



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Atmospheric System Research(ASR) Funding Opportunity Announcement (FOA) DE-FOA-0003194

Public Webinar

*Jeff Stehr and Shaima Nasiri
Biological and Environmental Research (BER)
November 9, 2023*

Disclaimer: Nothing in the webinar is intended to take away from or contradict any of the requirements in the FOA. If there are inconsistencies between the FOA and this presentation or statements from DOE personnel, the FOA is the controlling document.

Overview

- ▶ Introductions
- ▶ BER/EESS/ASR Overview
 - ▶ ASR priorities
 - ▶ ARM
- ▶ FOA Details
 - ▶ Announcement DE-FOA-0003194
 - ▶ Data management plans (DMPs)
 - ▶ Promoting Inclusive and Equitable Research (PIER) plans



Webinar Presenters

- ▶ ASR Program Managers
 - ▶ Jeff Stehr & Shaima Nasiri
- ▶ Other EESSD Program Managers/ Staff
 - ▶ Scott Collis (on detail from Argonne National Lab)
 - ▶ Other introductions



U.S. DEPARTMENT OF
ENERGY

Office of
Science

BER/EESSD/ASR Overview

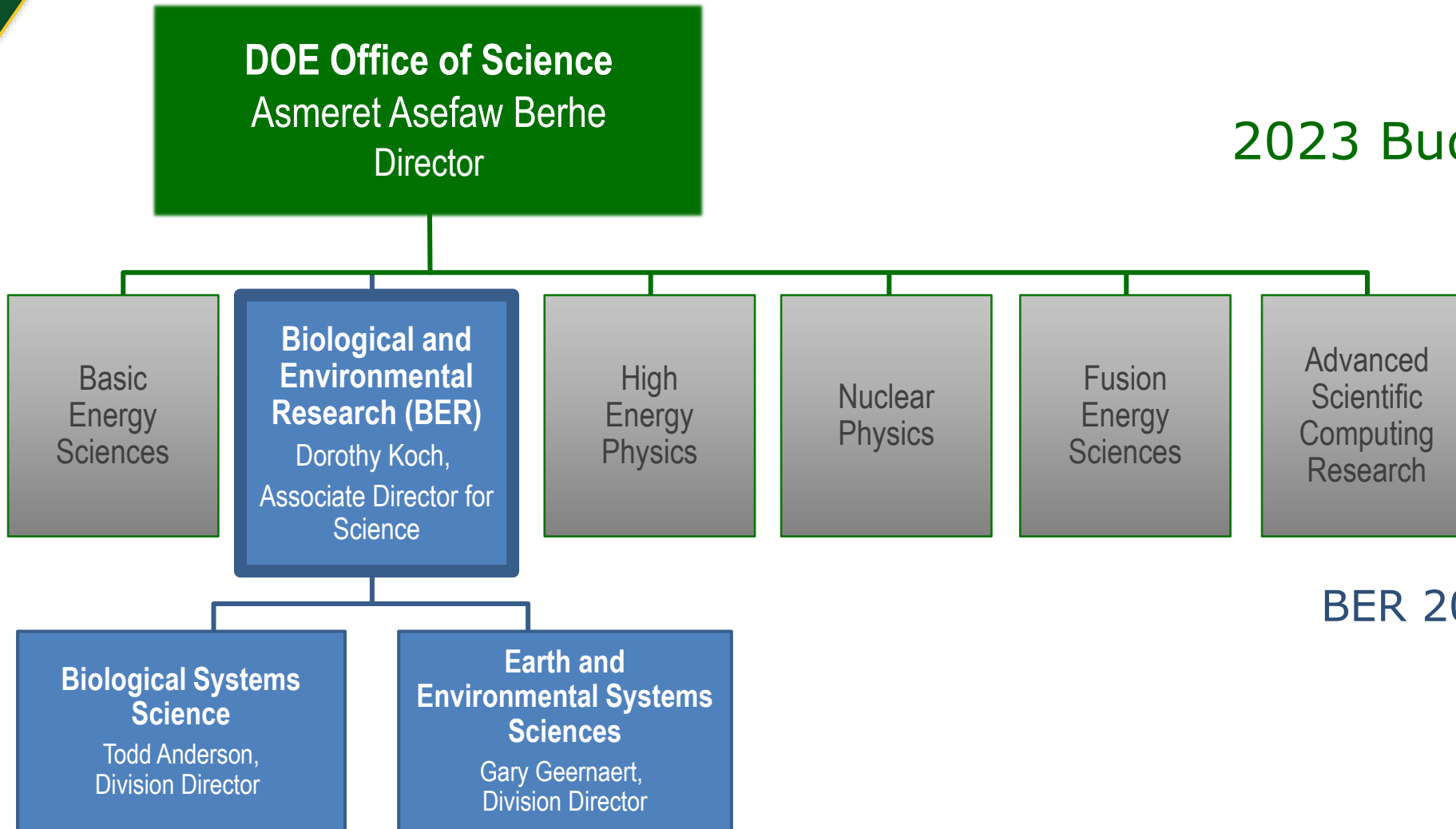


U.S. DEPARTMENT OF
ENERGY

Office of
Science

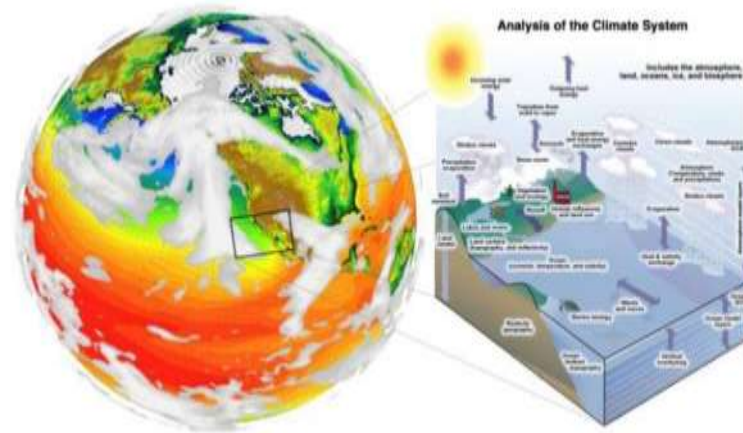
Office of Science Programs

Office of Science
2023 Budget: \$8.1 Billion



BER 2023 Budget: \$909 M
BSSD: \$464 M
EESSD: \$445 M

BER's Earth and Environmental Systems Sciences Division (EESSD)



Atmospheric System Research

- Atmospheric Science
- Atmospheric Radiation Measurement (ARM) facility

Earth and Environmental Systems Modeling

- Earth System Model Development
- Regional and Global Model Analysis
- Multisector Dynamics
- Climate Resilience

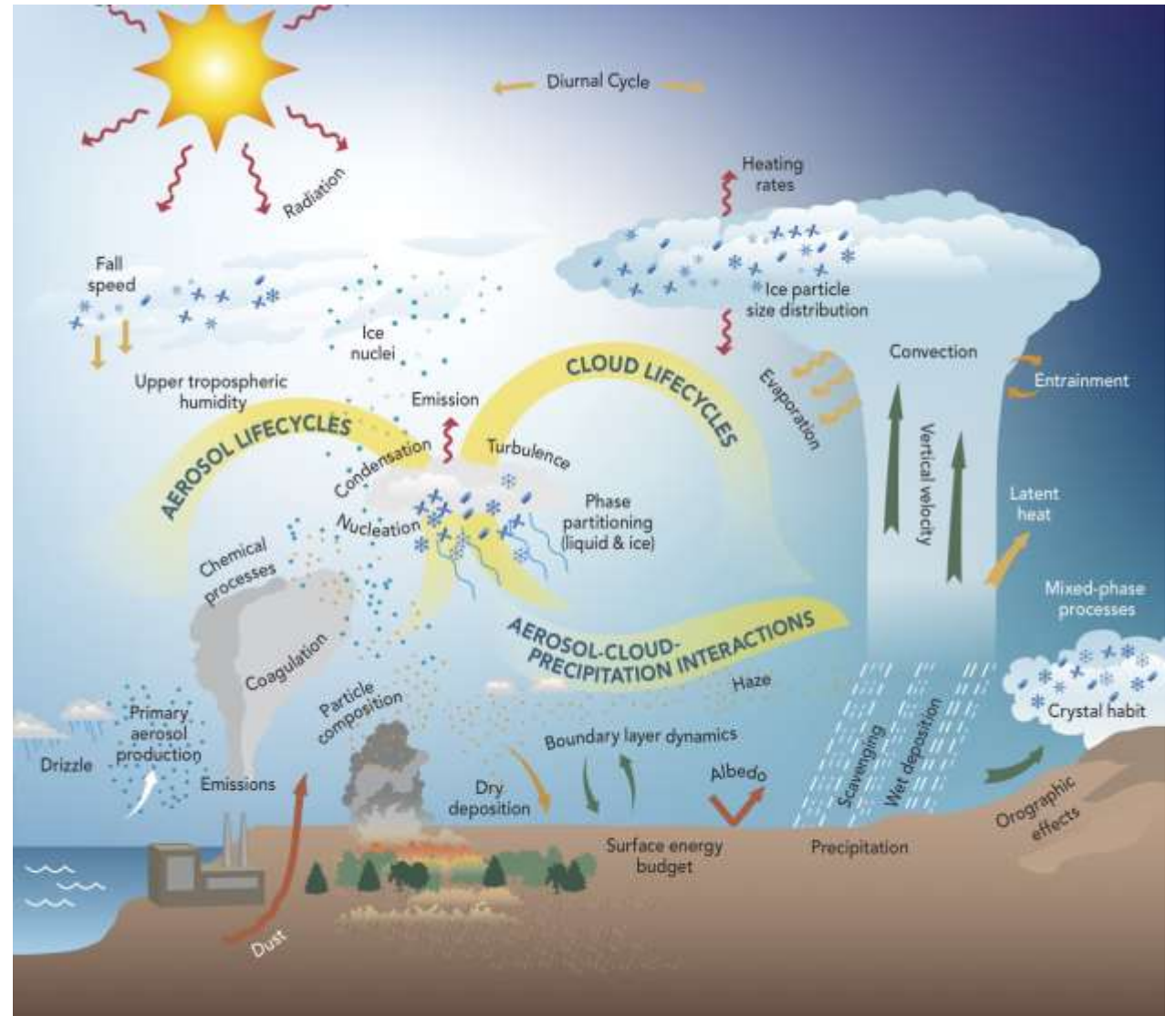
Environmental System Science

- Watershed Sciences
- Terrestrial Ecology
- Coastal Systems
- Environmental Molecular Sciences Laboratory (EMSL)

Data Informatics for Earth and Environmental Sciences

Atmospheric System Research (ASR)

- Only U.S. program dedicated to aerosol, cloud, precipitation, and radiation processes critical to Earth's energy budget and hydrological cycle
- Aerosol-Cloud-Precipitation interactions
- Scales: individual particles → precipitation → clouds → organized cloud systems – major uncertainties
- Testing atmospheric physics theories that are the foundation of Earth system models
- Primary supporter of research from DOE's ARM user facility
- Supports research at the DOE labs and the broader community



Atmospheric System Research

Goal:

- ▶ Quantify the interactions among aerosols, clouds, precipitation, and radiation to improve understanding of key cloud, aerosol, precipitation, and radiation processes that affect the Earth's radiative balance and hydrological cycle, especially processes that limit the predictive ability of regional and global models.

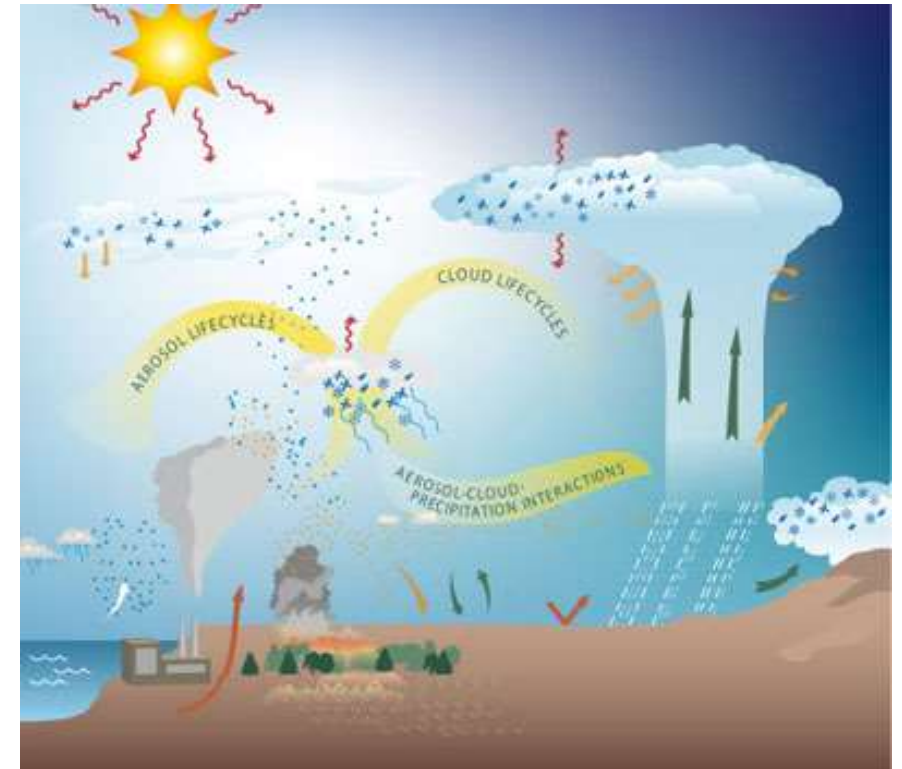


Objectives:

- ▶ Conduct observational, data analysis, and/or modeling studies using observations supported by BER – typically from the ARM facility and/or PI laboratories – to improve understanding and model representation of climate-relevant atmospheric processes.

ASR Priority Research Areas

- **Aerosol Processes** – understanding of processes governing the spatial and temporal distribution of atmospheric particles and their chemical, microphysical, and optical properties.
- **Warm Boundary Layer Processes** – understanding and model representation of processes controlling the structural and radiative properties of clouds, aerosols and their interactions with the underlying surface in the lowest few kilometers of the atmosphere.
- **Convective Processes** – understanding and model representation of convective cloud processes and properties including cloud cover, precipitation, life cycle, dynamics, and microphysics over a range of spatial scales.
- **High-Latitude Processes** – understanding and model representation of cloud, aerosol, and surface-interaction processes controlling the surface energy budgets in northern and southern high latitude regions



ARM Facility

- ▶ ARM is a DOE Office of Science user facility
- ▶ Long-term in situ and remote sensing observations of aerosol, clouds and radiation to improve the representation of their impacts on the energy budget in Earth system models
- ▶ 3 fixed measurement sites (Oklahoma, Alaska, Azores) in different climate regimes; 1 mobile facility for mid-range (~5 year) deployments
 - ▶ 24/7 data collection with all data freely available at www.archive.arm.gov
- ▶ 2 mobile facilities available for proposal-driven 6 mo. – 2 y deployments
 - ▶ e.g., the TRACER, EPCAPE, and CAPE-k campaigns
- ▶ High-performance computing resources for working with large ARM data sets; large eddy simulation output & forcing data at selected ARM sites
- ▶ Aerial facility component



FY24 announcement: DE-FOA-0003194

This is the “annual ASR call” – scope includes four specific research topics selected from ASR priority research areas and addressing congressional appropriations language.

This FOA solicits research grant applications for observational, data analysis, and/or modeling studies that use observations supported by BER, including the Atmospheric Radiation Measurement (ARM) user facility, to improve understanding and model representation of:

- 1) Aerosol processes at ARM sites,
- 2) Convective cloud processes,
- 3) Aerosol and cloud processes from ARM’s Eastern Pacific Cloud Aerosol Precipitation Experiment (EPCAPE), and
- 4) Mixed-phase cloud and ice cloud processes.



Important Dates

1) Submission Deadline for Required Pre-Applications:

- November 30, 2023 at 5:00 PM ET
- Pre-applications submitted in PAMS

2) Deadline for DOE to Send Pre-Application Responses:

- December 21, 2023 at 5:00 PM ET

3) Submission Deadline for Applications:

- February 13, 2024 at 11:59 PM ET
- Applications submitted by institution through Grants.gov



Funding

1) Estimated total funding available: \$12M

- Subject to availability of appropriations
- We expect to make approximately 15 to 20 awards

2) Ceiling:

- \$945,000 total for 3-year projects
- \$630,000 total for 2-year projects

3) Floor:

- \$200,000 total for either 2-year or 3-year projects



Eligibility and Partnering

- ▶ Applications are limited to three per institution.
 - ▶ **Pre-applications are not limited.**
- ▶ The principal investigator on a pre-application or application may be senior or key personnel on no more than one other submission. All senior or key personnel may only be named in at most two submissions.
- ▶ Multi-institutional teams must submit one application from the lead organization with all other organizations as subrecipients unless the team includes non-DOE federal agencies.
- ▶ Non-DOE federal agency team members of multi-institutional teams must submit their own applications through Grants.gov as part of a collaborative application.
- ▶ DOE laboratories are neither eligible to lead a proposal nor to be proposed as subrecipients but can be unfunded collaborators.

Elements common to most ASR FOAs

- ▶ Applicants should **clearly articulate** how the proposed research is expected to lead to improved atmospheric system predictability.
- ▶ **BER-supported observations are integral to proposed research:**
 - ▶ Additional caveats will be discussed later
- ▶ **Applications proposing field activities at ARM sites:**
 - ▶ submit a small field campaign to the ARM Facility by this FOA's deadline
- ▶ **Data Management Plan** is required
- ▶ **Promoting Inclusive and Equitable Research (PIER) Plan** is required



Specifics to DE-FOA-0003194 that are common to all topics

- ▶ **Applicants must clearly address which ARM-supported observations will be used in the proposed research and how they are integral to the proposed research objectives.**
- ▶ Researchers are also welcome to use DOE BER-sponsored observations from other BER programs and facilities, such as the Environmental Molecular Science Laboratory (EMSL) or BER-supported Ameriflux sites.
- ▶ Use of additional observational data from other sources (e.g., NASA or NOAA satellite observations or data from field campaigns

sponsored by other agencies) is encouraged only to the extent that the observations complement the DOE data and that they are used to address ASR science objectives.



Specifics that are common to all topics: Observations

- ▶ **PIs may propose to deploy their own instruments** to ARM sites or use PI data taken in association with a previous ARM campaign.
- ▶ PIs deploying an instrument to an ARM site are required to **submit a small ARM field campaign proposal** to the ARM Facility by this FOA's deadline.
- ▶ Those proposing field campaigns **must include a plan for submitting their data to the ARM data center** as a PI data product in their data management plan.
- ▶ **PI laboratory data** alone cannot be used to meet the BER data requirement. Applications proposing laboratory studies must include a plan for submitting their laboratory data to the ARM data

center as a PI data product as part of their DMP.

- ▶ Information about past, ongoing, and upcoming ARM field campaigns, as well as guidance for proposing small campaigns, is available at <https://www.arm.gov/research/campaigns>.



Specifics that are common to all topics: Modeling

Modeling

- ▶ Explicit modeling components are not required
- ▶ Must connect the modeling activities to DOE laboratory or field data
- ▶ Must focus on improved understanding and representation of specific processes in regional and/or global Earth system models.
- ▶ Complementary use of existing models and observational activities is encouraged if doing so provides better understanding of atmospheric processes
- ▶ ASR encourages, but does not require, the use of DOE-supported models (e.g., WRF, WRF-Chem, E3SM, E3SM-SCM, SCREAM, ARM's LASSO project).

Out of scope:

- ▶ Applications that focus on:
 - ▶ Model development without new process understanding
 - ▶ That use BER observations only to drive, initialize, evaluate or validate a model simulation without any process analysis of the observations
 - ▶ That focus primarily on air quality standards, health effects, satellite validation, or satellite algorithm development



DE-FOA-0003194 other topic-specific details

▶ 1. Aerosol processes at ARM sites

- ▶ Conduct observational, data analysis, and/or modeling studies using ARM observations to improve understanding of atmospheric aerosol processes that affect the Earth's energy balance and water cycle.



▶ 2. Convective cloud processes

- ▶ Conduct observational, data analysis, and/or modeling studies using ARM observations to improve understanding of convective processes controlling the occurrence, frequency, lifecycle, precipitation, and microphysical and macrophysical properties of convective clouds.
- ▶ Two recent ARM field campaigns that have focused on observations of convective cloud processes are Cloud, Aerosol, and Complex Terrain Interactions (CACTI) and Tracking Aerosol Convection Interactions Experiment (TRACER).

DE-FOA-0003194 other topic-specific details

▶ 3. EPCAPE (15 February 2023 – 15 February 2024)

- ▶ Conduct observational, data analysis, and/or modeling studies using observations from ARM's EPCAPE field campaign to improve understanding of climate-relevant cloud, aerosol, precipitation, and radiation processes and interactions.
- ▶ To characterize the extent, radiative properties, aerosol interactions, and precipitation characteristics of stratocumulus clouds in the Eastern Pacific across all four seasons at a coastal location.
- ▶ Data from EPCAPE and/or related ARM-supported campaigns must be integral to the proposed research.

▶ 4. Mixed-phase cloud and ice cloud processes

- ▶ Conduct observational, data analysis, and/or modeling studies using ARM observations to improve understanding of processes controlling the occurrence, frequency, lifecycle, precipitation, and microphysical and macrophysical properties of clouds containing ice crystals, supercooled liquid droplets, and/or both ice crystals and supercooled liquid droplets.



How to engage with ARM on small campaigns

- ▶ Bringing an instrument to an ARM site is a small campaign and requires you to submit a brief proposal to ARM to let them know your needs
- ▶ Use ARM's simple, web-based proposal form to provide:
 - ▶ The lead scientist and co-investigators
 - ▶ The campaign name and acronym
 - ▶ When and where the campaign will be
 - ▶ The science, its relevance to ARM's mission, and a campaign plan
 - ▶ The resources and instruments needed for the campaign
- ▶ Background, directions, and advice are here:
<https://www.arm.gov/guidance/campaign-guidelines/small-campaigns>
- ▶ Reach out to ARM ("Ask Us" link on any ARM web page) with questions

How to engage with ARM on ArcticShark and TBS

- ▶ Application process for the ARM ArcticShark is separate. FY24 ArcticShark preproposal deadline has passed.
 - ▶ <https://www.arm.gov/guidance/campaign-guidelines/arcticshark>
- ▶ Application process for the ARM Tethered Balloon System (TBS) is also separate
 - ▶ <https://www.arm.gov/guidance/campaign-guidelines/tbs>
- ▶ You can propose to use existing ArcticShark or TBS data.



Required Data Management Plans

- ▶ Applications that include collecting PI laboratory data or PI field campaign data **must use the ARM data center as a data archive.**
 - ▶ Other applications are encouraged to use the ARM data center to archive data.
- ▶ PIs should demonstrate a commitment to open science through data sharing, use of archives, and code repositories on this and previous research.
- ▶ The ARM-Synergy repository is available to host open-source software and community code: github.com/ARM-Synergy
- ▶ Your DMP should address:
 - ▶ BER requirements for digital data management science.osti.gov/ber/Funding-Opportunities/Digital-Data-Management
 - ▶ How FAIR principles will apply to data sets, software, and models to be developed.
 - ▶ What software, data sets, and models will be made available using open source licensing
 - ▶ The FOA includes links to best practices in scientific software development.

Promoting Inclusive and Equitable Research (PIER) Plans

- ▶ Appendix: 1-3 pages and should describe the activities and strategies to promote diversity, equity, inclusion, and accessibility in the proposed research project.
 - The complexity and detail of plans are expected to increase with the size of the research team and the number of personnel supported.
 - PIER plans are to be evaluated as part of the merit review criterion: *Quality and Efficacy of the Plan for Promoting Inclusive and Equitable Research*.
 - The scope should be integral to and tailored to the research project.
 - Applicants are encouraged to consider focusing on areas, including but not limited to:
 - The composition of the project team and partnering institutions.
 - The research environment—cultivating respectful, professional and accessible environments.
 - Equitable and inclusive implementation of the research project.
 - Mere references to institutional DEIA policies, outreach not integral to the proposed research, or a DEIA activity already being carried out and not related to the project would be considered insufficient.
 - <https://science.osti.gov/grants/Applicant-and-Awardee-Resources/PIER-Plans>

Additional questions



- ▶ If you have additional questions or would like clarification, please send us email to set up a meeting.
- ▶ There is often nuance especially regarding teaming arrangements, FOA topics, instrumentation, budgets, and field campaigns
- ▶ Jeff.Stehr@science.doe.gov
- ▶ Shaima.Nasiri@science.doe.gov





U.S. DEPARTMENT OF
ENERGY

Office of
Science

Disclaimer: This presentation summarizes the contents of the FOA. Nothing in the webinar is intended to add to, take away from, or contradict any of the requirements in the FOA. If there are inconsistencies between the FOA and this presentation or statements from DOE personnel, the FOA is the controlling document.