ARM Aerosol Measurements: Aerosol Measurements and Science Group (AMSG) 2017 Workshop

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AMSG Workshop

ARM CLIMATE RESEARCH FACILITY

Science Questions

ARM Sites/Facilities

Measurement Areas

- Number Density
- Size distribution
- Hygroscopic activity and CCN
- Optical properties
- Gas Phase Aerosol Chemistry
- Aerosol Composition
- Greenhouse Gases
- System Configuration and Operation

Observations /Data Products

- What science questions are addressed?
- What data products or VAPs are needed?
- Is there a critical measurement missing?

Measurement Strategy

- Are all measurement areas required at all sites?
- Should each location be operated identically?
- What are measurement requirements/specifications?
- Can a subset of instrumentation be operated periodically vs continuously?

Measurement Issues

- What are current impediments to providing science ready, accessible data?

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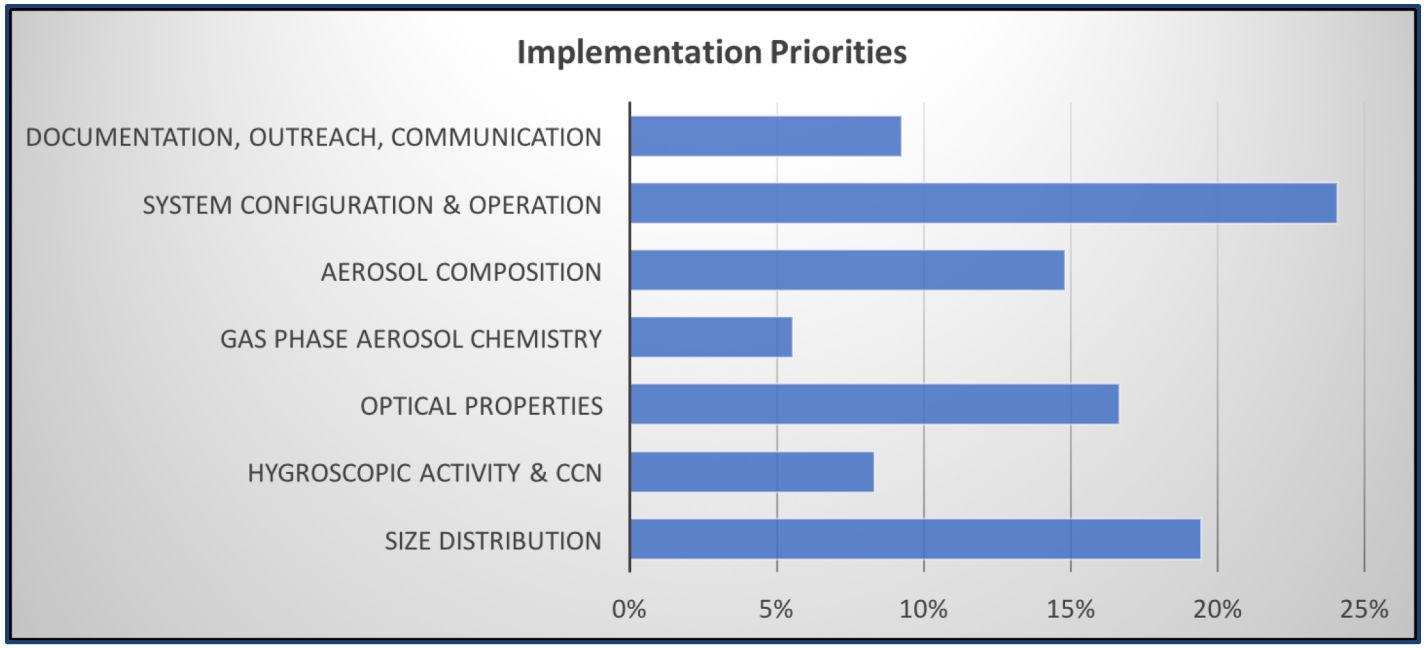

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Category	Recommendation
System and Instrument Priorities	• Full size distribution (SMPS, UHSAS, and APS) at all sites • Diffusion drying (rather than heating) to control sample RH • Temporal sampling resolutions to be maintained as is • Measurement/instrument prioritization • Support for development of new direct absorption instrument from a DOE SBIR
Locational and Sampling Priorities	• A single comprehensive site to study aerosol process (SGP) • Maintain an ARM Mobile Facility AOS • Move the Oliktok Point AOS to Barrow • Continued operational support for the additional AMF and ENA AOS • MAOS facility with specialized gas phase and detailed aerosol composition
Data Product Development	• Ongoing AOS Harmonization effort essential • Merged size distribution VAP • Closure experiments: optical, size, composition
Needs for a High-Quality, Successful Aerosol Measurement Program	*Instrument and System Characterization* • Mentors afforded more time with instruments in the lab (esp. b/t deployments) • Complete characterization of AOS inlet efficiency (AICE) • Characterization of filter absorption (PSAP and Aethalometer) • Define calibration protocols (widely established or ARM-specific protocols) *Documentation and Communication* • Improve ARM archive data access: data availability, location, • AOS web-pages - transparent and simple interface for users

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

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- **Measurement/instrument prioritization**:
  - dry extinction, scattering and absorption (CAPS, NEPH, PSAP/TAP/AETH)
  - composition, (ACSM, SP2 in limited spatio-temporal sampling mode, PILS)
  - one- or two-column CCN
  - direct absorption measurement by new technique (see below)
  - fixed ‘high’ RH scattering (NEPH at high humidity, ~ 90%)
  - ambient extinction (open path extinction cell, new purchase)
  - hygroscopic growth factors (HTDMA, after characterization)
  - CCN, size distributed (in-line with SMPS)
  - Ozone, carbon monoxide, other gas-phase measurements (PTR-MS, NOx)

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