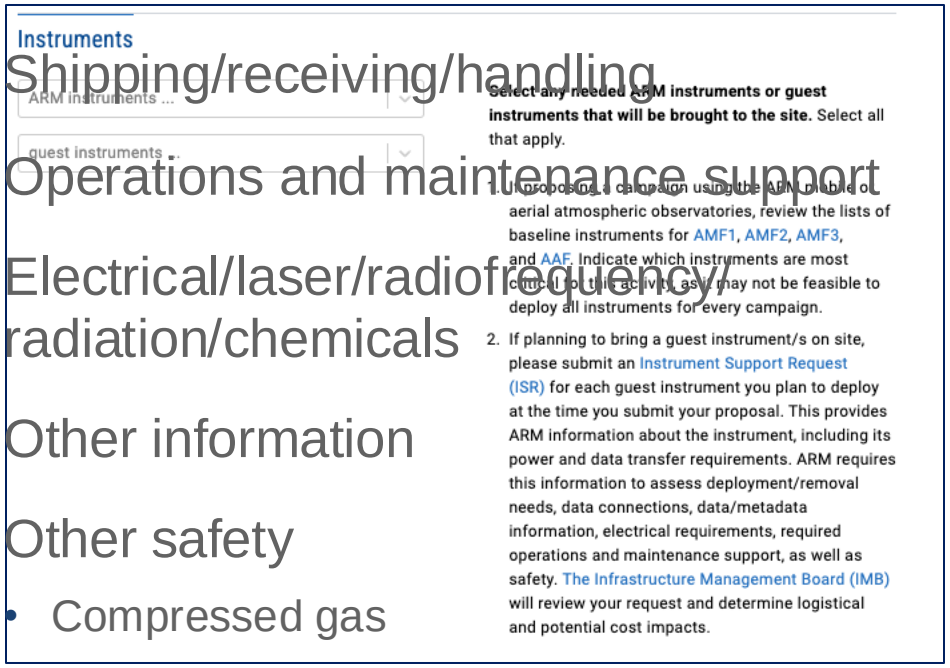
ADD CO-INVESTIGATOR

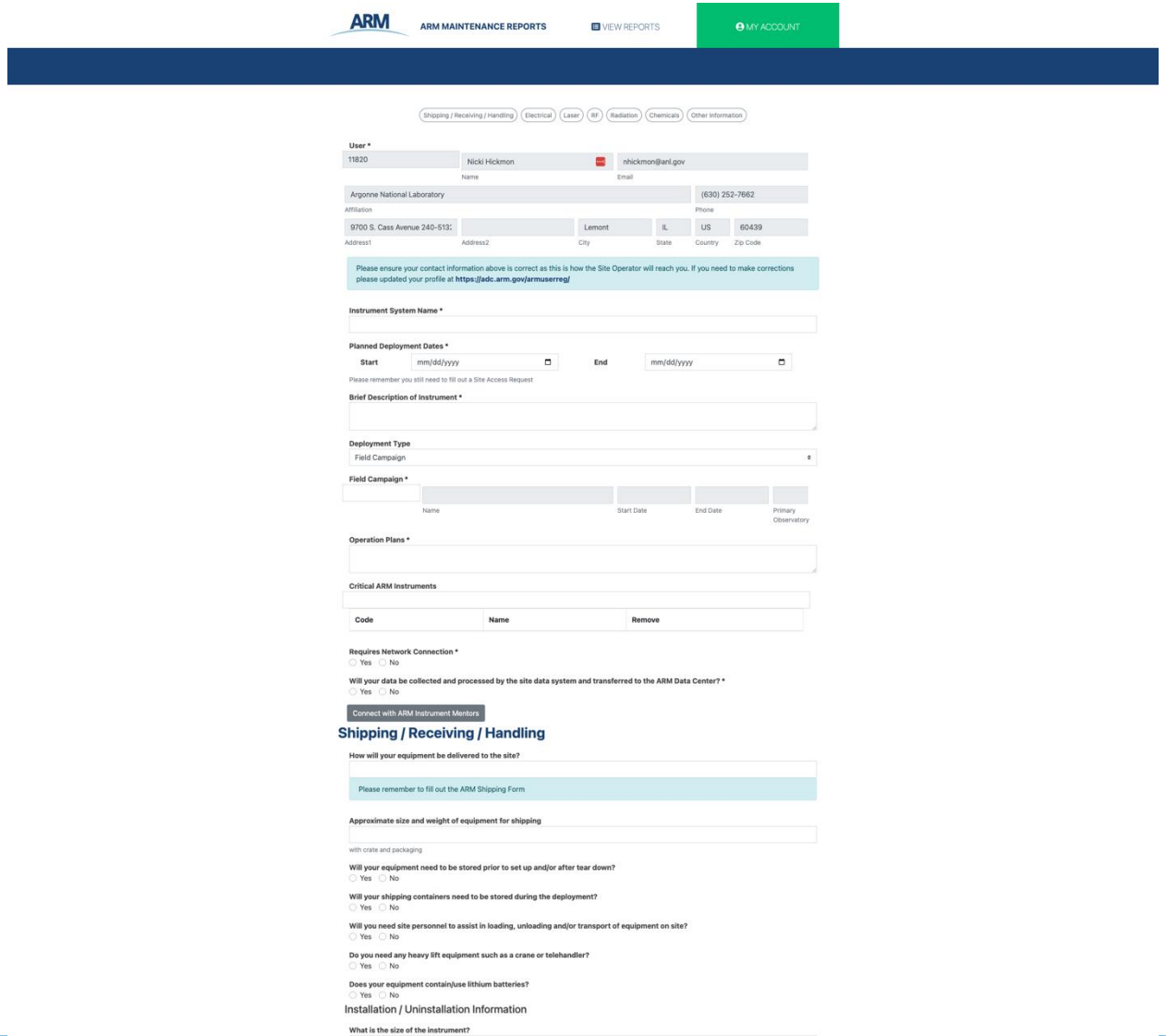
Choose the co-investigator(s).

- Enter the last name of the investigator and click search.
- Click on name of the desired person in the list that appears.
- Repeat for each additional co-investigator.

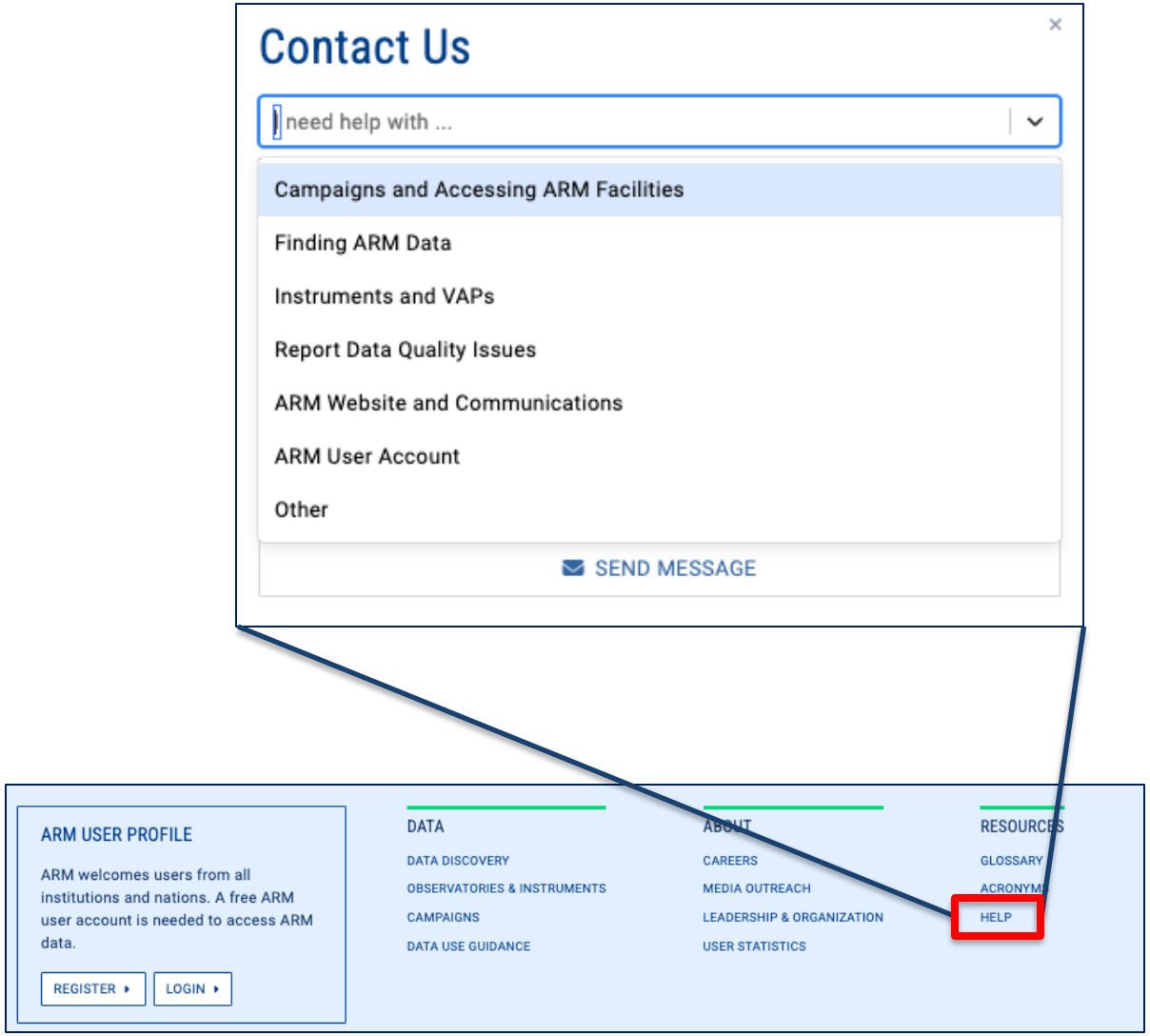
Instrument Support Request

- Shipping/receiving/handling
- Operations and maintenance support
- Electrical/laser/radiofrequency/ radiation/chemicals
- Other information
- Other safety
  - Compressed gas
  - Cryogens
  - Work at height
  - Arctic/polar/alpine
  - Interface with ARM instruments





- Campaigns and Accessing ARM Facilities
- Finding ARM Data
- Instruments and VAPs
- Report Data Quality Issues
- ARM Website and Communications
- ARM User Account
- Other



Questions