

ARM Prepares to Move Mobile Facility to U.S. Southeast

The Atmospheric Radiation Measurement (ARM) user facility will soon move its third mobile facility (AMF3) to the Southeastern United States.

A workshop in August 2018 identified the Southeast as a priority region of interest for further study by ARM. The Southeast is a region with abundant atmospheric convection, yet the land surface, boundary layer, vegetation, and aerosol properties are markedly different from those seen at ARM's fixed observatory in Oklahoma, allowing opportunities to explore new research questions.

To maximize the scientific value of the new site, the U.S. Department of Energy's (DOE) Biological and Environmental Research program selected a site science team to help guide the move of AMF3. Brookhaven National Laboratory (BNL) in New York is leading the AMF3 relocation effort. Supported by ARM and DOE's Atmospheric System Research (ASR), the multi-institutional team is responsible for developing a science plan and initial research project for the Southeastern U.S. deployment.

The site science team aims to improve process understanding and model representations of aerosol, cloud, and landatmosphere interactions, together with key cross-coupling of those areas to explore land-atmosphere feedbacks and aerosol-cloud interactions.



The Southeastern United States experiences high humidity, frequent convection, and large amounts of natural emissions. The Bankhead National Forest in northern Alabama (starred) is the preferred location for ARM's upcoming deployment in the Southeast.



The third ARM Mobile Facility (AMF3) operated from 2013 to 2021 at Oliktok Point, Alaska. AMF3's next extended deployment will be in the Southeastern United States.

Science Objectives

In 2021, AMF3 ceased operations at Oliktok Point, Alaska, where it collected data since 2013. The Southeastern U.S. deployment is planned to start in 2023 and scheduled to last five years.

The site science team aims to facilitate and enable research that will be performed with the AMF3 data.

"We plan to work with the leadership of ARM, ASR, and other relevant agencies to host focused, strategic community workshops on scientific themes connected to the Southeastern United States," says BNL aerosol scientist Chongai Kuang, who leads the site science team.

Kuang says the team wants to put AMF3 in an area where the interactions between aerosol, convection, and landatmosphere processes can be clearly and carefully studied.

"The processes that we're trying to study there are defined by the unique environment of the region, which is characterized by high humidity, frequent convection, and high biogenic emissions," he says.

The preferred location for the AMF3 deployment is the Bankhead National Forest in northern Alabama. This decision is based on science-driven siting criteria developed and applied by the site science team.

Collaborations

When the call went out in 2019 for a national laboratory-led site science team, Kuang knew BNL had to respond because, he says, "it was right up our alley."

Researchers in BNL's Environmental and Climate Sciences Department study the topical areas that Kuang wanted to target in the proposal. The 10-person site science team includes three topical leads from BNL: Kuang (aerosols), Scott Giangrande (convective clouds), and Shawn Serbin (land-atmosphere interactions).

"We were very excited to be able to bring in expertise from land-atmosphere interactions," says Kuang. "It was the first time in our department where we were able to leverage that expertise."



From left to right, Shawn Serbin, Scott Giangrande, and Chongai Kuang, researchers at Brookhaven National Laboratory in New York, are the core leadership group and topical leads for the site science team that is helping with the AMF3 relocation effort.

Other members of the site science team are:

- Gregory Elsaesser, Goddard Institute for Space Studies, Columbia University/NASA
- Pierre Gentine, Columbia University
- Thijs Heus, Cleveland State University
- Mariko Oue, Stony Brook University
- John Peters, Naval Postgraduate School
- James Smith, University of California, Irvine
- Allison Steiner, University of Michigan.



The Southeastern United States, with its abundant atmospheric convection, will open new opportunities for research and collaboration. Photo is courtesy of NOAA.

With feedback from the scientific community in mind, the group is working closely with ARM leadership and Argonne National Laboratory in Illinois to pinpoint potential instrument sites for the AMF3 deployment and identify collaborators in the region. Argonne will manage AMF3 after it heads to the Southeast.

During the annual Joint ARM User Facility/ASR Principal Investigators Meeting, the site science team has given updates on pre-deployment activities and solicited community feedback. The team has also presented at larger scientific conferences such as the American Geophysical Union (AGU) Fall Meeting. In addition, the team regularly communicates project updates through the ARM and ASR newsletters.

"A goal of this project is to really engage with the broader scientific community and the public," says Kuang.

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https://www.arm.gov/capabilities/observatories/amf/locations/bnf

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