ENA AOS and Supplementary Site: Identifying and Filtering Local Aerosol Sources

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ASR Atmospheric System Research

ARM CLIMATE RESEARCH FACILITY

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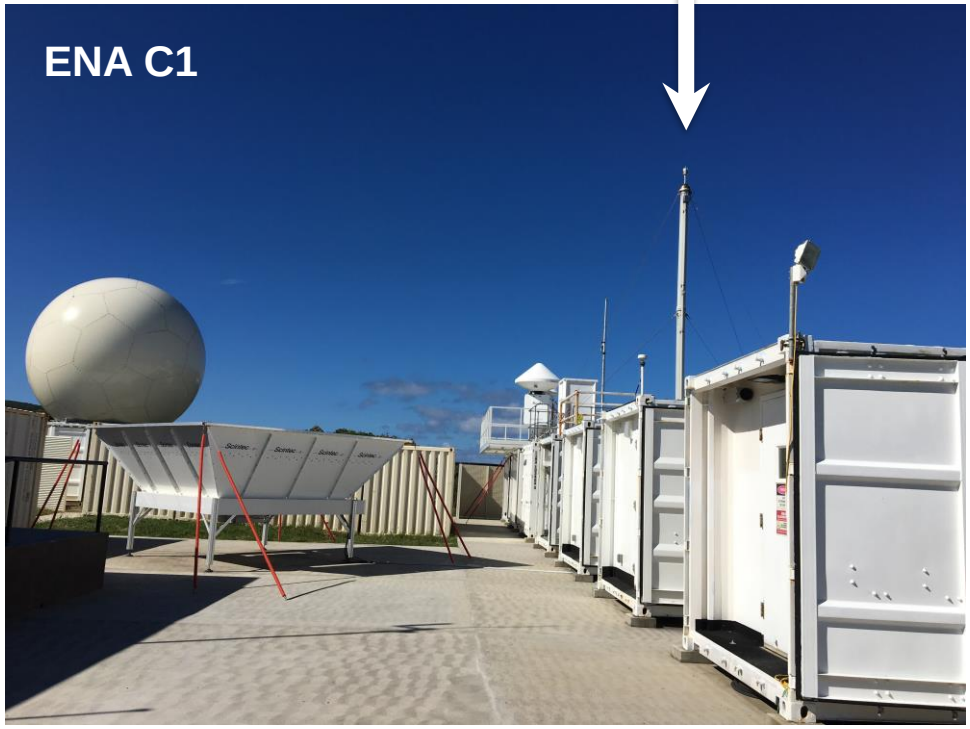
ENA Aerosol Observing System (AOS)

- **Aerosols and Trace Gases**
  - Main C1 Ground site (10 meters a.g.l.)
  - Physical Properties
    - CPC: Particle number
    - UHSAS: size distributions
    - CAPS, Neph, PSAP: optical properties (absorption, scattering, extinction)
  - Chemical Properties
    - ACSM: non-refractory chemical composition of Ammonium, Chloride, Nitrate, Organics, Sulfate
  - Water uptake
    - CCN: cloud condensation nuclei
    - HTDMA: hygroscopicity
  - Trace Gas: CO, N_2O, Ozone
  - Green house gases: CH_4, CO_2, H_2O
  - Met Sensor
    - Wind direction and speed
    - Temperature
    - RH and rainfall



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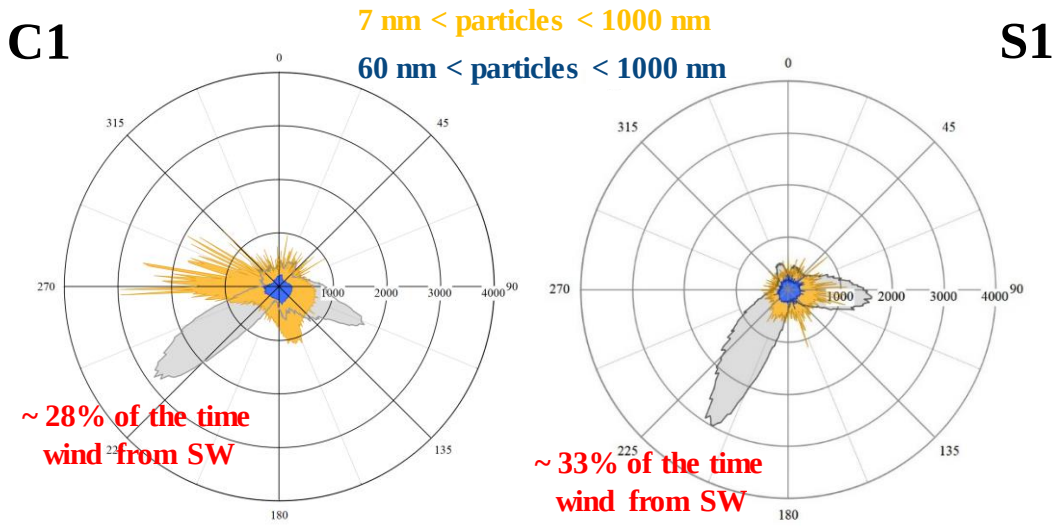
Aerosol Supplementary Site (S1) during ACE-ENA

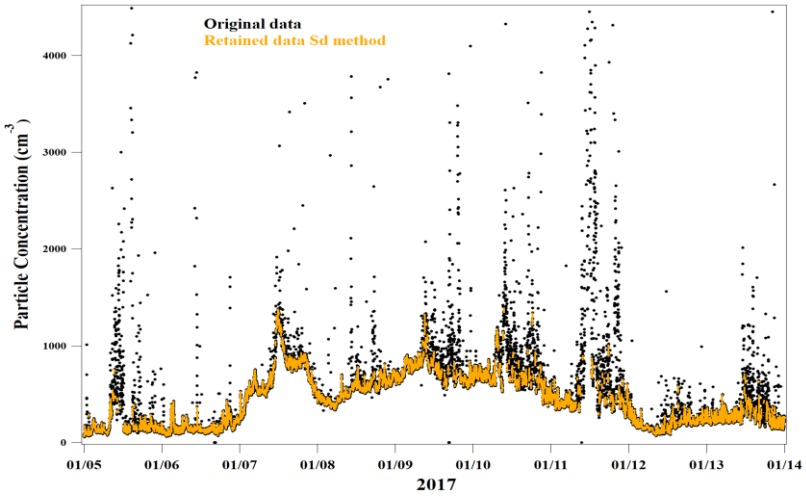
- **ENA AOS main facility (C1)** is impacted by local sources due to the location – near a local airport and roadway
- An aerosol **Supplementary Site (S1)** was installed during ACE-ENA (July 2017 – April 2018) ~0.75 km from C1 to constrain sources
  - CPC number concentration (~ 7 nm - 1 µm)
  - UHSAS number concentration (~ 60 nm – 1 µm)
  - Met Sensor (Wind Speed and Direction, T, RH, Pressure, Rain)
- **Deliverables**
  - Data available in the ARM Archive
  - ARM ENA S1 Report
    - *Aiken, Gallo, Uin, et al. 2019*
  - Manuscript in prep for AMT – Gallo et al.
  - Planned C1 filtered data PI product

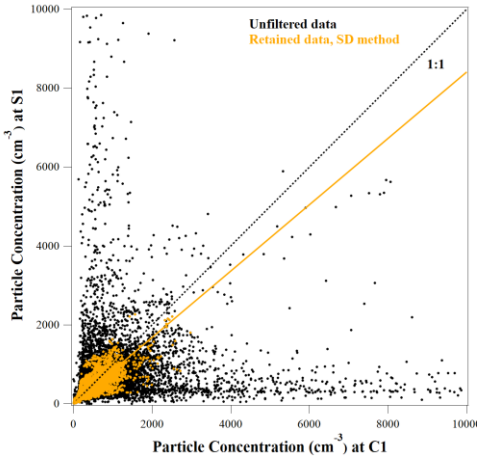
S1

AOS C1 and S1 Local Aerosol Sources and Filter

- Summer (shown below) and Winter dominant wind directions and particulate sources are compared at C1 and S1
- Local sources detected at both locations
- Different methods for identifying local sources are evaluated
- **ARM ENA S1 Report**
  - ***Aiken, Gallo, Uin, et al. 2019***







Size Distributions and Filtering Method Comparison

- Particles < 100 nm d. associated with the highest variability and number concentrations
- CPC number concentration can be used to flag local sources with a modified Standard Deviation Method to identify outliers
- Airport Operational Periods dominate local sources at C1
- Diurnal profile after applying the filter and monthly averages of submicron concentrations from 2016 – 2018 are between 200 – 600 #/cc

– Gallo et al., in prep for AMT