SOUTHEASTERN UNITED STATES

The next deployment of the third ARM Mobile Facility will be in the Southeastern United States.

Ground Heat Flux

Evaporation

U.S. DEPARTMENT OF ENERGY

Office of Science

ASR Atmospheric System Research

ARM

Chongai Kuang (BNL – PI SEUS AMF3, Topical Lead, Aerosols)

SEUS Site Scientist Team – Presentation to the Warm BL Processes WG

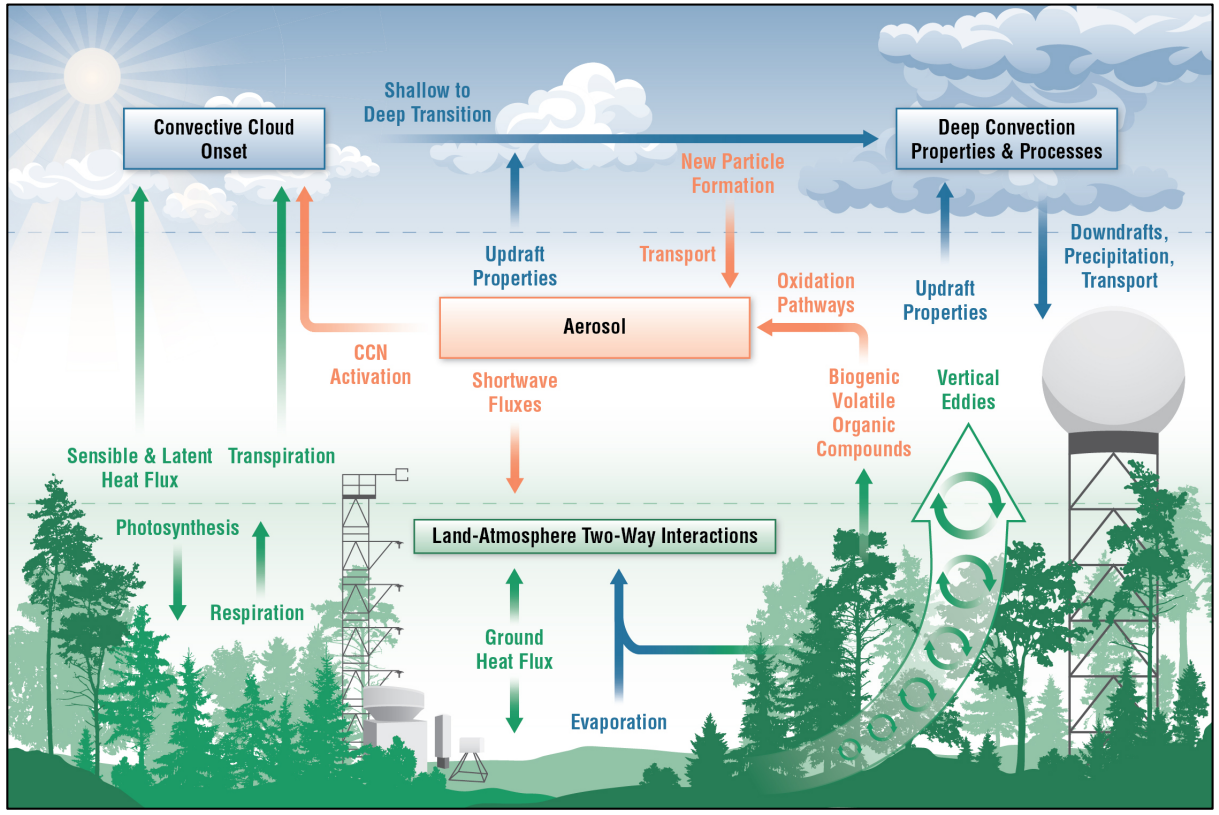
26 June, 2020

Breakout Session 3:
AMF3 Southeast United States Deployment (SEUS)

- First time ARM, ASR, and a Site Science Team (SST) are working together for an AMF deployment in this manner.

- There is no typical AMF3 deployment:
  - 5 year deployment.
  - SST are ambassadors, not gatekeepers.
  - Our SST proposal was funded, in part, because of Land-Atmosphere Interaction strengths (terrestrial focus).
  - Distributed Networks.
  - Emerging measurement opportunities?

- Siting and instrument prioritization of the AMF3 will be informed by community feedback.



Challenges – Issues – Needs: Warm BL Processes WG

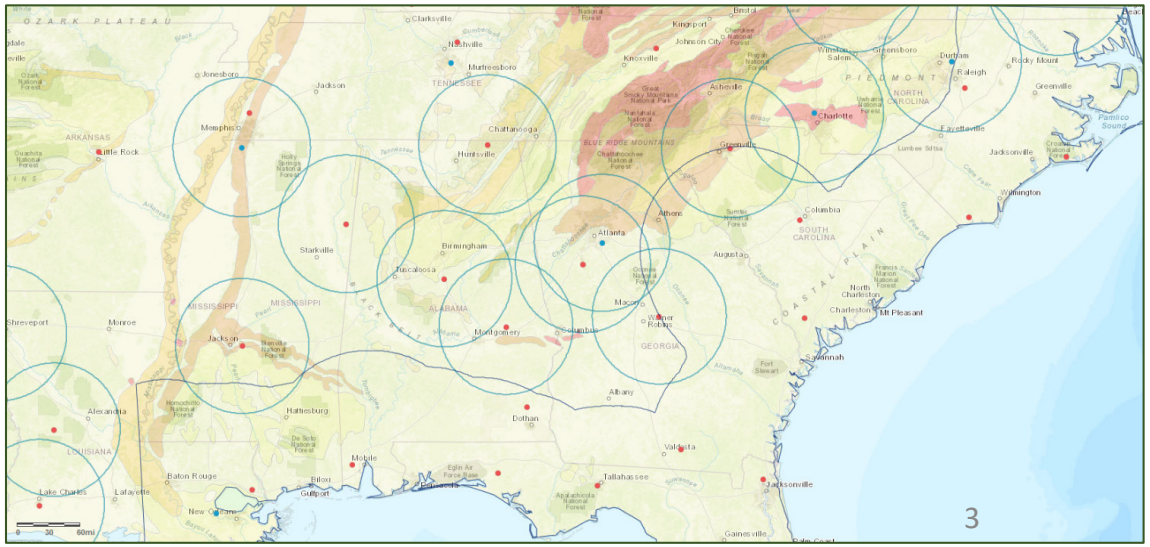
March 2023: Site Operational ← **Sept. 2021: Site Identified** ← **March 2021: Site Shortlist**

Initial Team Activities & Needs: **"Science Traceability Matrices"**

- **Science Driver ⇒ Prioritized Questions ⇒ Required Measurements**
- **Measurements ⇒ Instruments (prioritized) ⇒ Operational Requirements**

SNL working on ArcGIS online viewer:

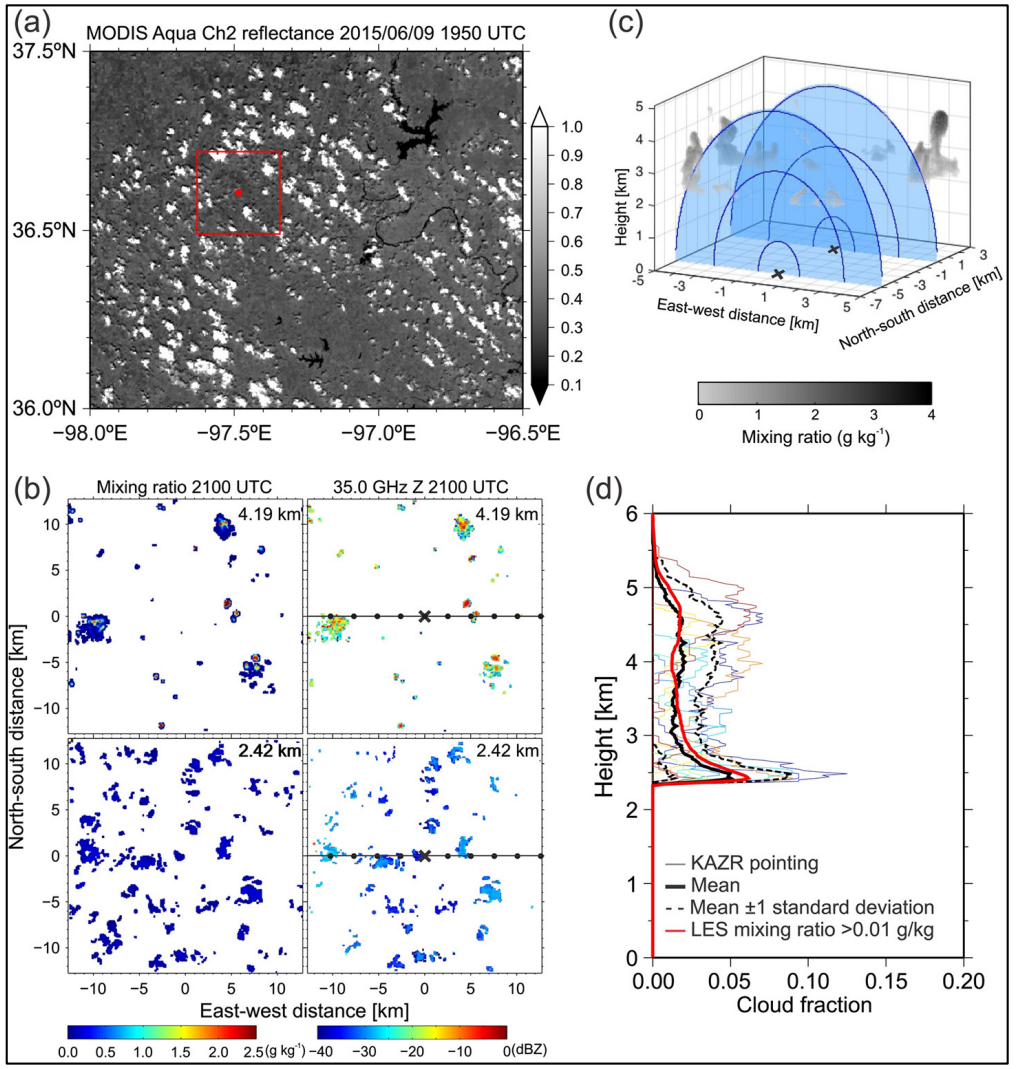
- Map layer generation (suggestions?)
- Example map layer: "surface-forced" shallow to deep convective locations within 100 km of a surveillance precipitation radar.



“What is the role of large-scale vs. mesoscale thermodynamic perturbations in the onset of shallow convection?”

- “Surface-driven” convective clouds – How does this inform SEUS siting (i.e., interior SEUS, flat terrain)?
- Distributed Networks: Supplemental sites – to what scales (T, moisture, ECOR, SFC albedo, …)?
- Optimal cloud sampling capabilities? Multiple stereo cameras, cloud radar, Doppler lidar.
- Emerging technologies / IOPs?

Left: Multiple stereo cameras may improve 3D cloud sampling, mitigate issues with 2D/3D cloud radar observations such as sensitivity to shallow clouds and insect contamination.



Oue et al. 2016 JGR-A

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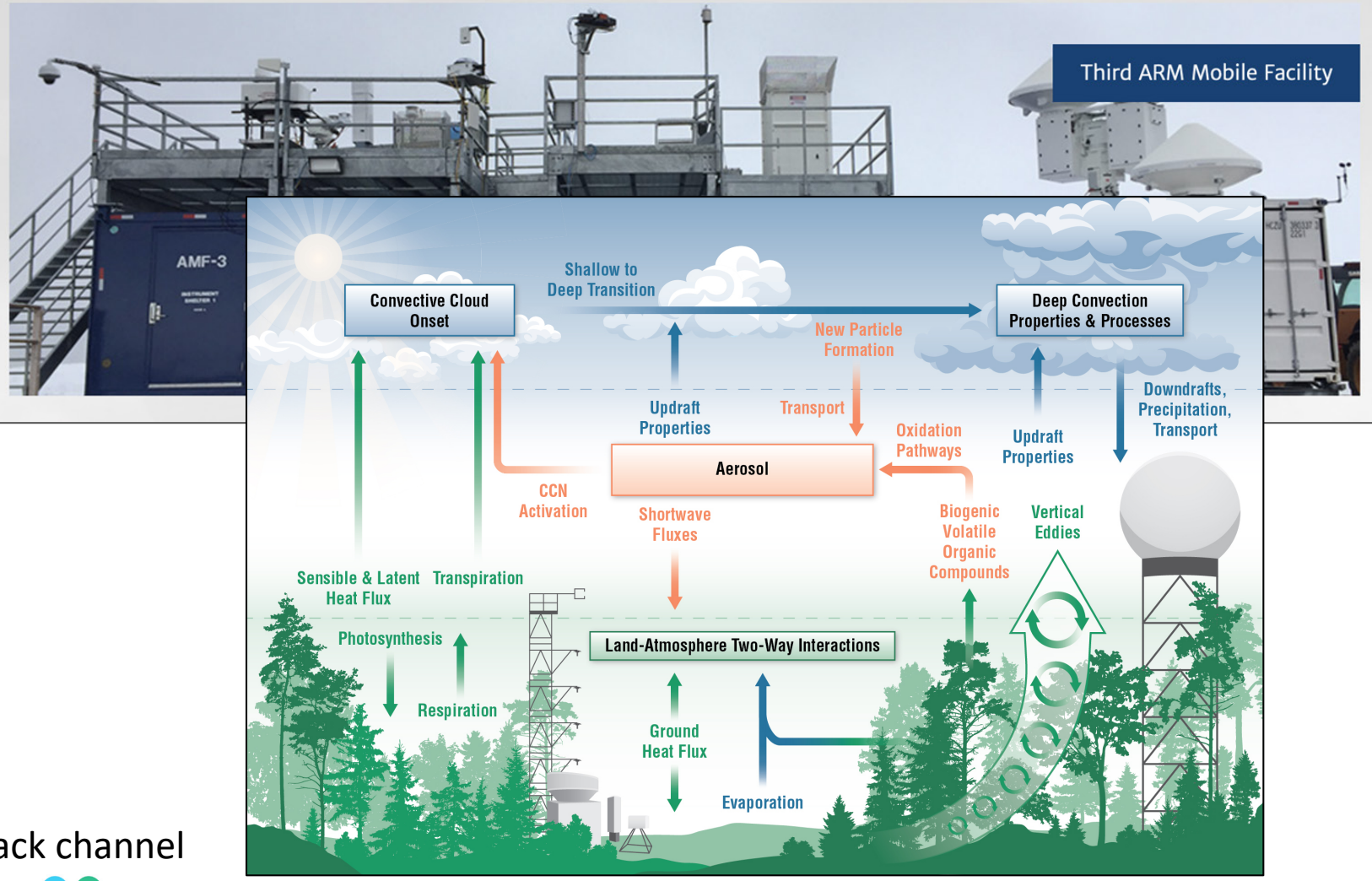

ARM

ARM Mobile Facility Leaving Alaska for U.S. Southeast

The Atmospheric Radiation Measurement (ARM) user facility will soon begin the process of moving its third mobile facility (AMF3) from Alaska 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, DOE's Biological and Environmental Research program selected a site science team that will help guide the move of AMF3. Brookhaven National Laboratory (BNL) in New York will lead 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 proposes to improve process understanding and model representations of aerosol, cloud, and land-atmosphere 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 high natural emissions.

The third ARM Mobile Facility (AMF3) will soon end its extended deployment at Oliktok Point, Alaska, and move to the Southeastern United States. AMF3 has collected data at Oliktok Point since 2013.

Science Objectives

By the end of fiscal year 2021, AMF3 is expected to end operations at Oliktok Point, Alaska, where it has collected data since 2013. The Southeastern U.S. deployment is planned to start in the fall of 2022 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 land-atmosphere 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.

Slack channel

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