



# Size and Time- resolved Aerosol Collector Results

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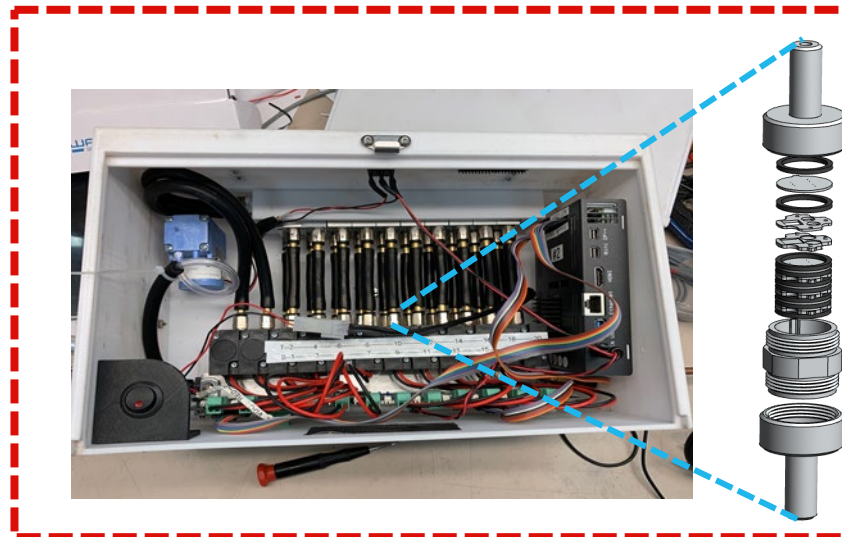
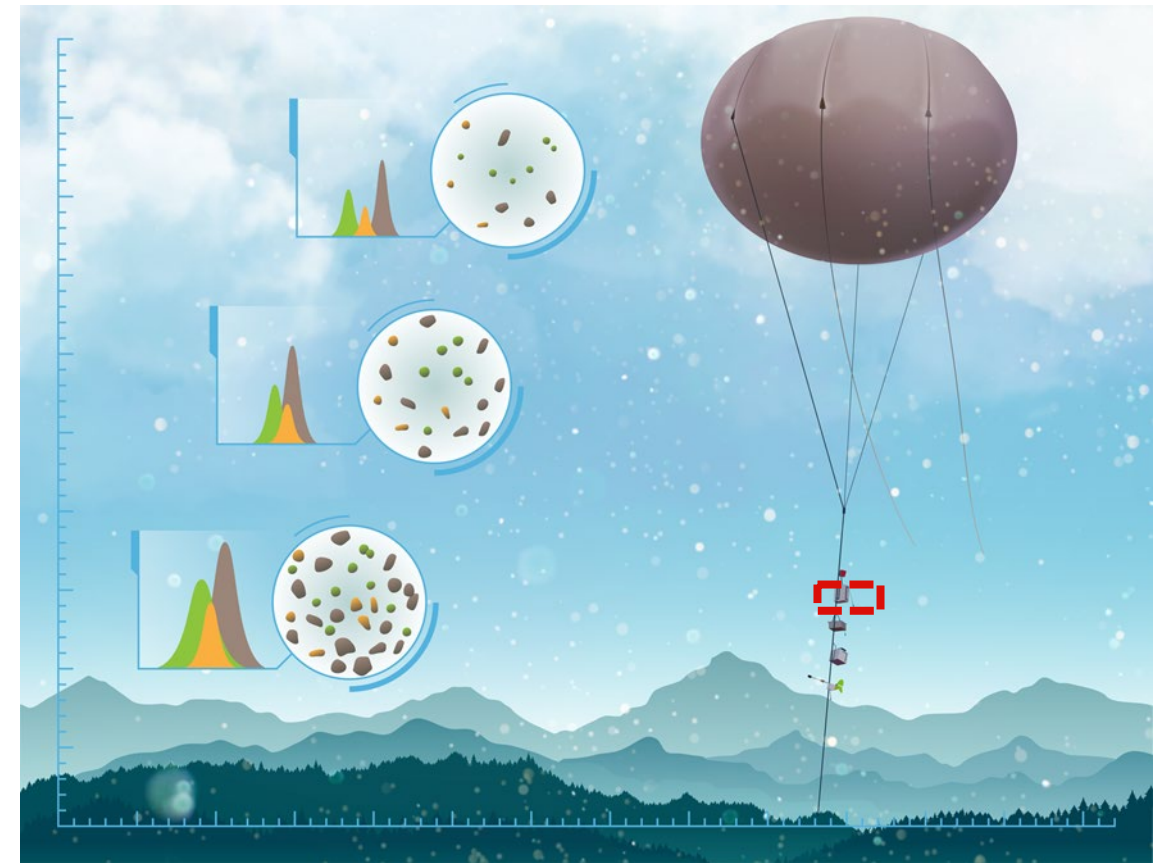
Swarup China

2022 ARM/ASR Joint User  
Facility and PI Meeting

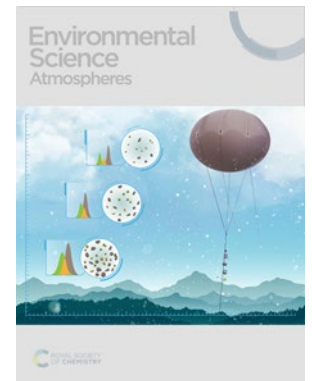


# Size and Time Resolved Aerosol Collector (STAC)

- Vertical profile of atmospheric interactions and processes
- Size-resolved and time-resolved chemistry



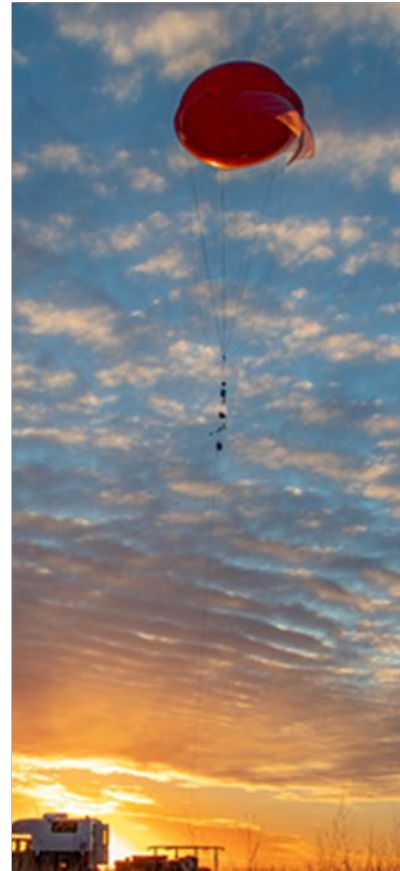
Cheng et al., Environ. Sci.: Atmos., 2022  
DOI: 10.1039/D2EA00097K



# Deployment of STAC at ARM-DOE Campaigns



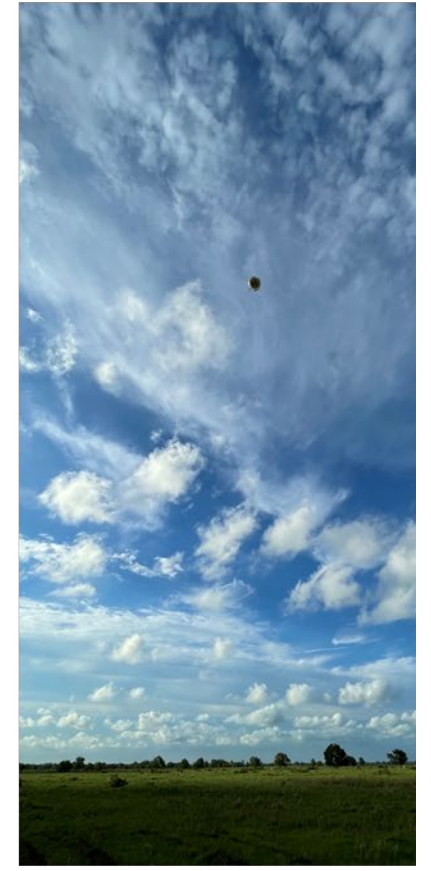
OLI, Alaska  
November 2020



SGP, Oklahoma  
2021, 2022

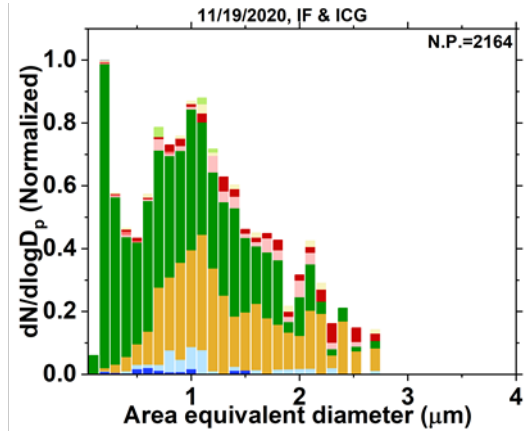
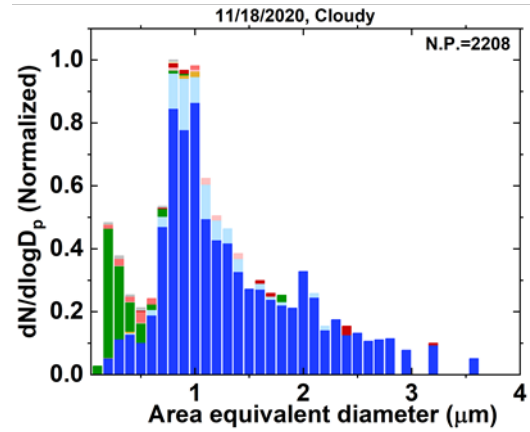


SAIL, Colorado  
2021, 2022



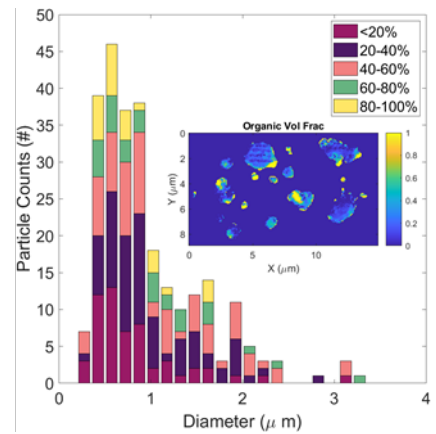
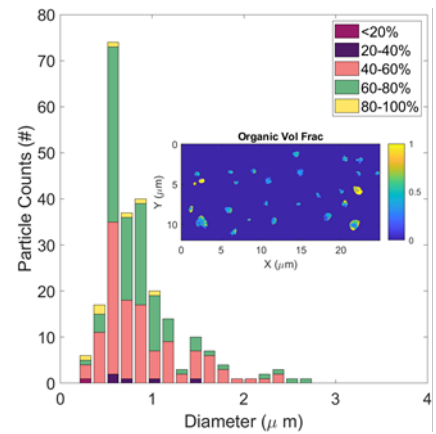
TRACER, Texas  
2022

# Chemical Composition of Ice-fog Processed Particles



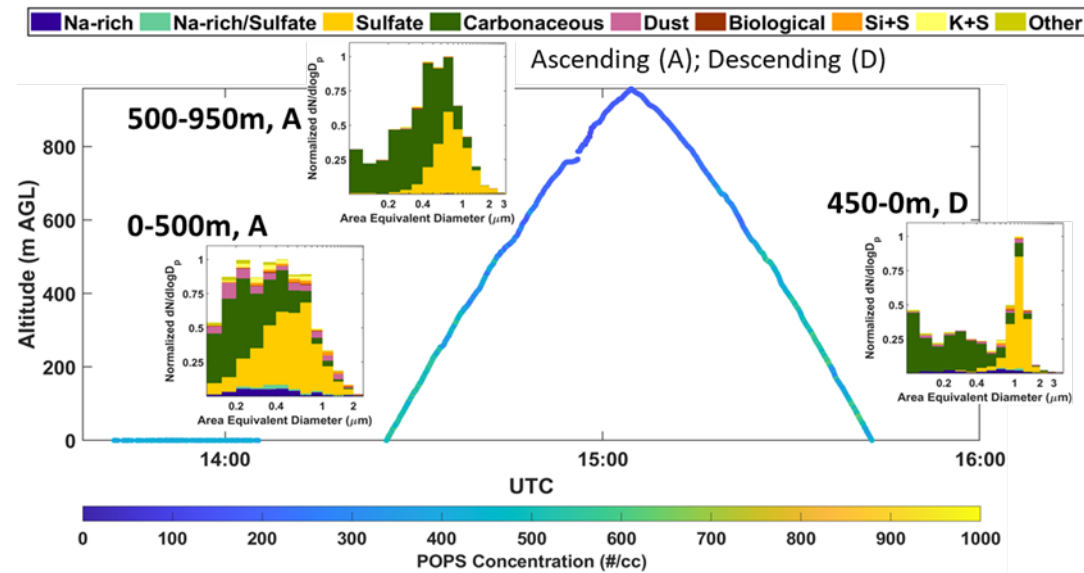
**Cloudy:** dominated by Na-rich salt particles

**Ice fog+ Icing:** dominated by Sulfate and carbonaceous

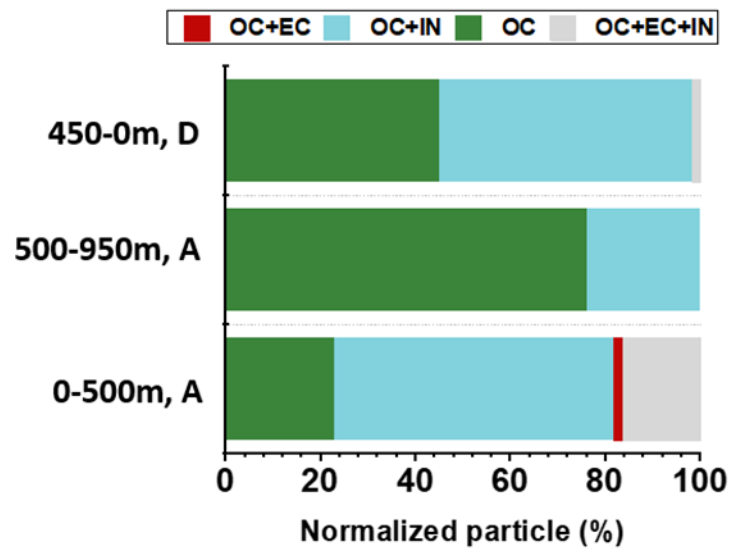


Size dependency on organic volume fraction

# Chemical Composition of Particles during TRACER

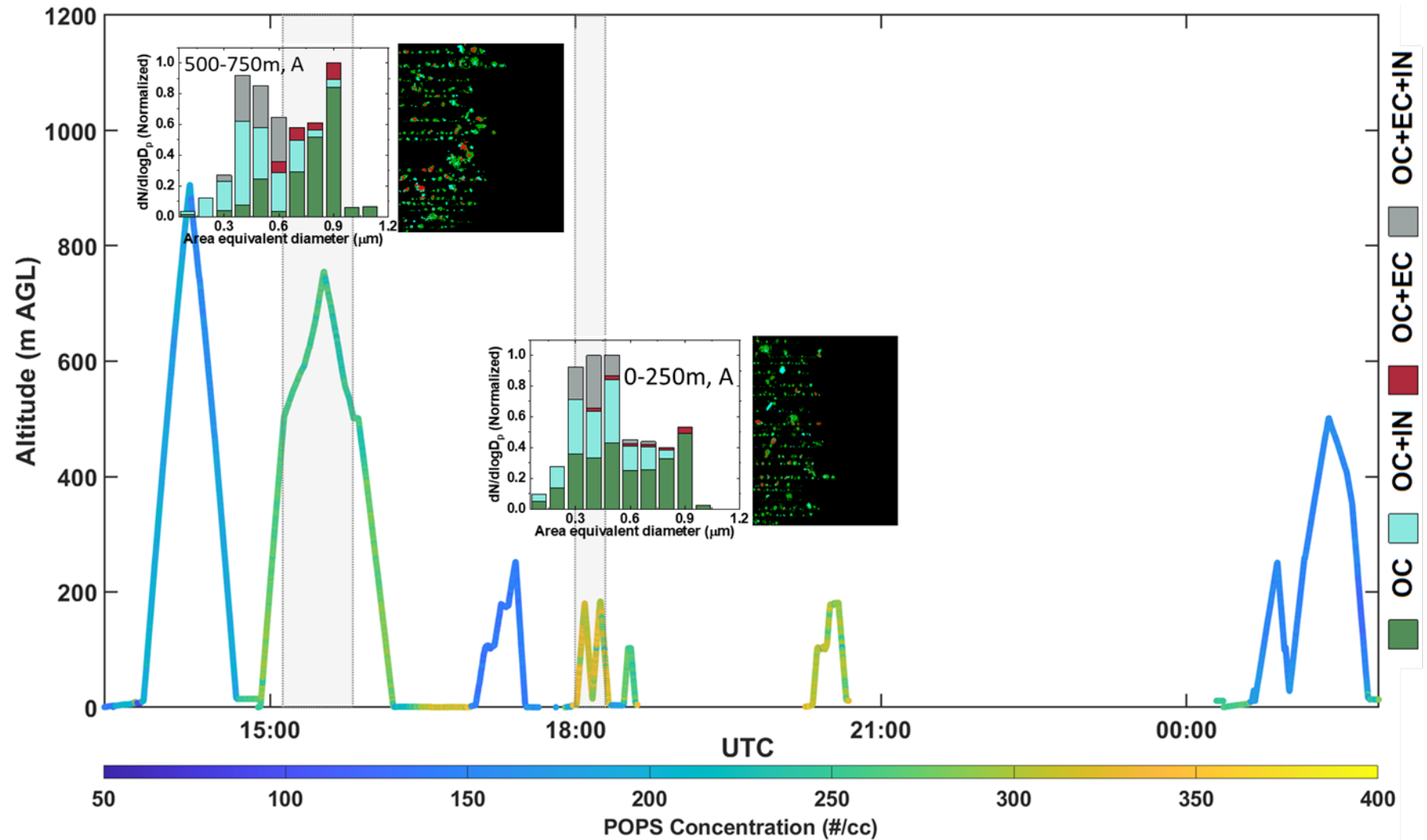


Particles are dominated by carbonaceous (smaller size) or sulfate (larger size) particles.



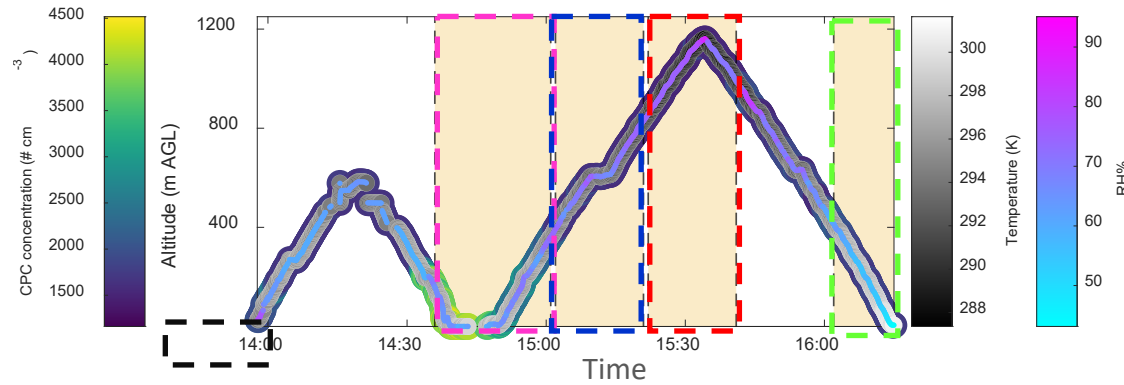
High altitude particles are dominated with organic carbon

# Chemical Composition of Particles during SAIL

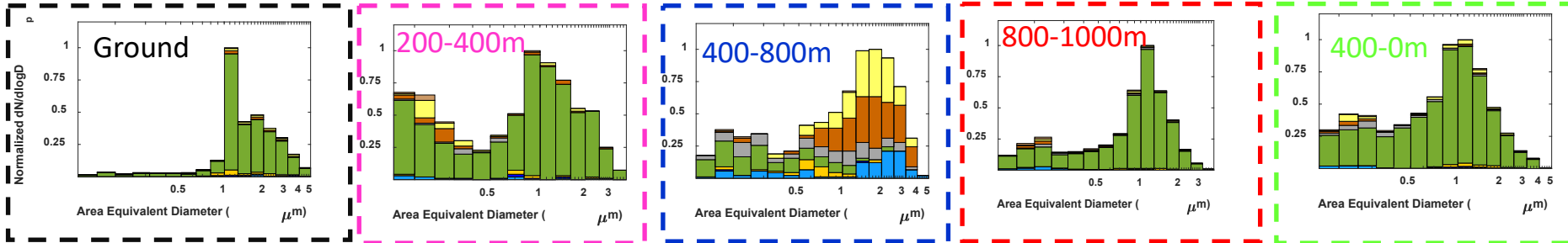


No significant difference in chemical composition at different altitudes

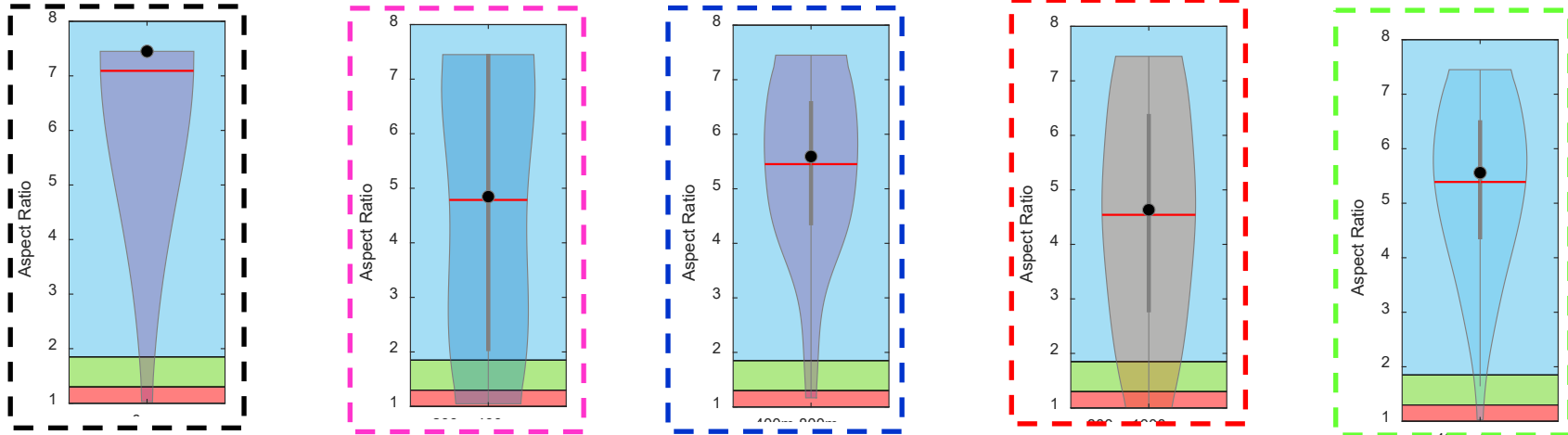
# Vertical Distribution of Aerosol Phase state at SGP



STAC sample collection



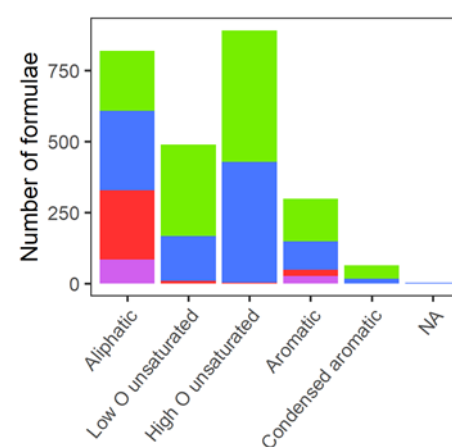
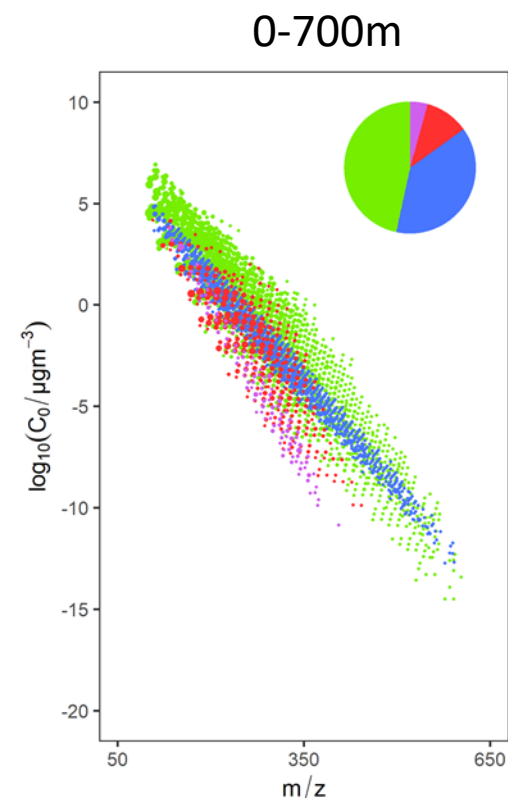
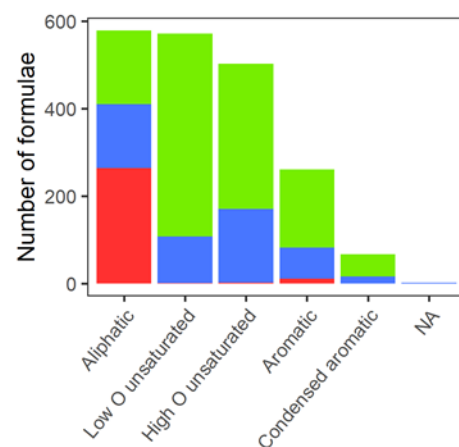
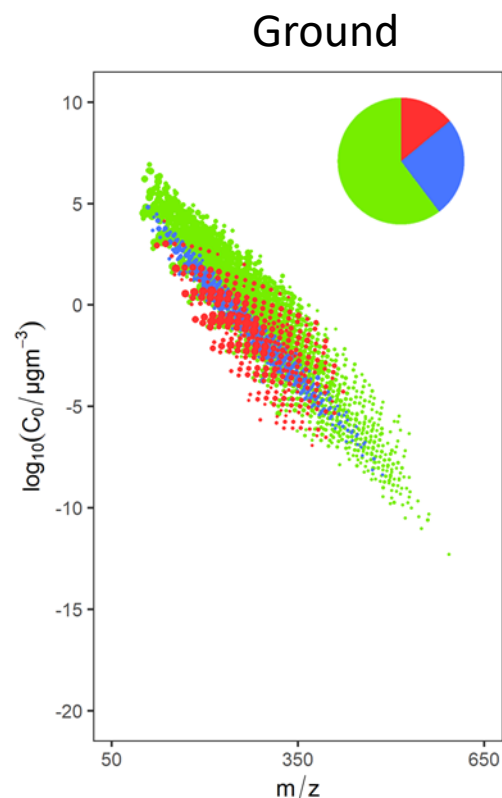
■ Na-rich     ■ Sulfate     ■ Dust     ■ K+S  
■ Na-rich/Sulfate     ■ Carbonaceous     ■ Si+S     ■ Other



■ Liquid     ■ Semisolid     ■ Solid

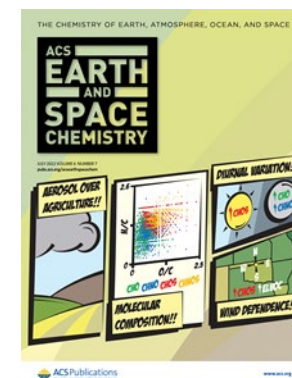
Abundance of liquid and semi-solid particles

# Molecular Composition of Organic Aerosols at SGP



Increase in low volatility species, particularly CHNO at high altitude

Vandergrift et al., ACS Earth and Space Chemistry, 2022  
doi/full/10.1021/acsearthspacechem.2c000432022





Questions?

**Thank you!!**