Biomass burning and anthropogenic aerosol influence on cumulus cloud microphysical properties during CAMP^{2}Ex

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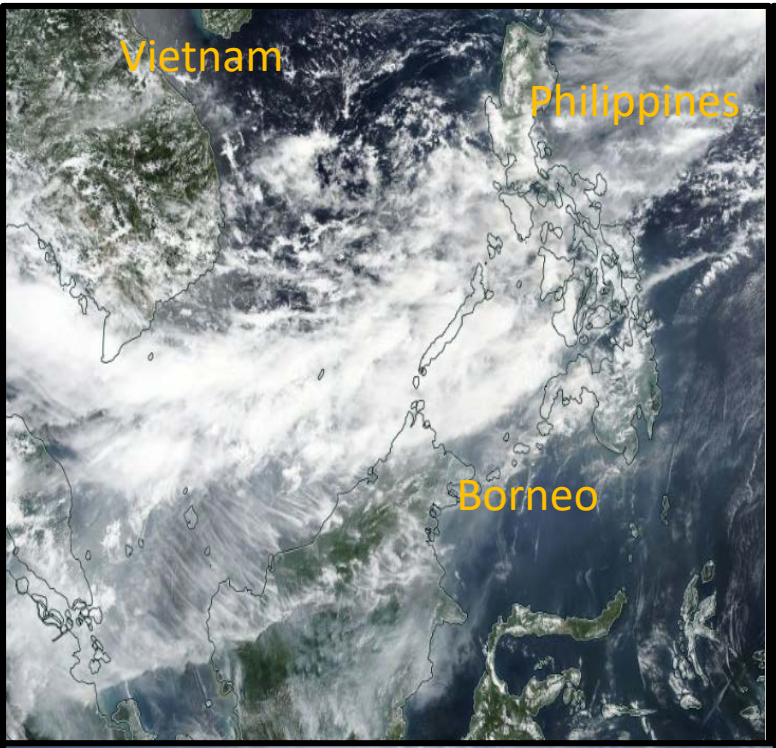
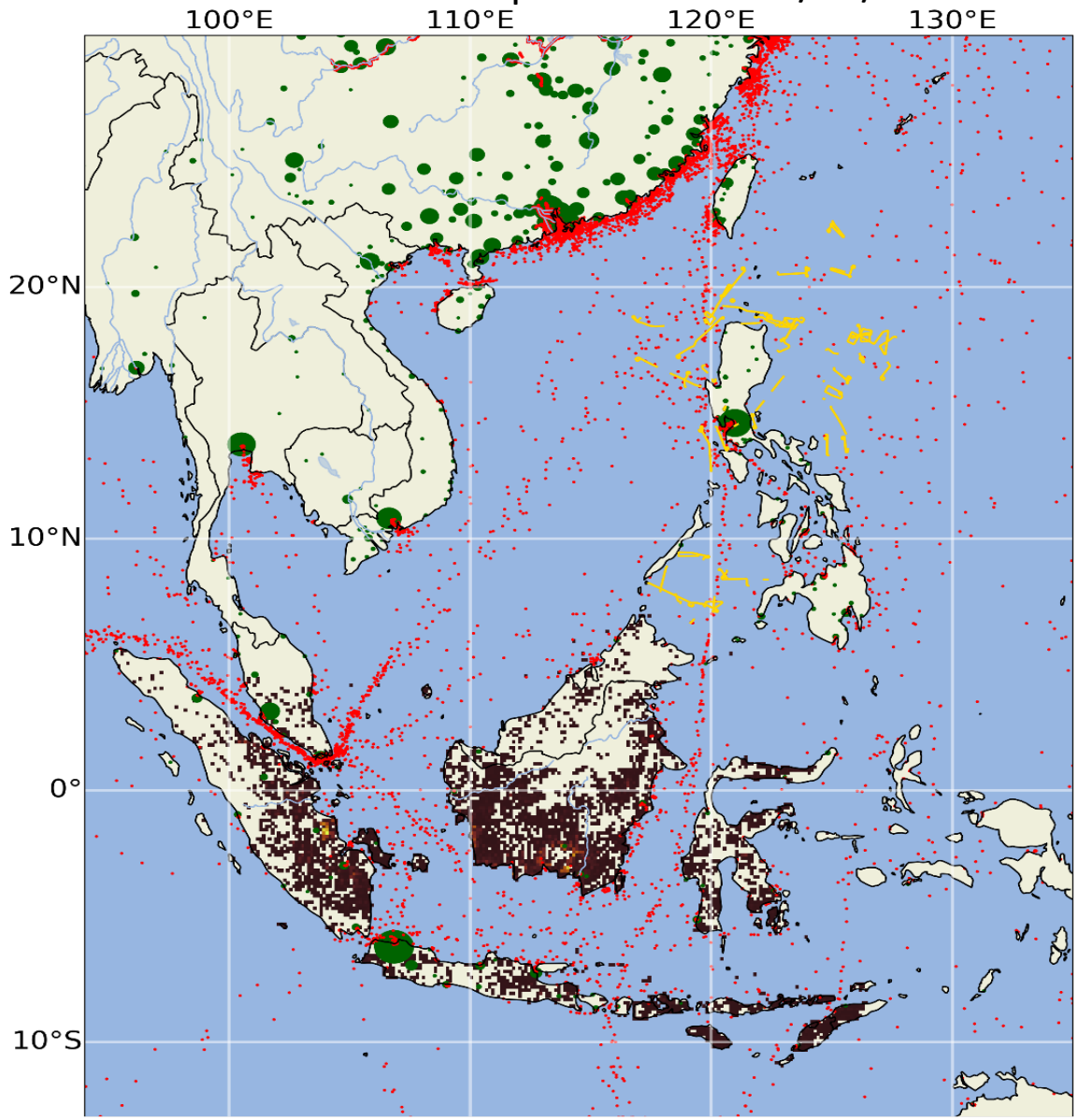
The Cloud, Aerosol, and Monsoon Processes Philippines Experiment (CAMP2Ex)



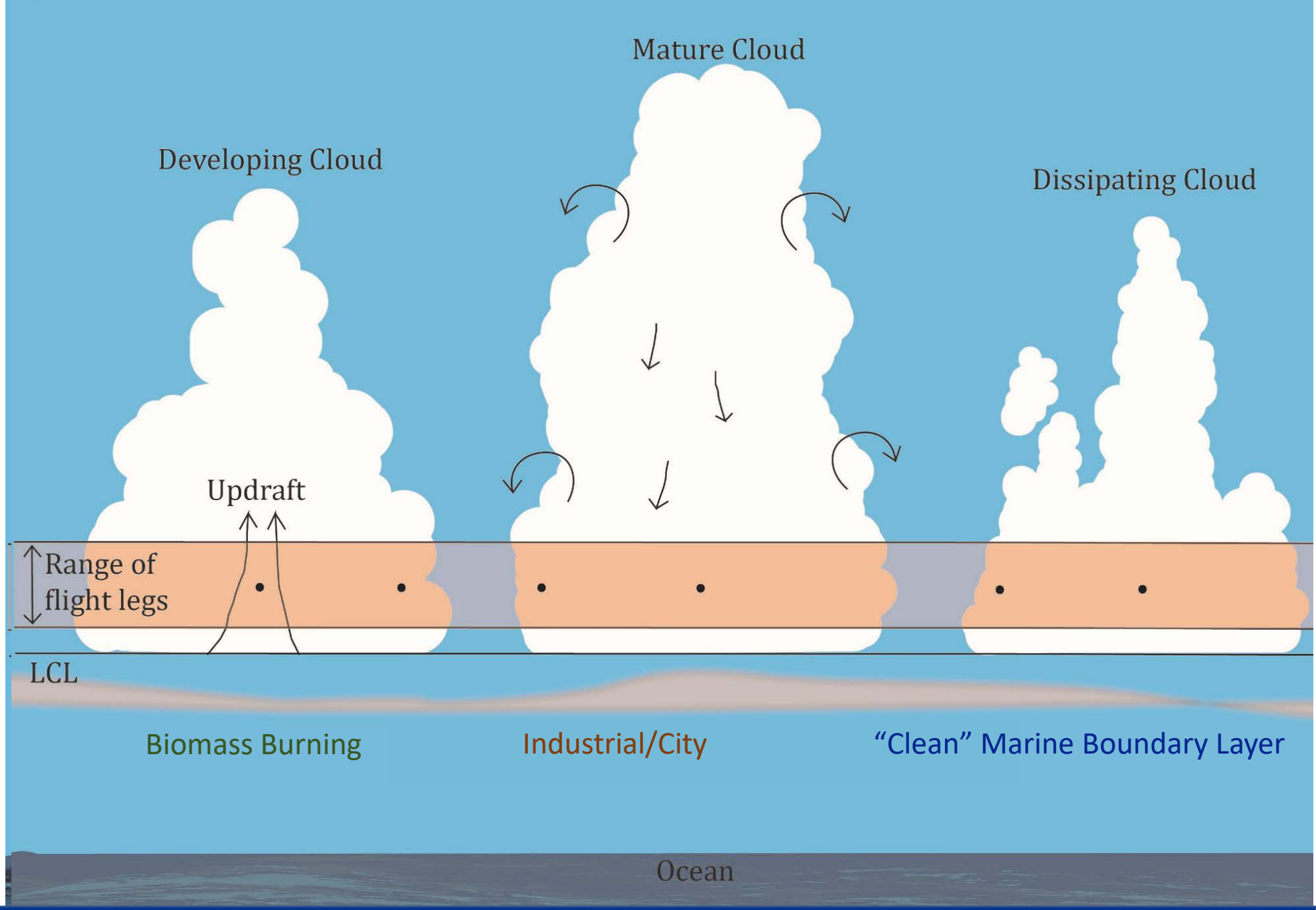
Active Fires and Ship locations on 9/19/19



Ship location Cities by pop. Flight legs in MBL Active Fires (FIRMS)

Background

- Determine the relationship between aerosol source region and cloud properties.
- Focused on the lower level of the clouds right above cloud base
- Complex dataset to represent the lower level of the cloud



Cloud transect lengths measured from remote sensing and in-situ instrumentation

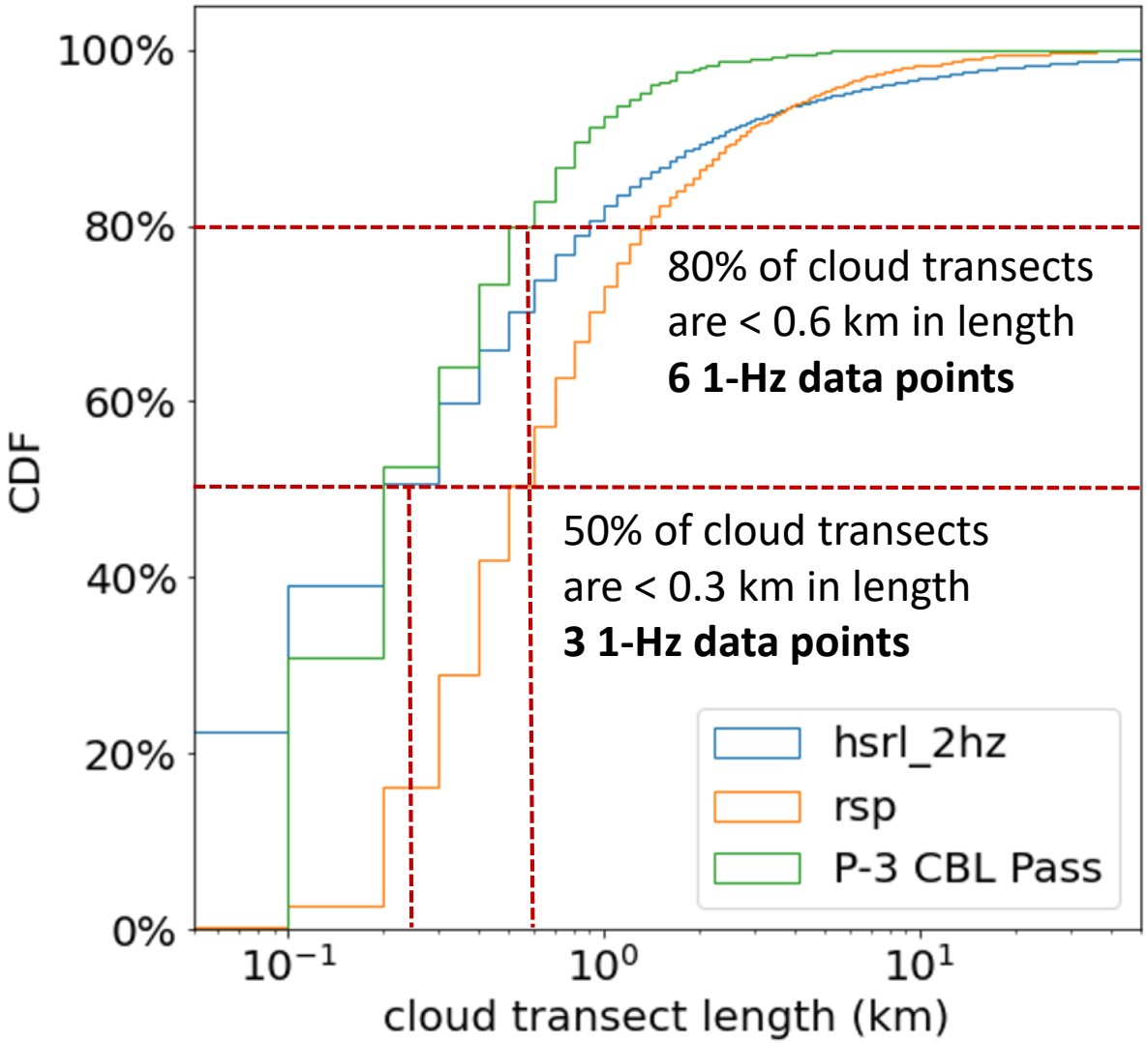


Image: Dongwei Fu

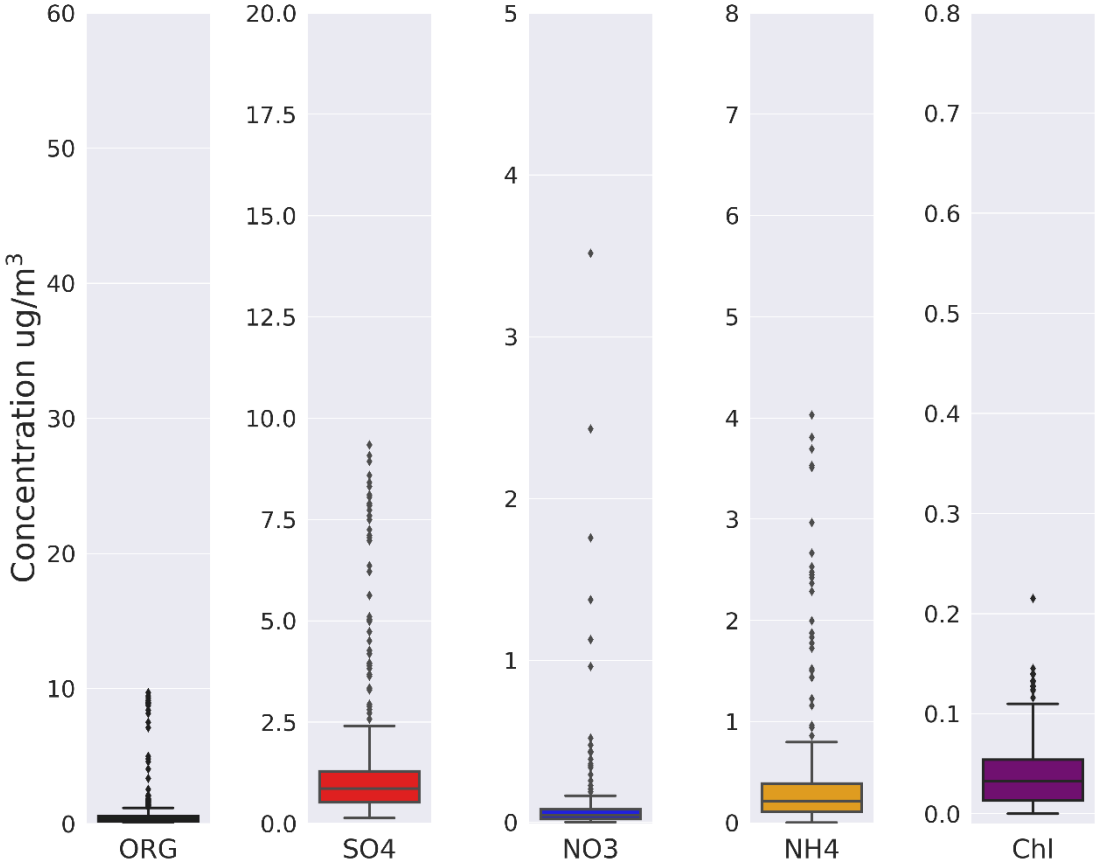
Biomass burning impact on cloud droplet number concentration

-Six distinct aerosol groups classified in the MBL using aerosol mass spectrometer

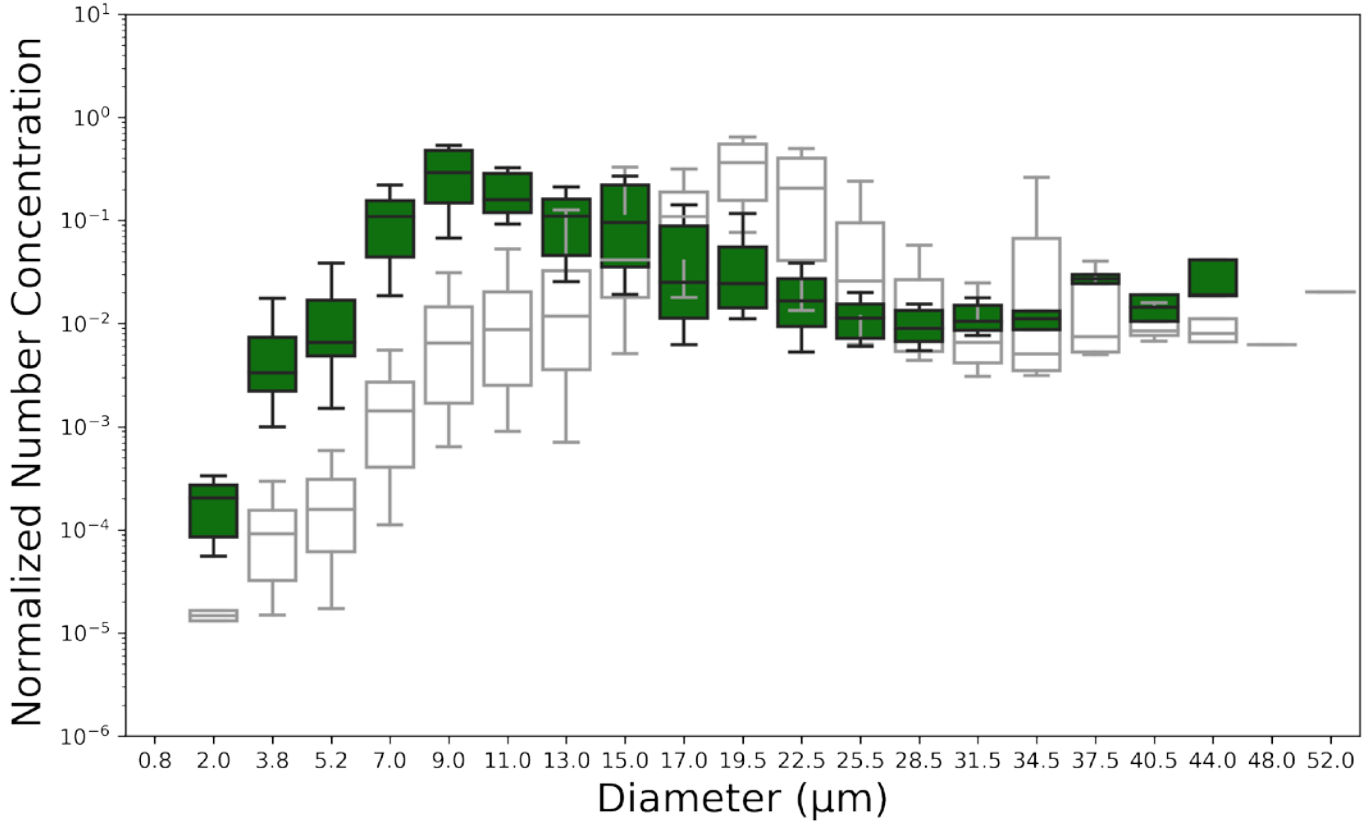
- Anthropogenic, ship plume, biomass burning, slightly polluted, Manila plume, and the clean MBL

-Cloud base in-situ sampling using the FCDP in each aerosol group

Biomass Burning Aerosol Mass Composition Distribution



Biomass Burning Normalized Cloud Droplet Number Distribution



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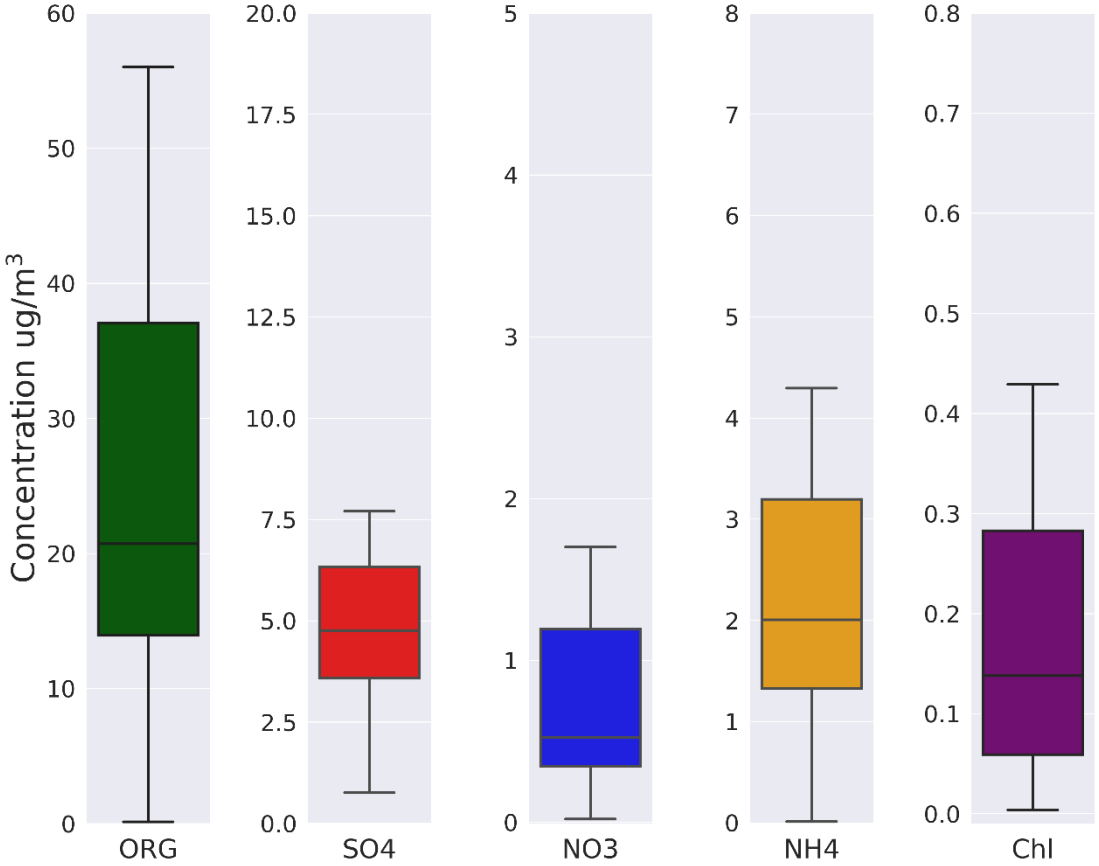

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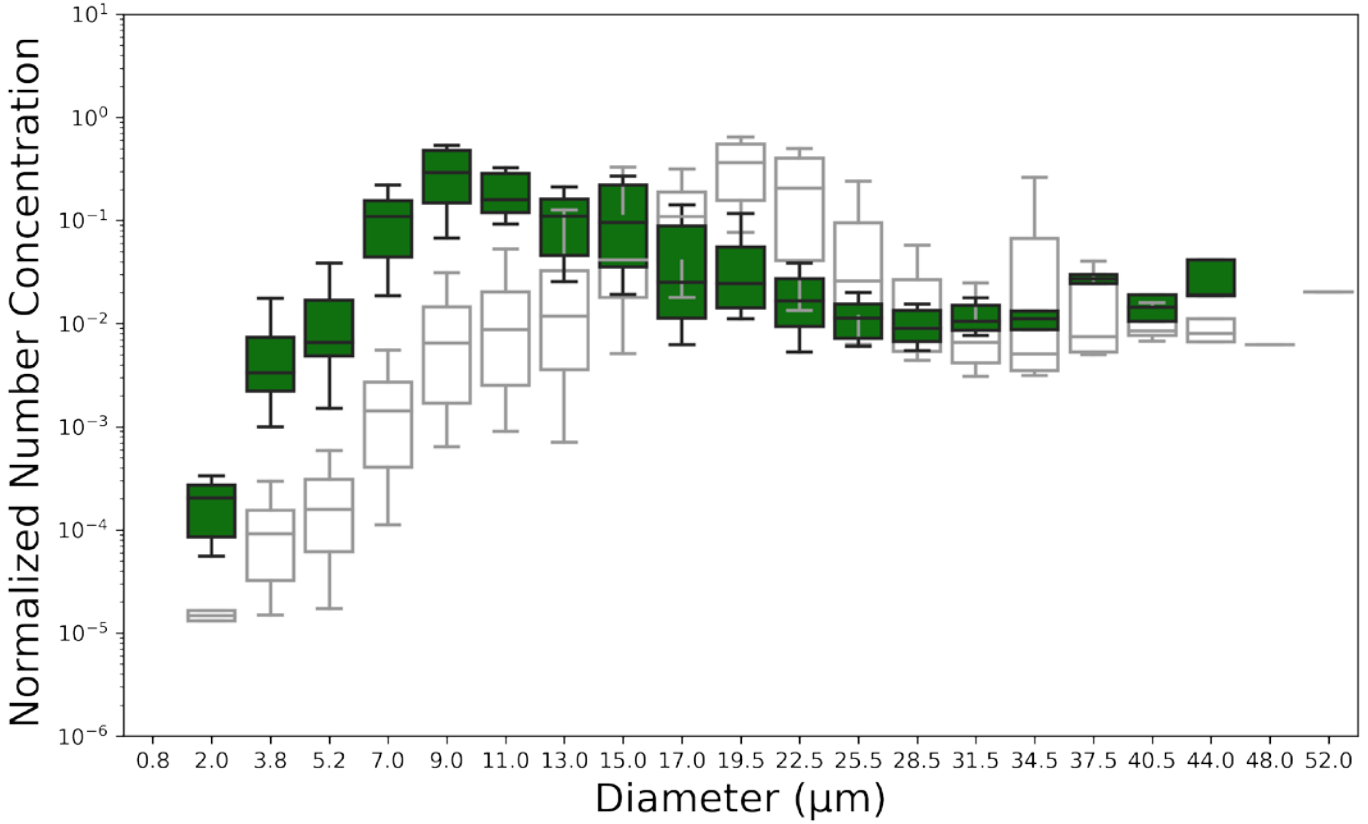

Conclusions and Future Work

- 1675 Cloud Base Passes from 17 research flights
- Marine boundary layer passes from below cloud base and in clear air showed winds corresponding with different aerosol source regions
- Cloud droplet concentrations at cloud base differed amongst the six aerosol groups

Next Steps…

- Determine the relationship of aerosol source region with CCN concentrations and aerosol size distribution

Thank you!