# Aerosol Measurement Science Group
## 2019 Workshop Overview

Allison McComiskey
AMSG Co-chair
June 24, 2021



https://www.arm.gov/about/constituent-groups/amsg

# Context for the AMSG 2019 Workshop

## Aerosol Processes Working Group Survey

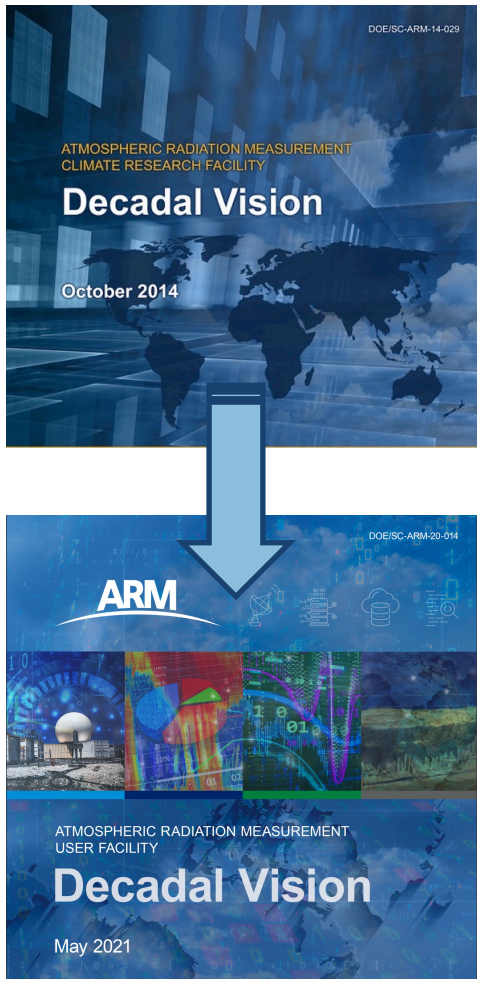
1. Which ARM aerosol data products are you using in your research?
2. If you are not using ARM data products in your research, why not?
3. Are there data products that you wish ARM could provide, but currently does not?

## Results

- 43 mentions of the use of campaign data
  - 14 mentions of data use from fixed sites
- Prioritization of measurement classes:
  - Size distributions
  - Composition
  - Hygroscopicity/CCN concentrations
- > 1 mention, ranked
  - Wide range of aerosol sizes (distributions)
  - Composition beyond ACSM
  - Basic trace gases
  - Vertical profiles

Shift from a technical to a science-oriented strategy

# 2019 AMSG Workshop




## Toward a Science-Oriented Strategy

- Framing Questions:
  - Who are the audiences for ARM measurements? Are we appropriately serving these stakeholders and if not, how can we improve?
  - Is there a community strategy (or strategies) for linking ARM data to the representation of aerosols in large-scale models?
  - To what extent is the current ARM sampling strategy a limitation to stakeholders?
  - Does there remain a core set of operational and calibration issues with measurements and data processing that are a limitation to stakeholders?
  - Can a set of near- and longer-term goals can be devised for practical implementation of recommendations?

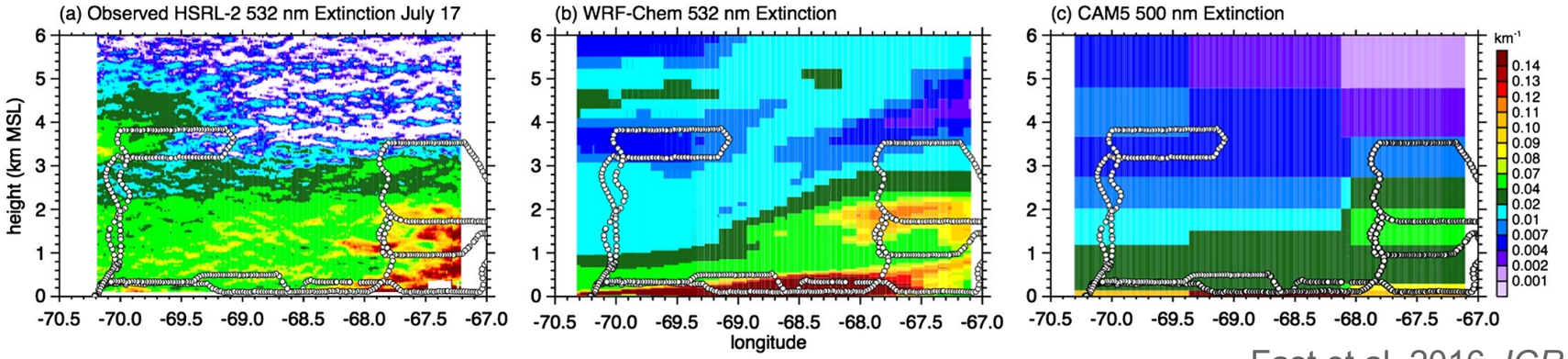
# 2019 AMSG Workshop

## Workshop Sessions

- Interfacing with Models
- Sampling Strategies & Site-Specific Measurements
- Remote Sensing and Vertical Profiling
- Aerosol Properties and Instrumentation
- ARM Aerosol Calibration Protocols
- Aerosol Data Products

## Cross-cutting Areas for Implementing a Science-Oriented Strategy

- Data Quality
- Measurements & Data Products
- Sampling Strategies
- Data Useability & Usership

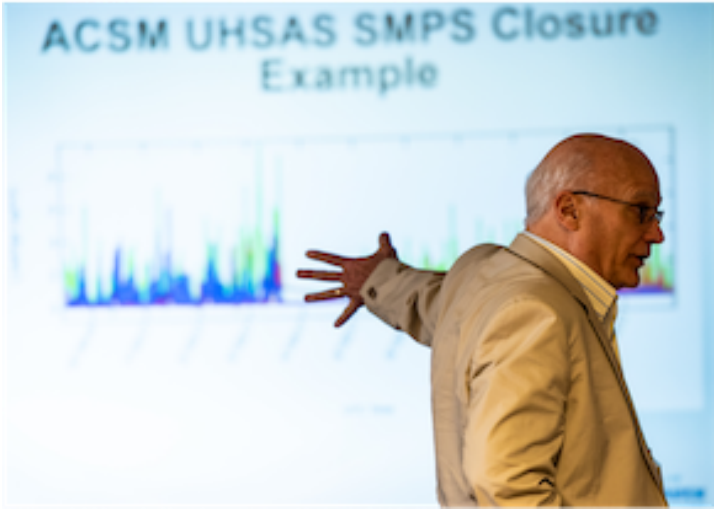



Fast et al. 2016 *JGR*

# 2019 Workshop Outcomes

## Data Quality

- Shift mentor time from the field to the lab and to time spent analyzing data
- Develop established calibration protocols
  - publish aerosol instrument calibration and sampling protocols; follow international procedures where appropriate
  - more frequent participation in national and international instrument intercomparisons
  - invest in ARM internal instrument intercomparisons
- Develop and implement closure experiments to ensure internal consistency among measurements of aerosol properties
- Consider siting implications for local source contamination
- Invest in relationships with instrument vendors that include mentors, translators, and key users

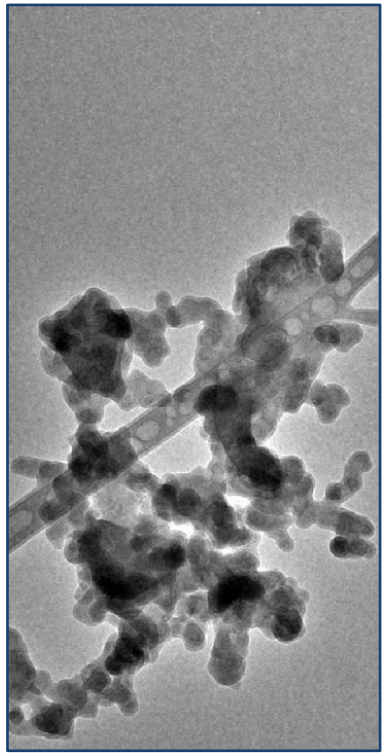



Tom Watson, EMSL-ARM Summer School 2019

# 2019 Workshop Outcomes

## Measurements & Data Products

- Size & Number Concentration
  - unified/merged size distribution data stream reconciling different methods (reconcile SMPS and UHSAS)
- Composition
  - strategy for providing the appropriate components of composition at the right scales
  - size resolved chemical composition
- Hygroscopicity/Cloud Condensation Nuclei / Ice Nuclei
  - additional humidigraphs and HTDMA ambient scans where possible
  - implement CCN flow-scanning method
  - develop a Kappa product
  - increase frequency on IN measurements
- Absorption
  - use of remote sensing to constrain aerosol absorption
- Expand ARM's interface with external networks (e.g., AERONET, IMPROVE, EBAS, FAN)



# 2019 Workshop Outcomes

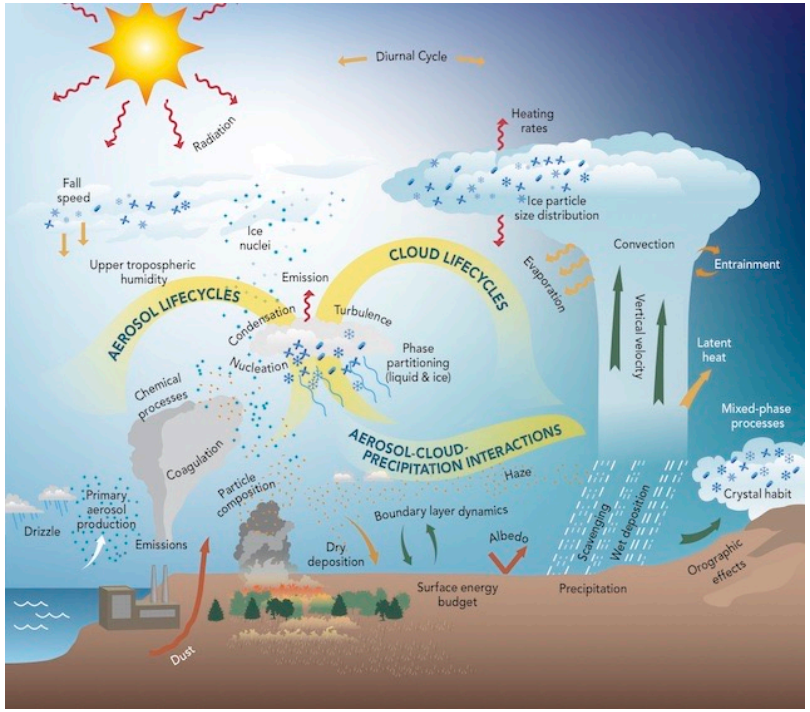
## Sampling Strategies

- Shift to an IOP mode of operation
  - develop a 3-tier measurement strategy involving long-term observations, intensive periods, and guest instruments with consideration of needs for model improvement
  - consider seasonal IOP's at fixed site locations with a more comprehensive suite of measurements (more complex ARM and GUEST instruments)
- Develop new measurement strategies with consideration of needs for model improvement
  - enabling spatial (distributed networks) and vertical sampling (remote sensing/airborne platforms, esp. UAS)
  - better integrate remote sensing and in situ measurements
- Expanded GUEST instrument support
- Implement process to engage PIs regarding configuration of complex instruments
- Consider routine (bi-weekly?) flights between SGP and AMF3 SEUS site

# 2019 Workshop Outcomes

## Data Useability & Usership

- Data bundling (with post processing masks) for ease of use with models
- Characterize measurement uncertainties
- Develop and implement operational closures among and between in situ and remote sensing observations
- Improve Translator-Mentor-User communication
  - joint ARM Aerosol Translator-Mentor annual meeting
  - mentor-user web conferences
  - e.g., Aerosol Modeling Translator
- Facilitate measurement science/technical peer-reviewed publications (additional to ARM reports)
- Improve instrument pages on the ARM web site and link to Data Discovery (incl. recommended data sets)
- Expand ARM presence in aerosol process community (e.g. AAAR)
- Encourage PI data product submissions
- Continue ASR data products call



# AMSG Looking Forward

## Focal Topics for Coming Year

- IOP Sampling Strategies
  - Themed, proposal driven intensives at existing ARM deployments
- North Slope of Alaska aerosol measurements
  - Coordination with NOAA and their new Barrow Observatory
- Remote Sensing – In Situ Observation Integration
  - Use of airborne platforms
- Observational Data – Model Integration
  - Data bundling
  - Uncertainty reporting
  - Testbed/evaluation capabilities
- Building ‘Capability Needs Templates’ according to priority science themes to track current and evolving community needs
- Report submitted for publication