UCDAVIS
UNIVERSITY OF CALIFORNIA

Insights into Organic Aerosol Sources and Processes at T1

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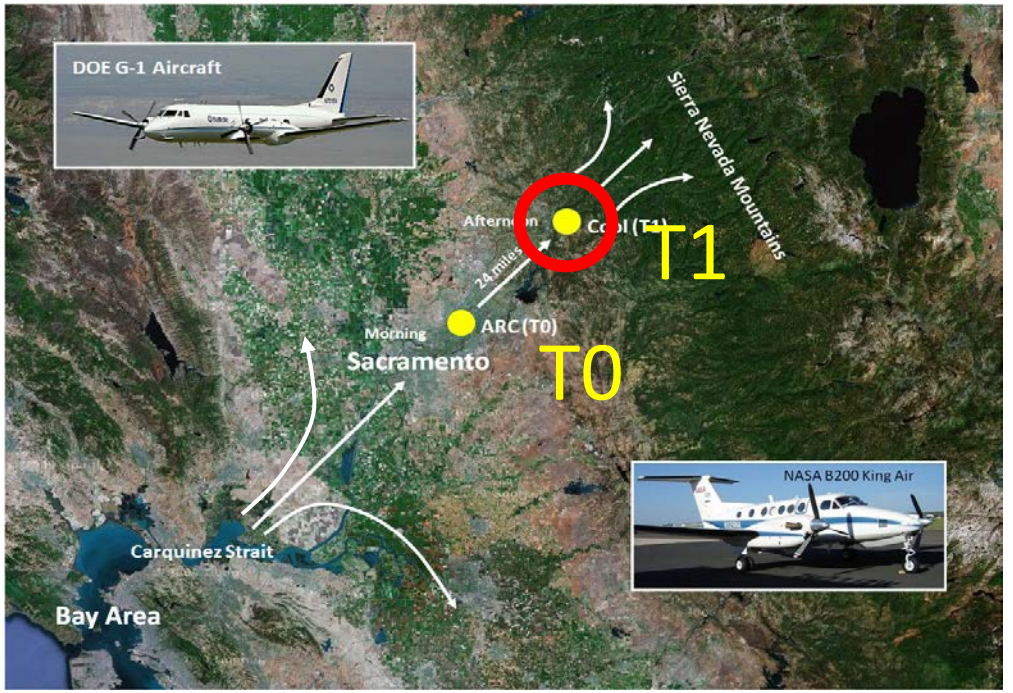
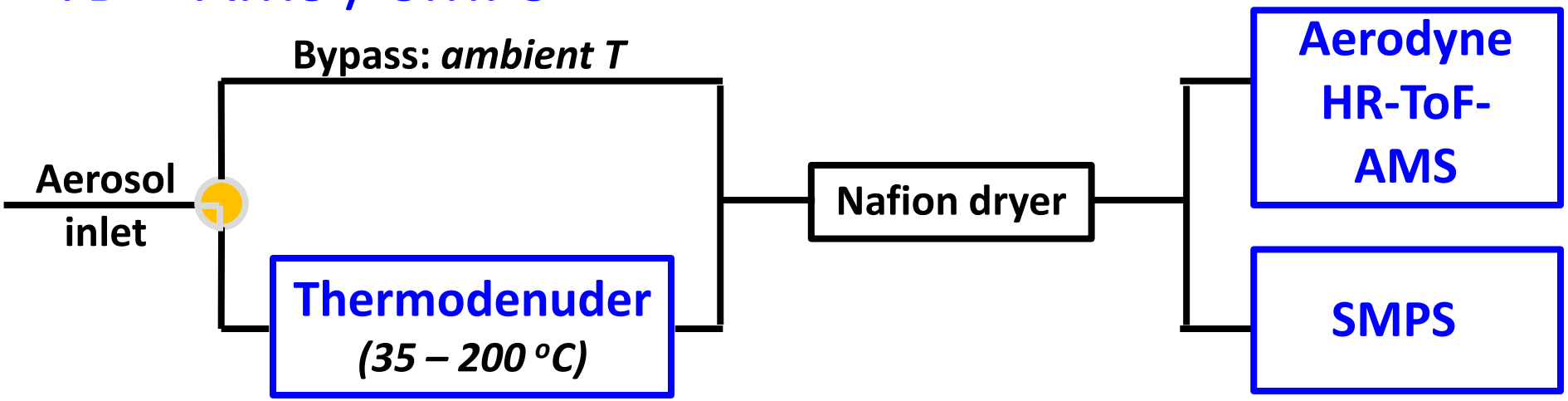
CARES: Carbonaceous Aerosol and Radiative Effects Study

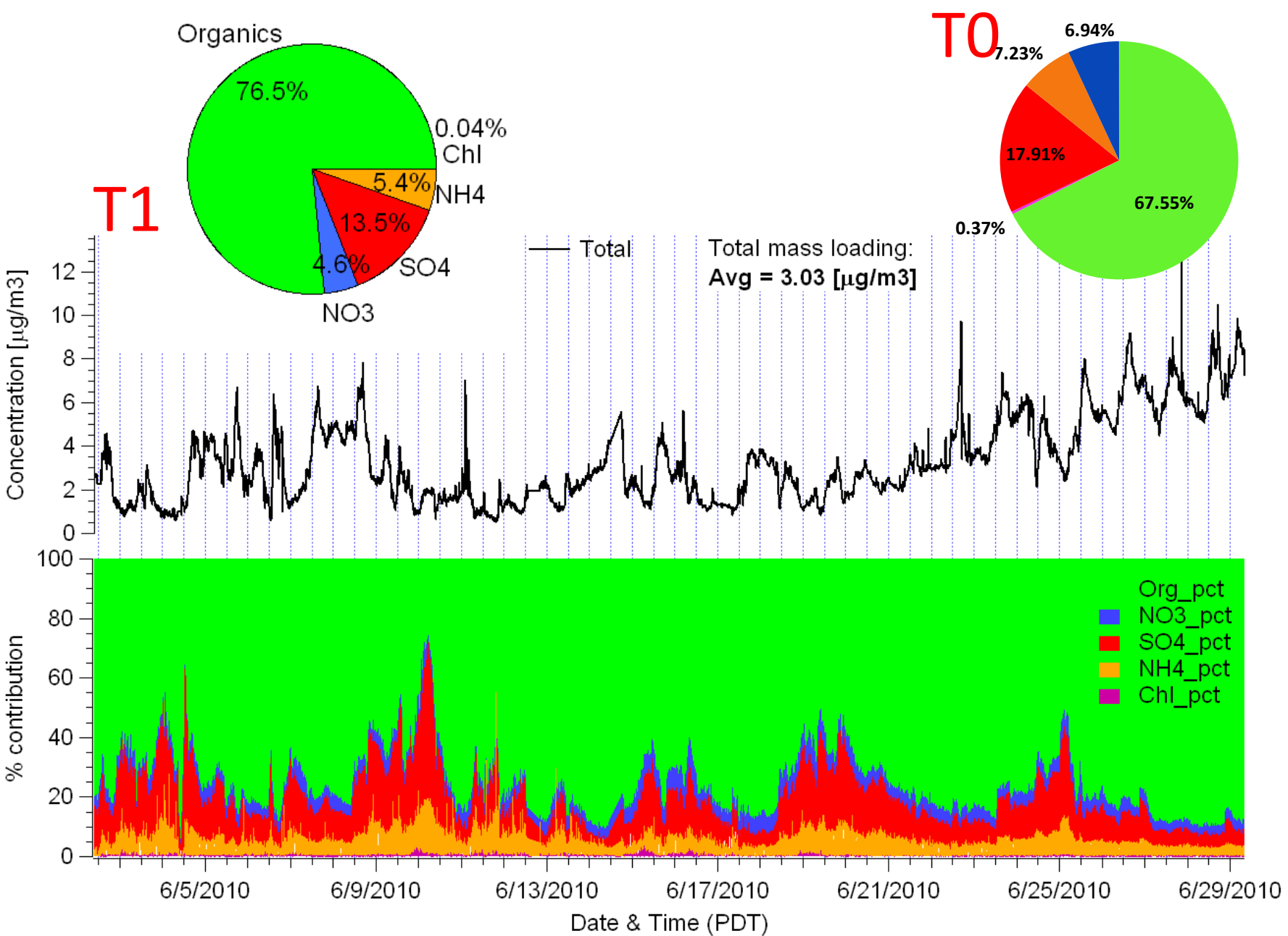


TD – AMS / SMPS

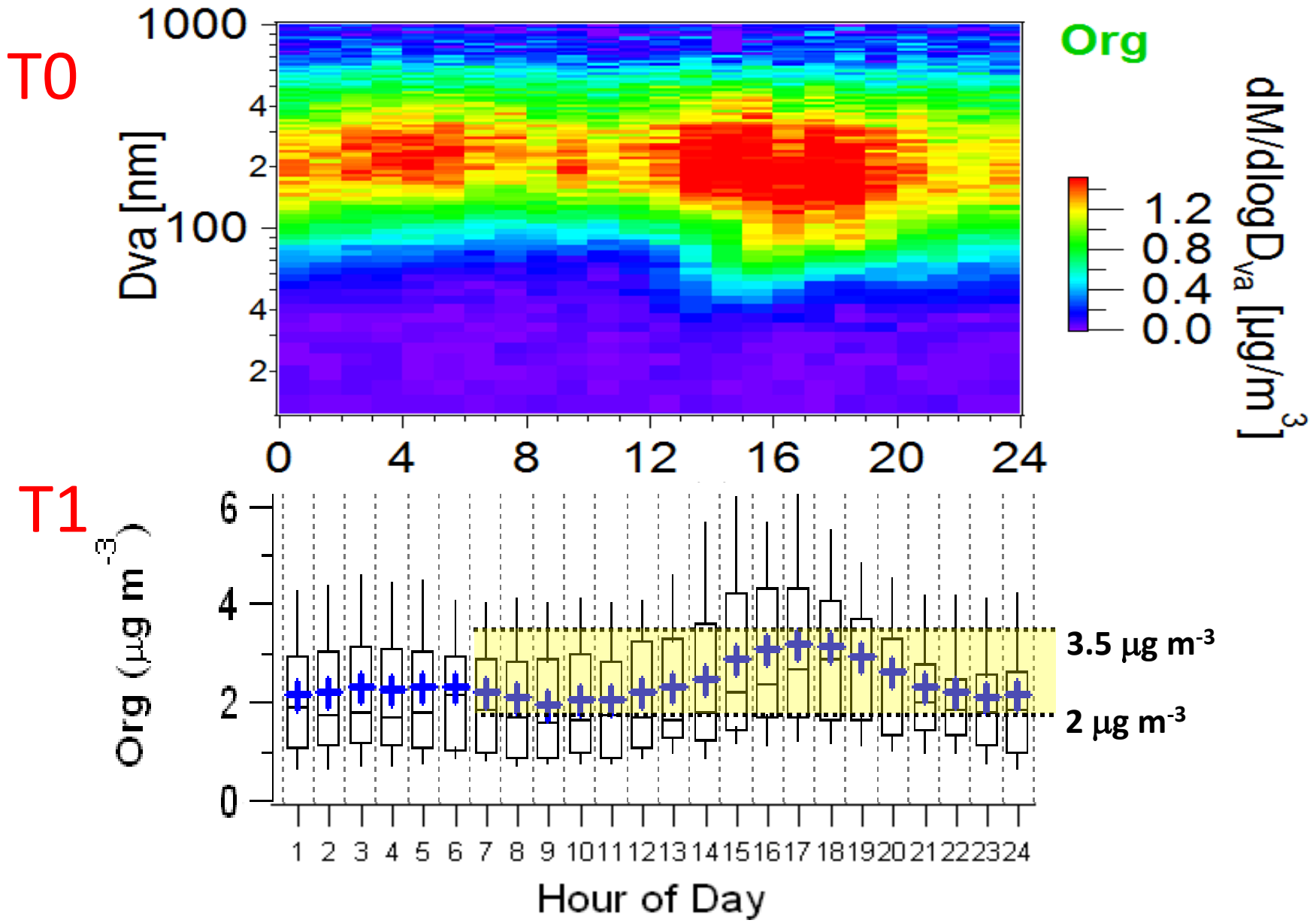


- PM composition
- Volatility distribution
- Size distributions (number and chemical species)

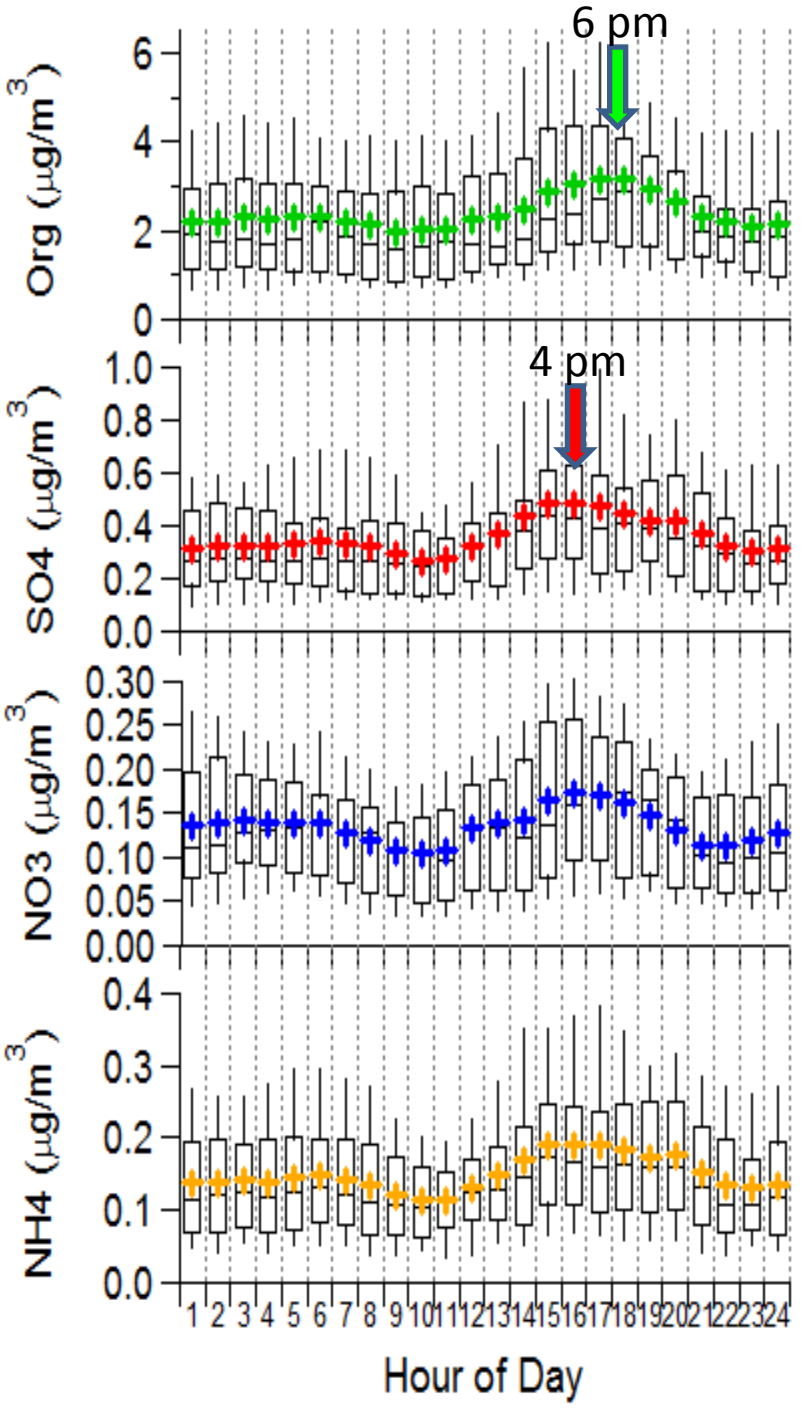
Organics dominate PM_1 composition

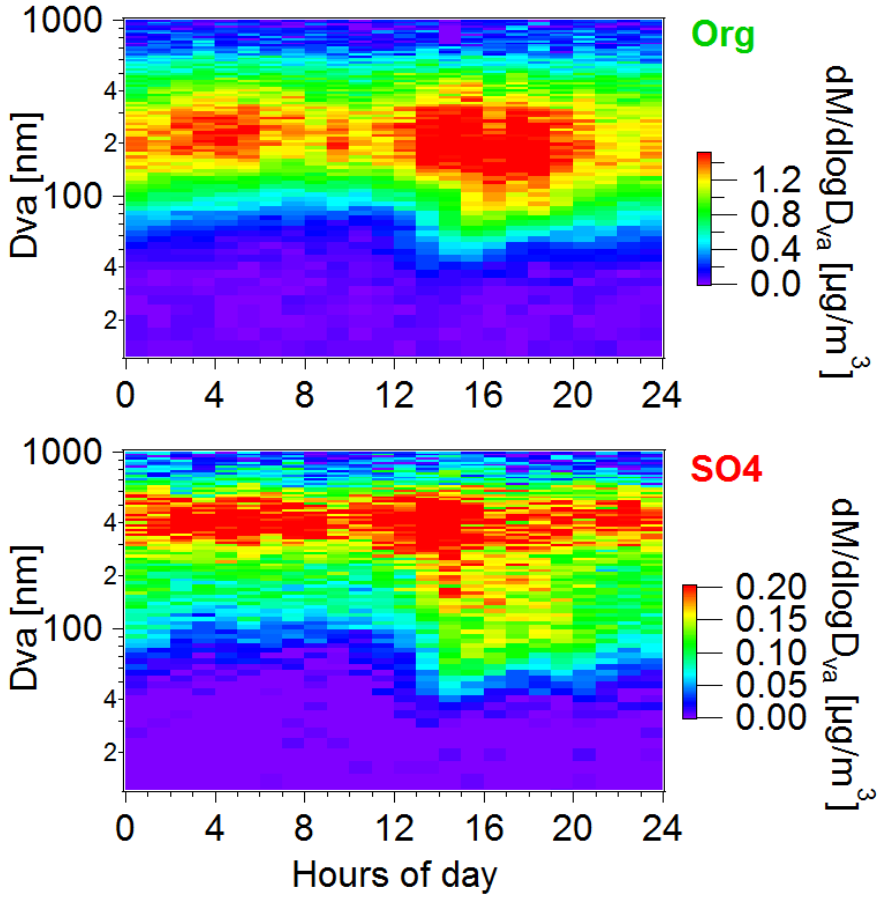


Strong diurnal profiles due to SOA Production

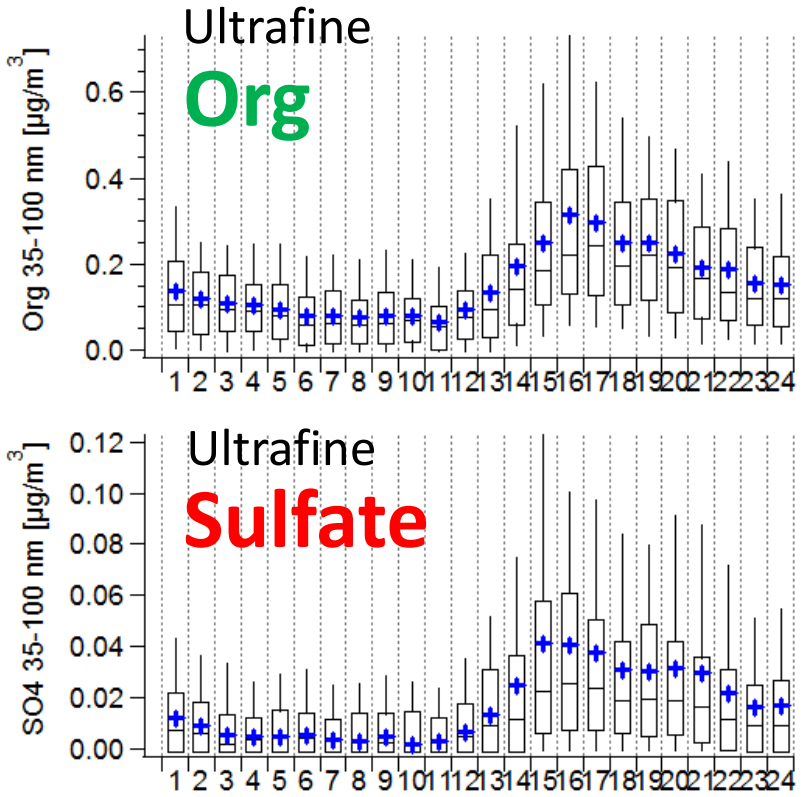


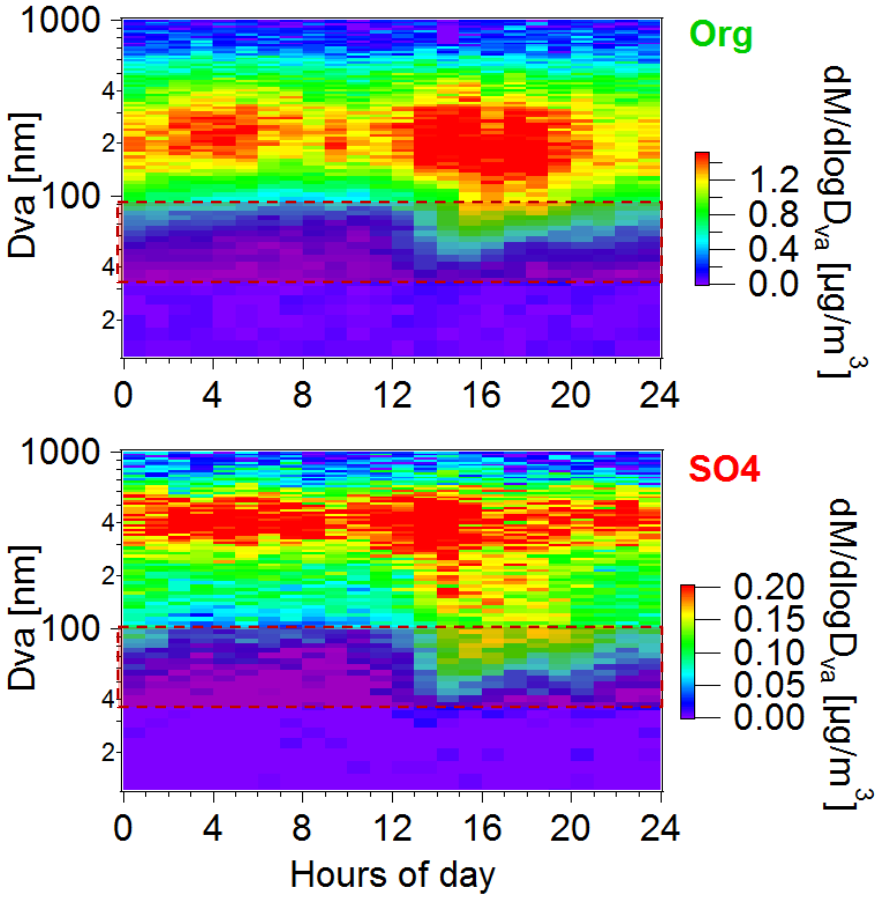
T1


6 pm
4 pm
Org (μg/m3)
SO4 (μg/m3)
NO3 (μg/m3)
NH4 (μg/m3)
Hour of Day

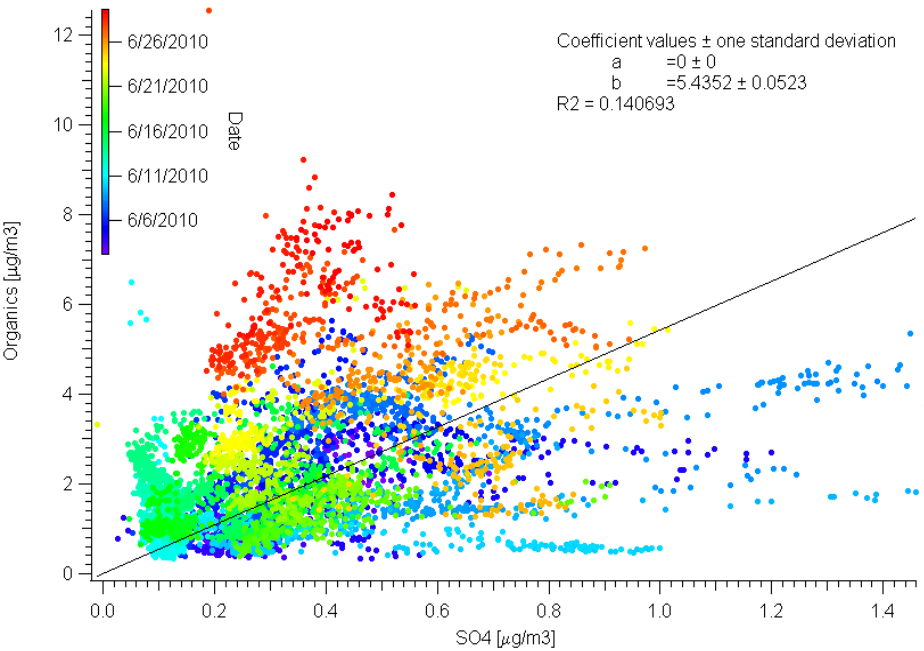

Org
SO4
Dva [nm]
dM/dlogDva [μg/m3]
Hours of day

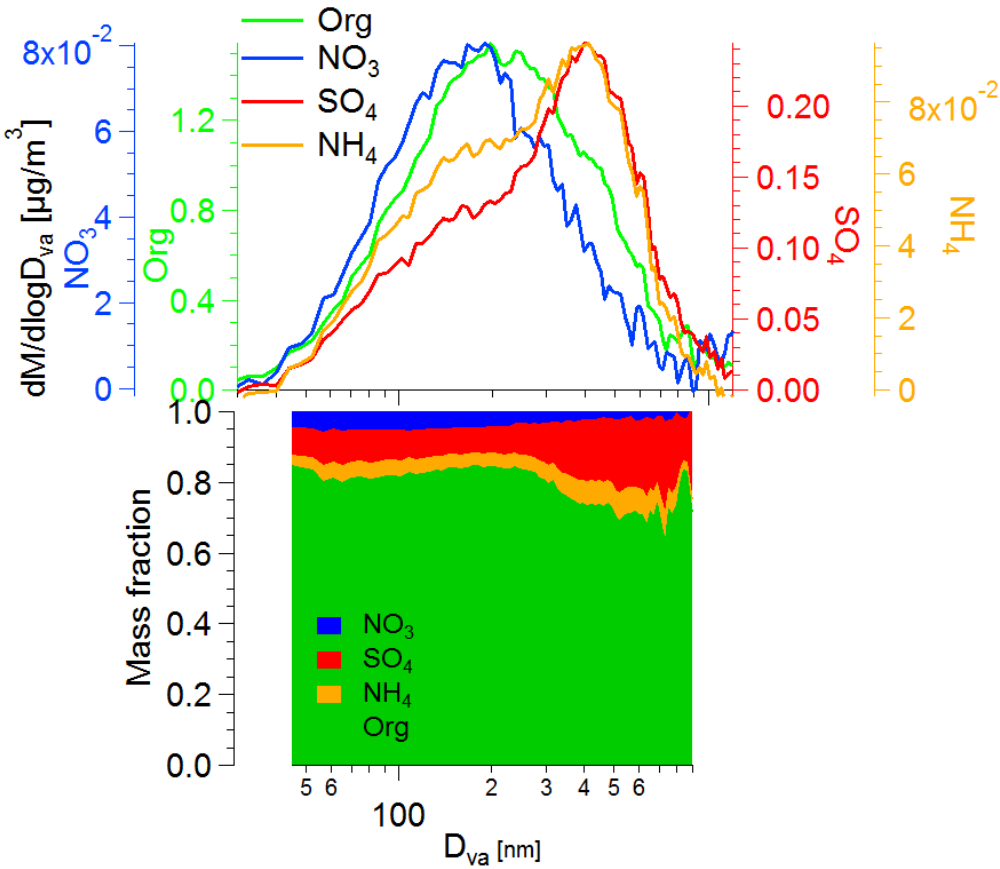
Contribution to new particle growth: Org > Sulfate



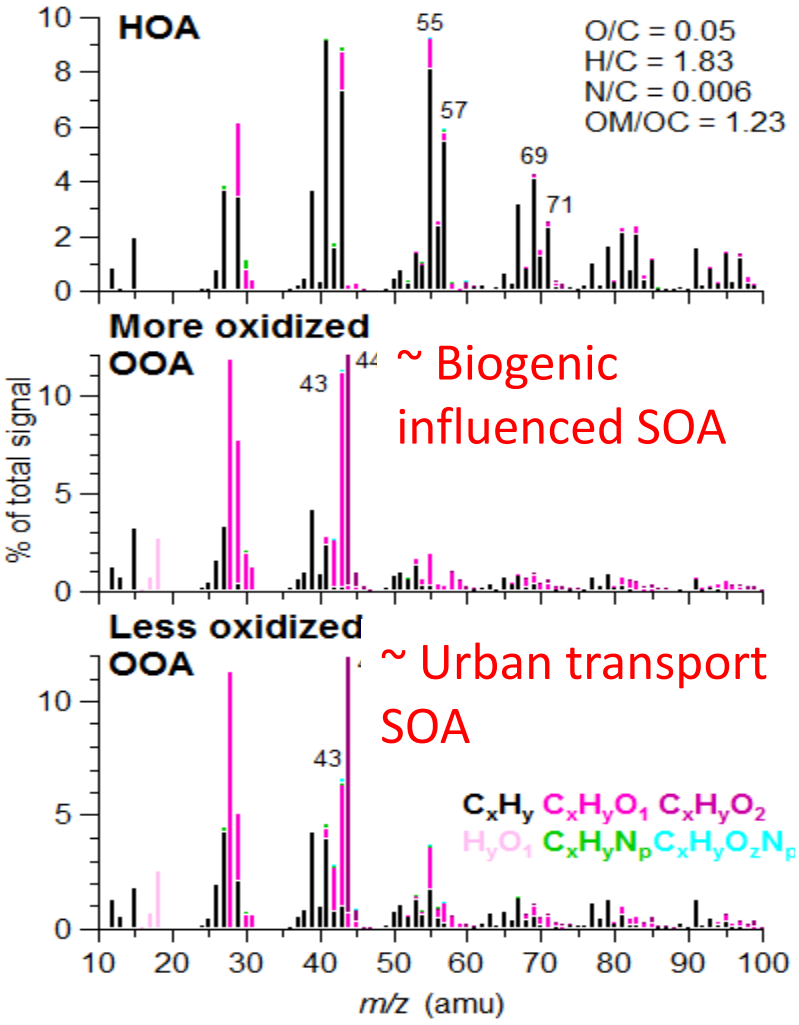


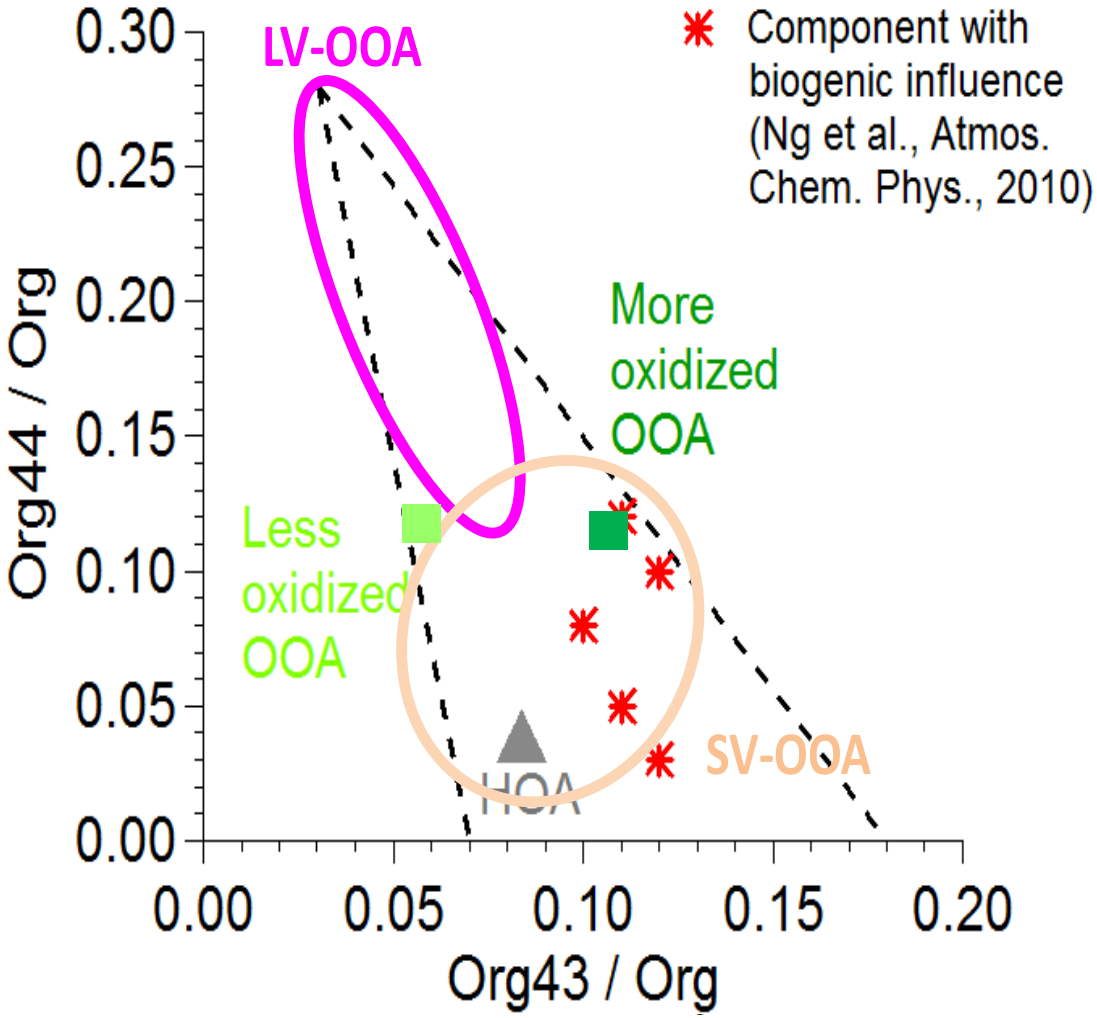
Sulfate and organics are externally mixed, due to different sources and formation mechanisms



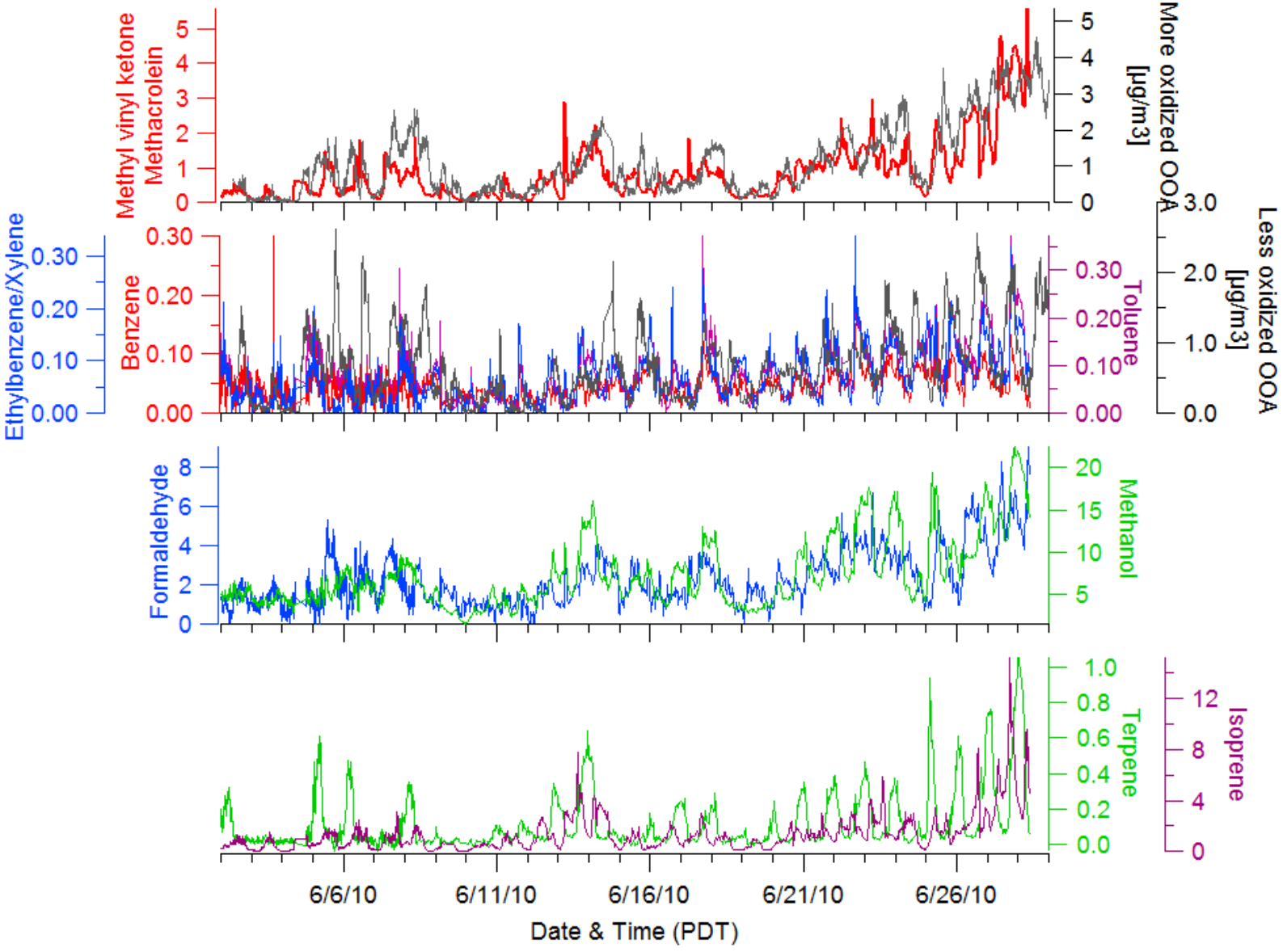


PMF analysis of HR spectra → 3 OA factors

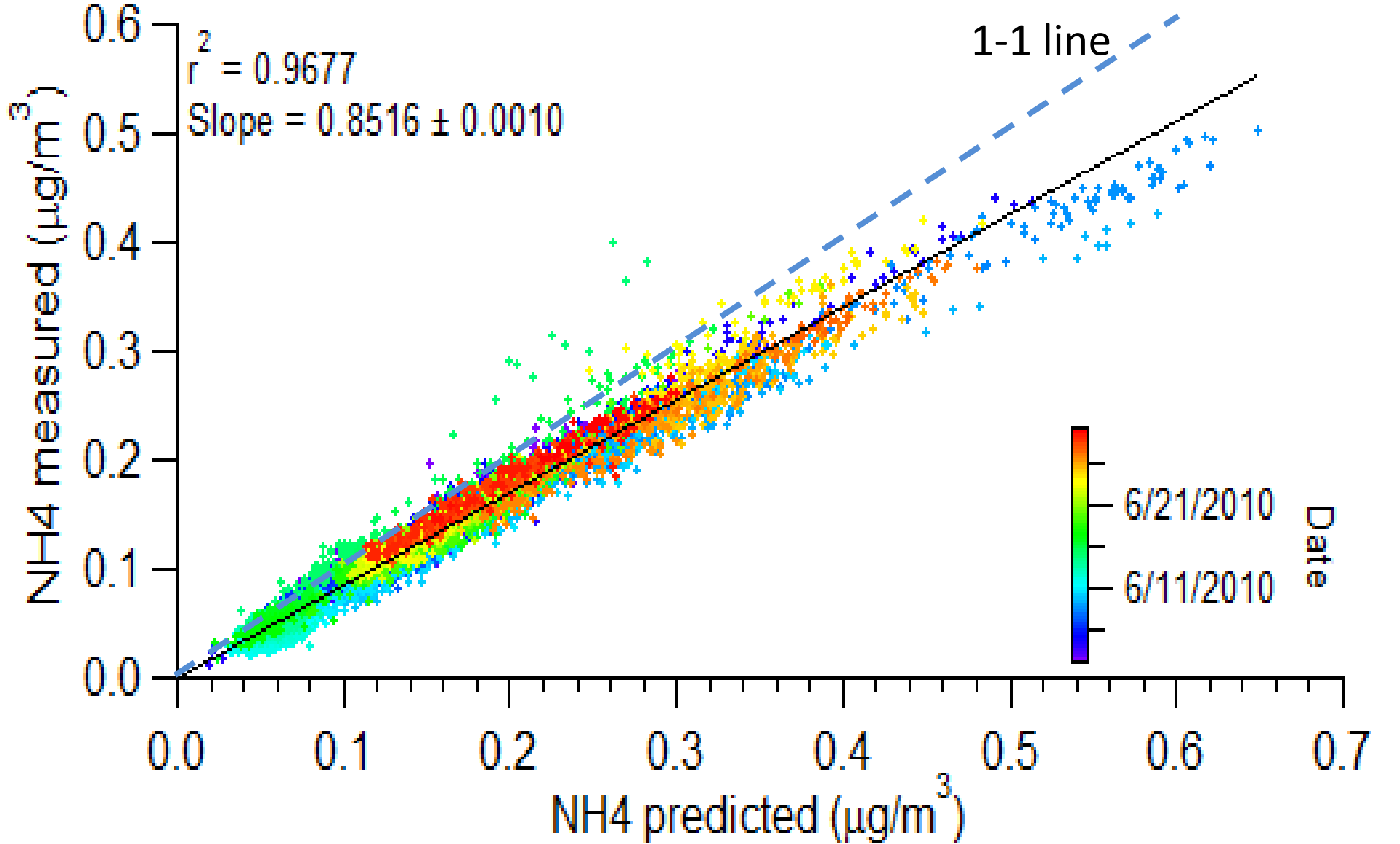


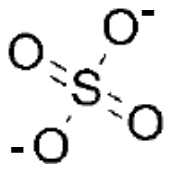


biogenic influenced vs. urban transport SOA

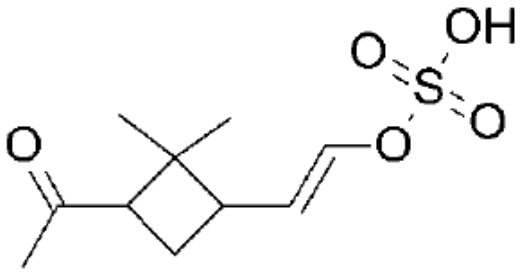


Particles appear not fully neutralized
Presence of organosulfates?

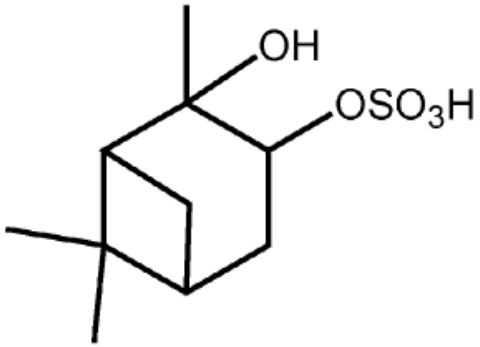


Sulfate: SO_4^{2-} 

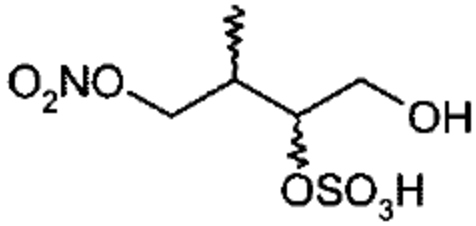
OrganoSulfates (OS): $ROSO_3^-$



sulfate ester of pinoaldehyde



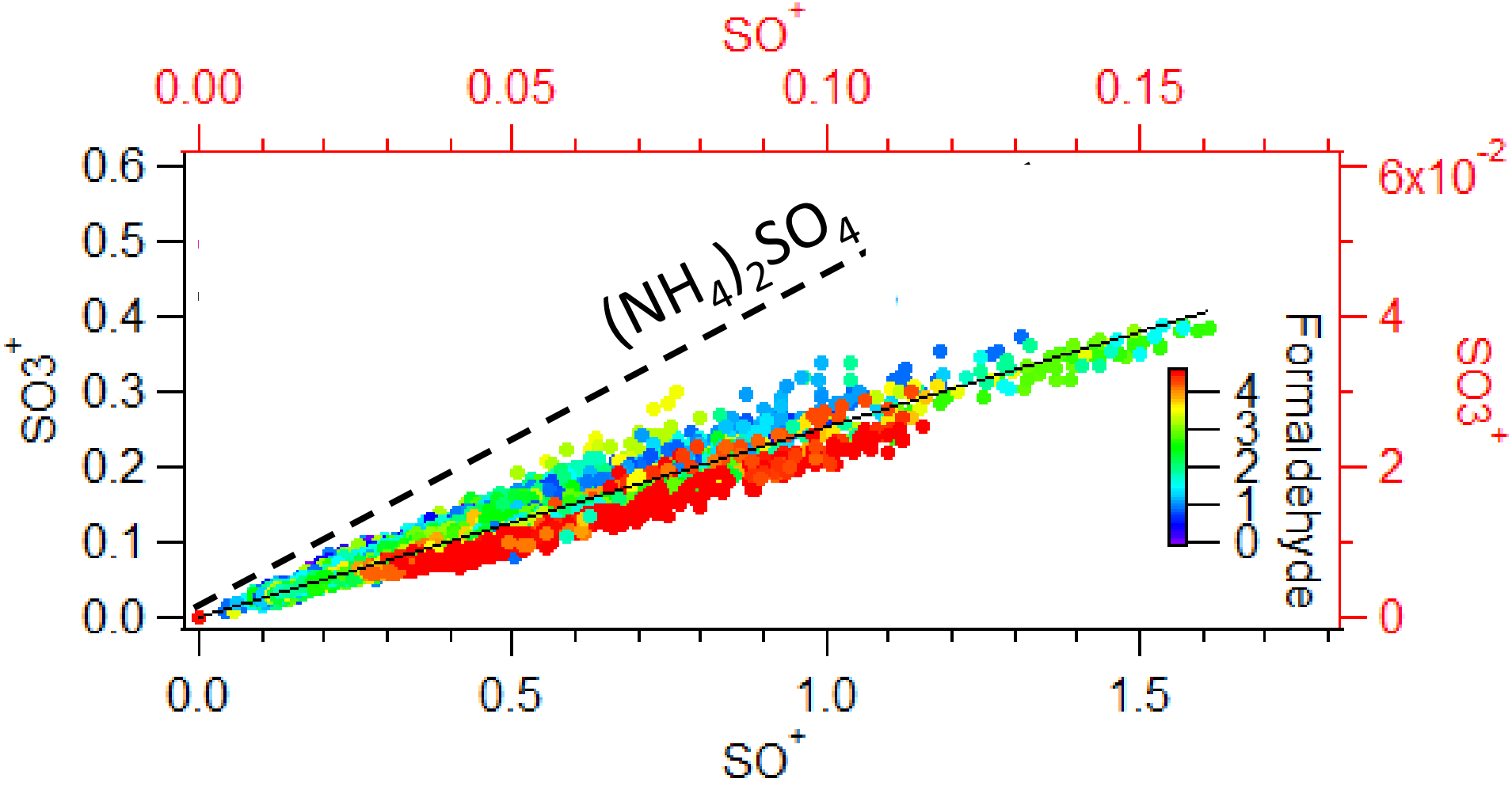
α-pinene derived organosulfate



isoprene derived organosulfate

OS are mainly formed by oxidation of biogenic VOCs in the presence of acidified sulfate aerosols.

Presence of organosulfates?



Fragmentation pattern of sulfate deviated from $(NH_4)_2SO_4$

Deviation more pronounced when photochemical VOCs ↑

Conclusions

- Organics (76%) are a major component of PM_1.
- Frequent new particle formation and growth events; contribution to PM growth: Org > Sulfate
- 3 OA components identified by PMF:
  - Biogenic influenced OOA
  - Urban transport OOA

  } SOA

  - HOA (< 10%): combustion POA
- Indication of organosulfates
- Unique case studies may be performed to study interactions between biogenic SOA production and transport of urban plumes.

Acknowledgements

Financial support:

- Department of Energy (DOE)
- Atmospheric Aerosol Health (AAH) program of UC Davis