

# Gas- and Particle-phase Chemical Composition Measurements Onboard the G1 During the CARES Campaign.

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<sup>1</sup>PNNL

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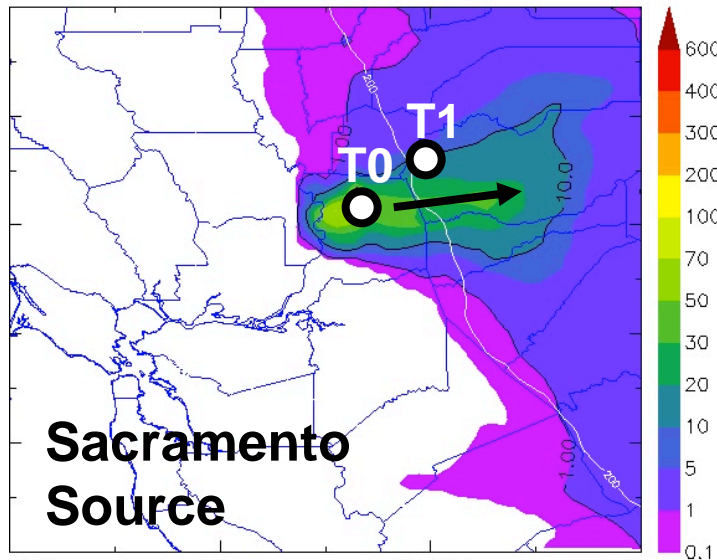


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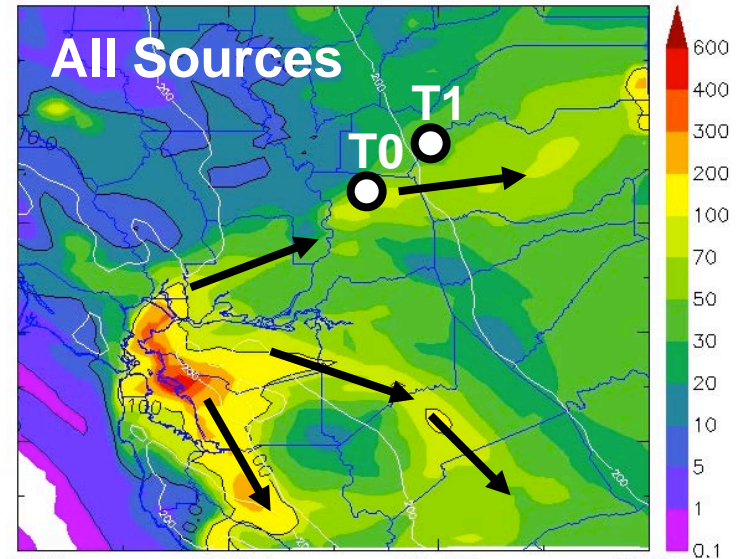
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# Plume transport on June 28<sup>th</sup>: WRF forecasts

- ▶ Sacramento plume transported to T1 in early afternoon.

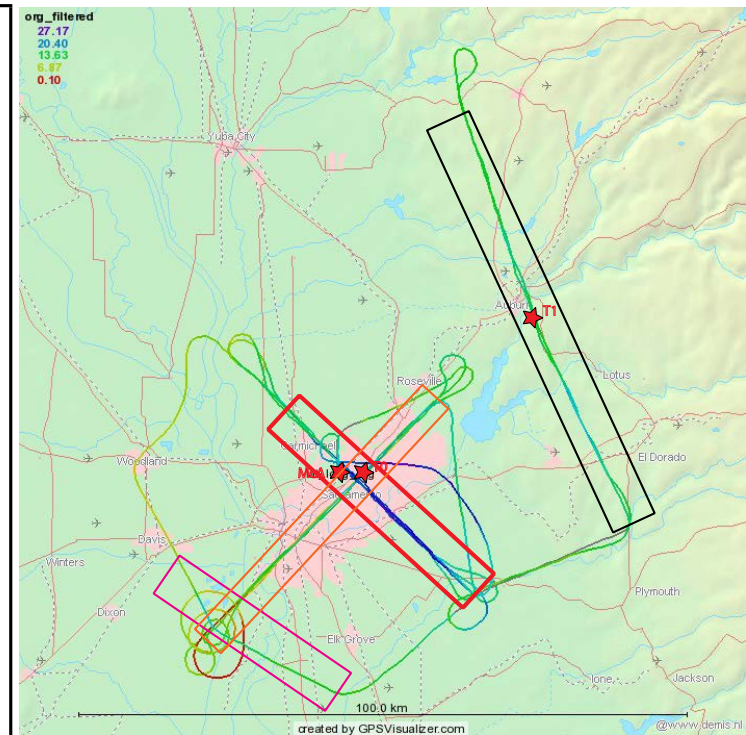
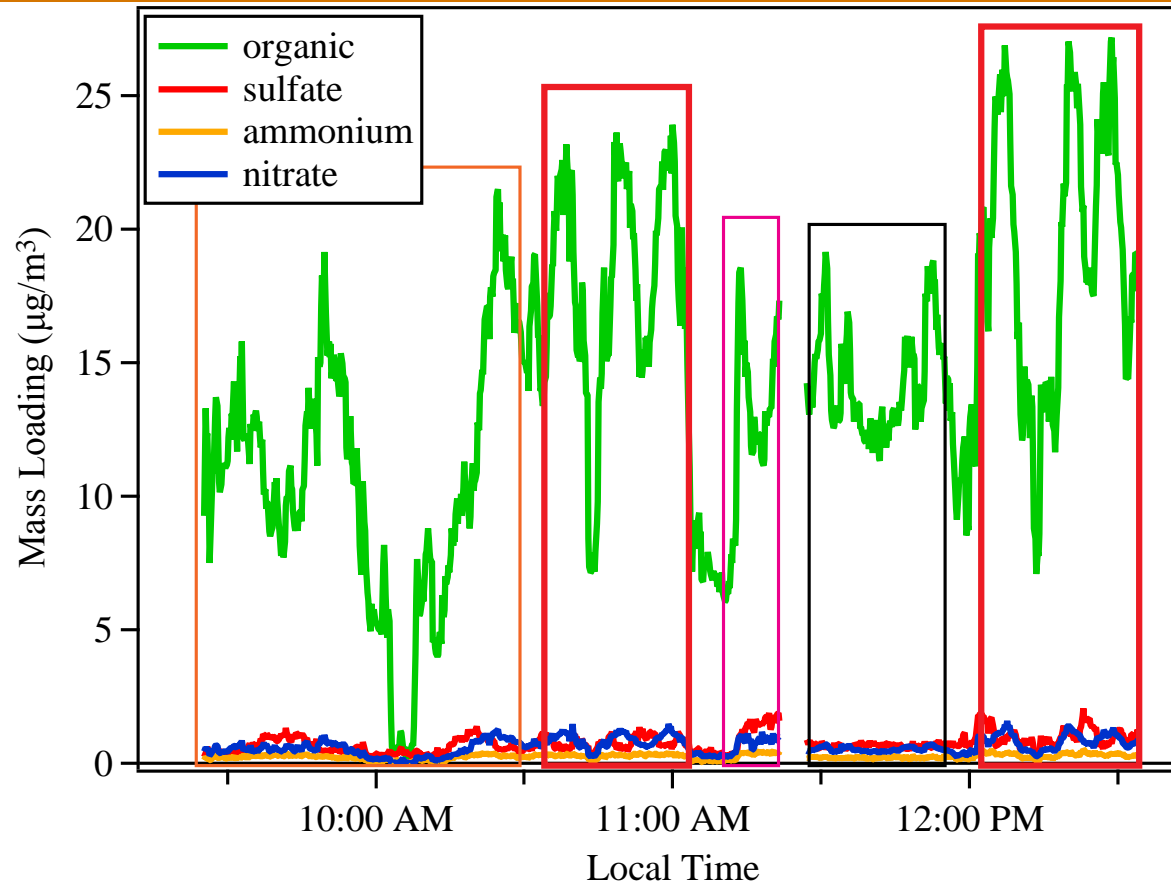


- ▶ Bay area plume predominantly transported to the south.



For more information see: “Transport and mixing processes affecting the evolution of aerosols in the Sacramento Valley during CARES”, J.D. Fast et al., Tuesday afternoon poster session.

# June 28<sup>th</sup> Morning Flight: AMS data shows an intense plume to SE.



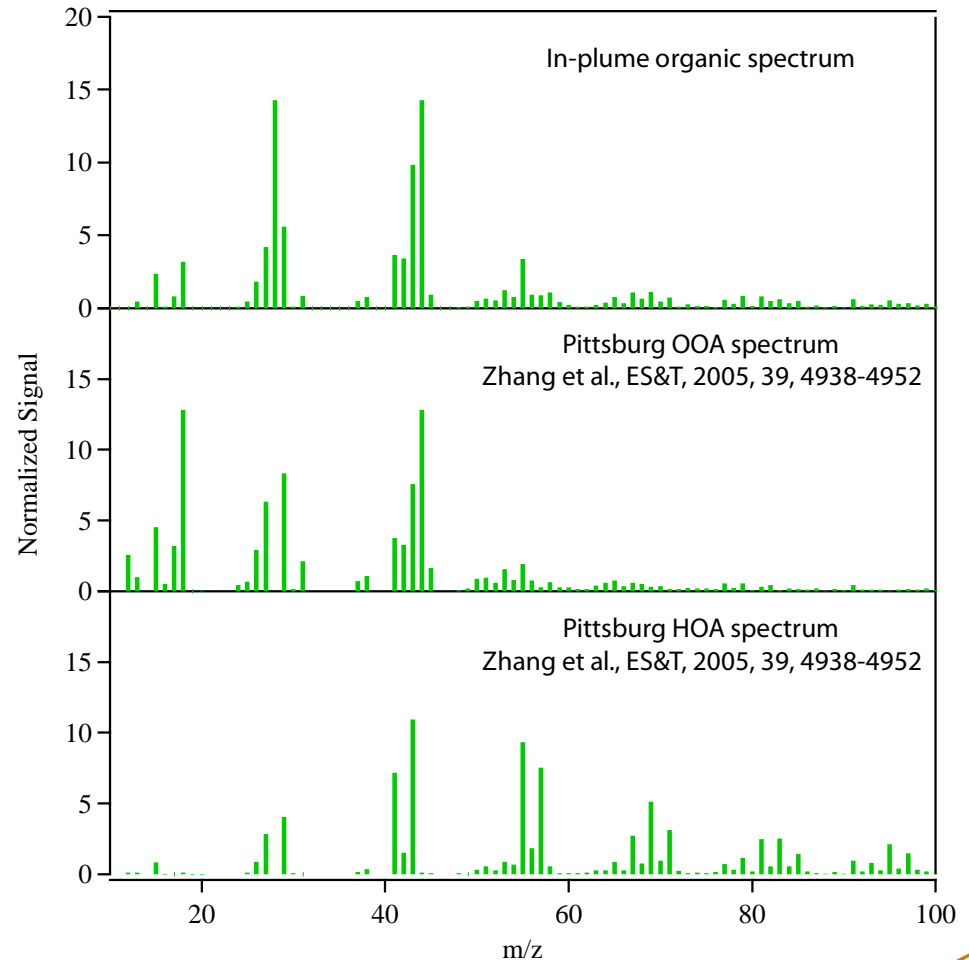
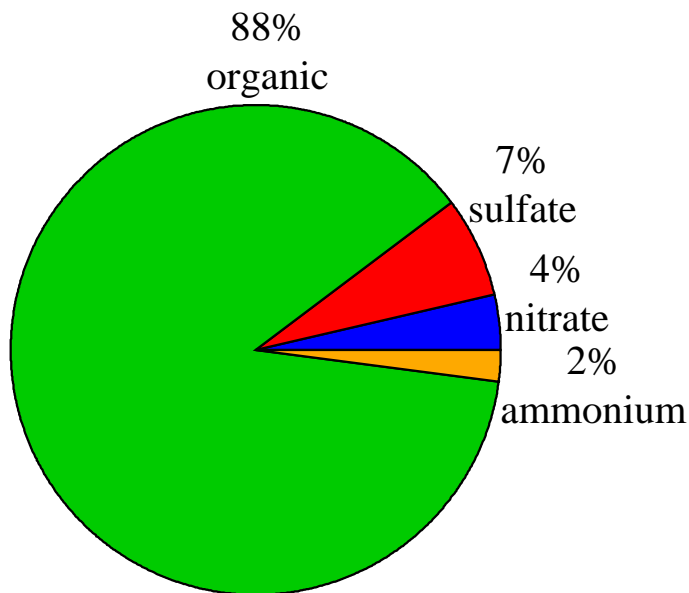
- ▶ Intense plume dominated by organics is observed SE of city in morning.
- ▶ Evidence of fast growth  $\sim 5 \mu\text{g}/\text{m}^3$  mass added in 1.5 hr.



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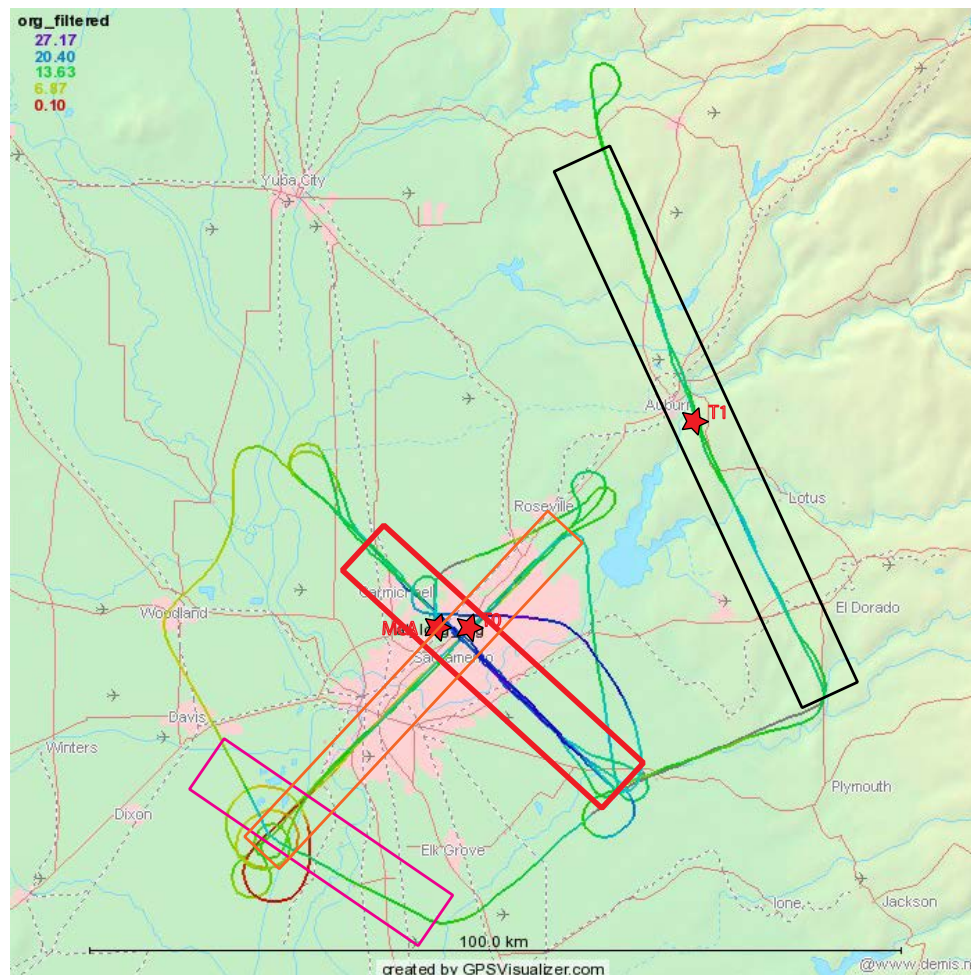
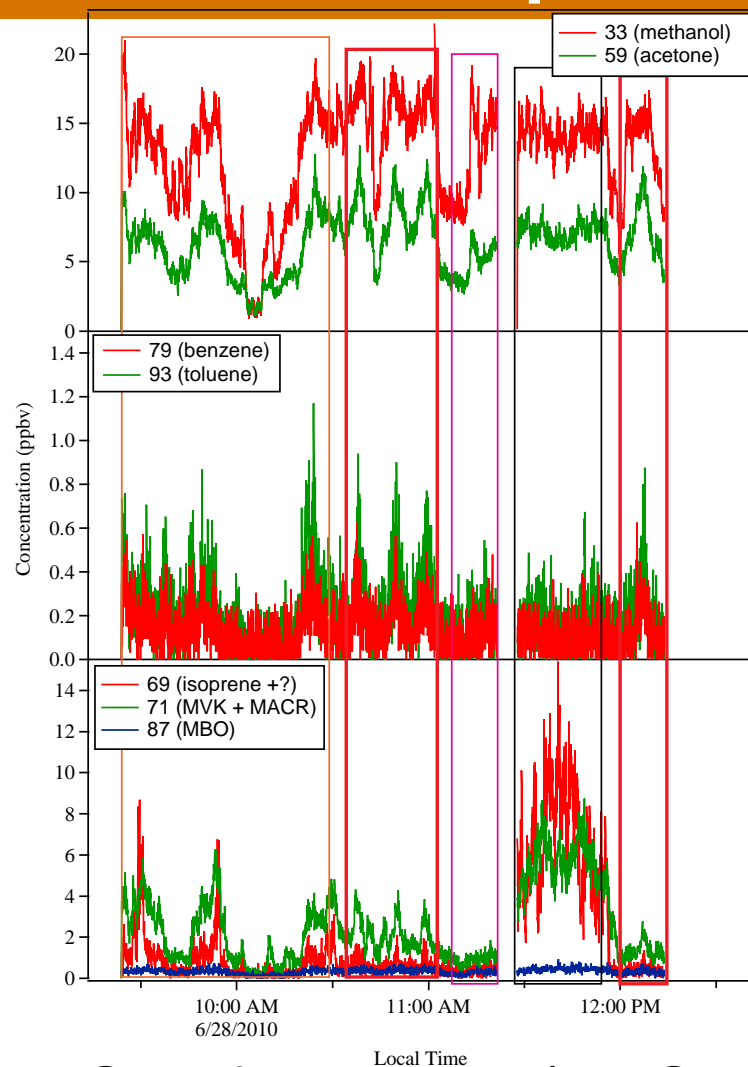
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# Chemical composition of the plume



- ▶ Comparison to literature spectra suggest organics are dominated by OOA (SOA).

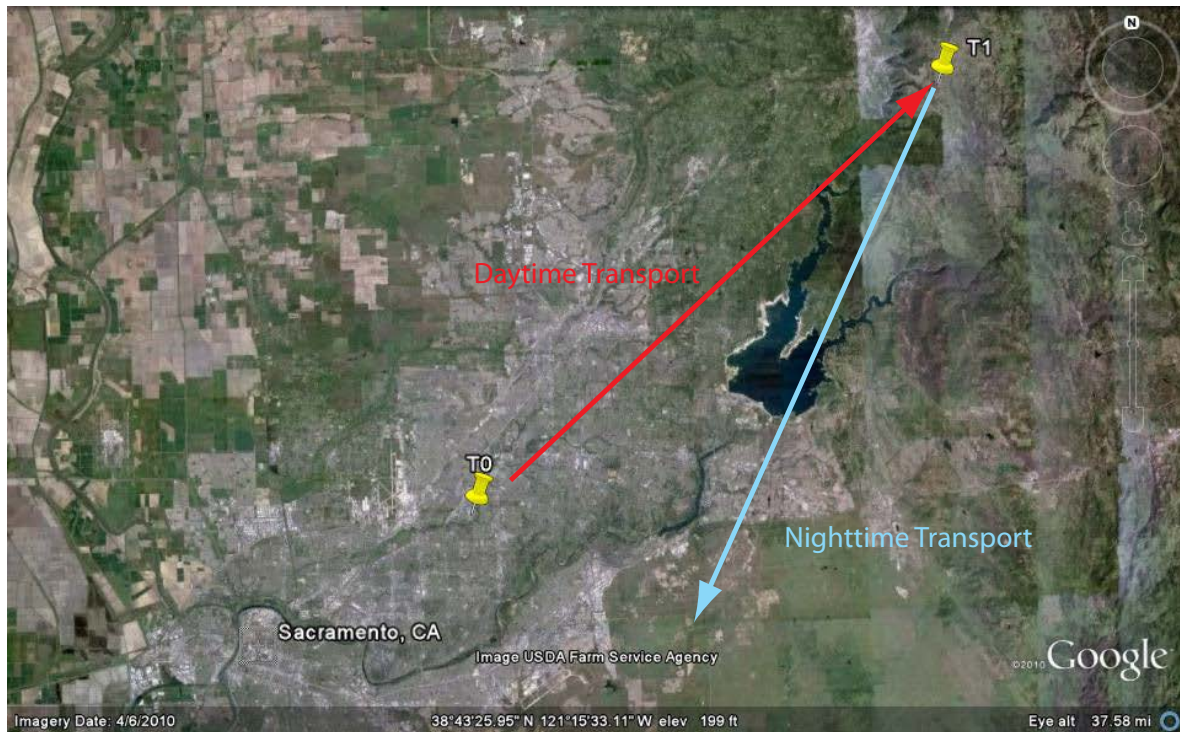
# PTR-MS data provides clues to plume origin



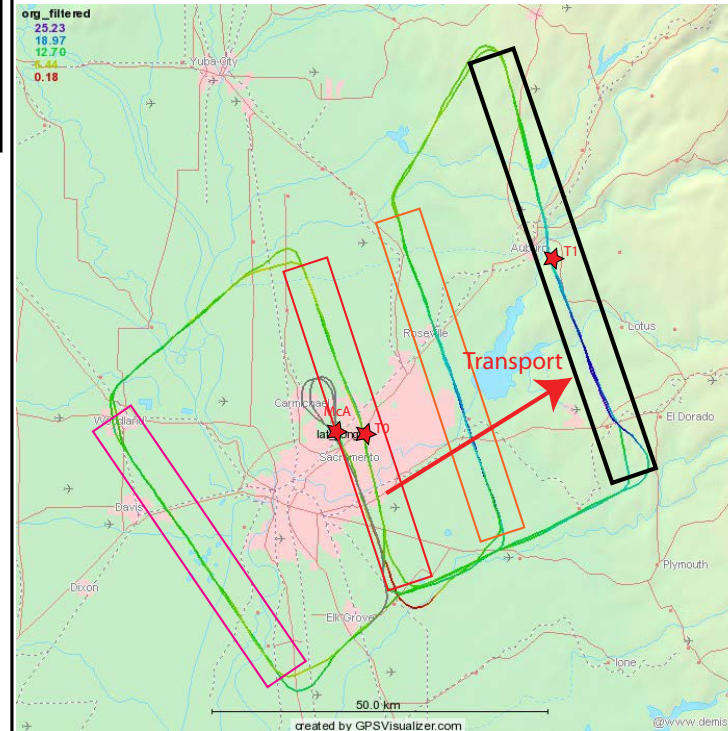
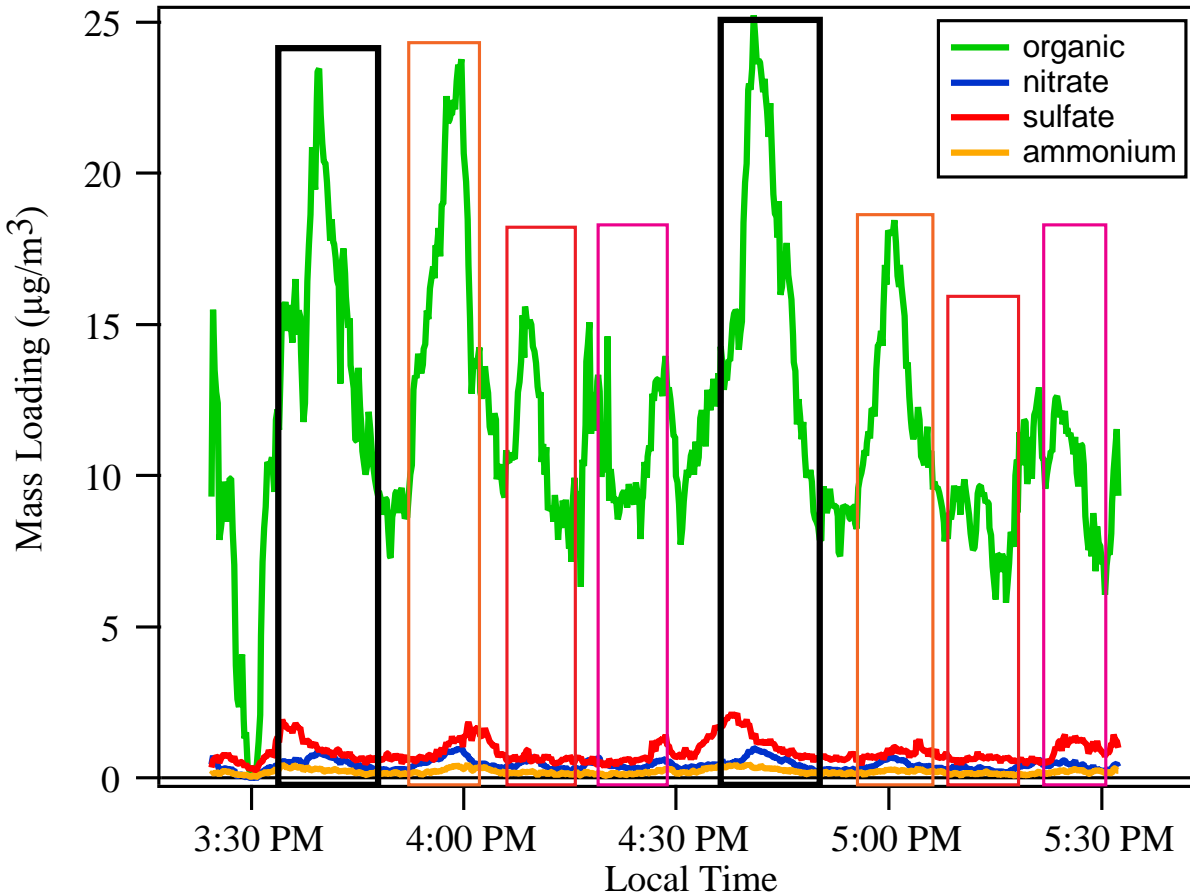
- ▶ Significant MVK/MACR and isoprene in plume
- ▶ Benzene/Toluene clock suggests plume age is 9 hours.

# Hypothesis on plume origin and formation

- ▶ Plume from previous day is transported to the foothills during the day.
- ▶ At night, downslope flow re-circulates isoprene-rich air back to city.
- ▶ Tracer modeling confirms NE downslope flow overnight on 6/27 – 6/28.
- ▶ Mixing of biogenic and anthropogenic emissions promotes rapid (enhanced?) aerosol formation.

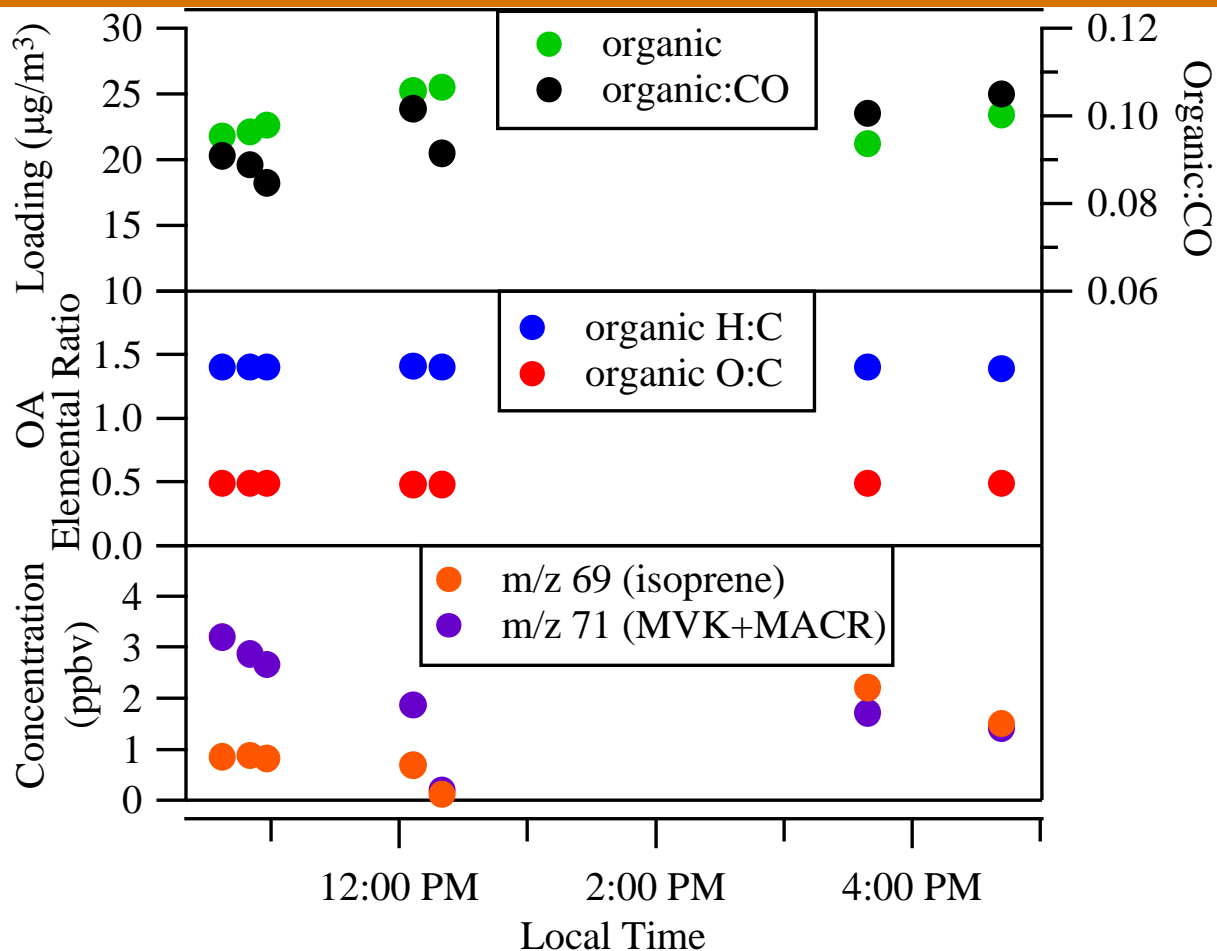


# June 28<sup>th</sup> Afternoon Flight: Plume Transport



- ▶ Plume transported to the NE toward T1 in agreement with WRF predictions.
- ▶ Plume evolution can be investigated.

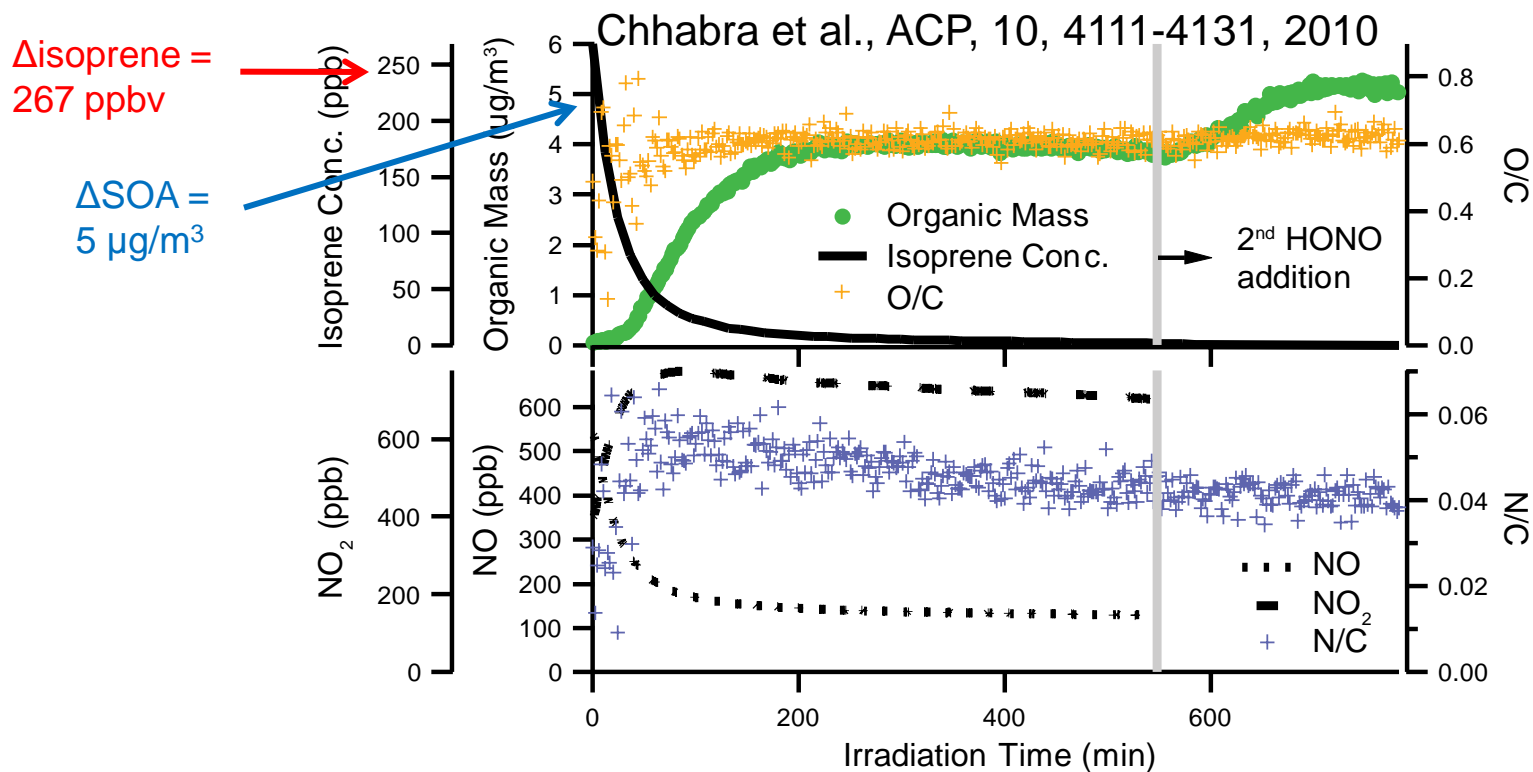
# Plume Evolution and Ageing



- ▶ Loss of isoprene, MVK, and MACR correlates with OA production in morning.
- ▶ Organic O:C and H:C ratios are identical for the morning and afternoon OA.



# Isoprene Chamber Data



- ▶ Our observations of the plume temporal evolution are consistent with chamber observations of SOA formation from isoprene.
- ▶ O:C and H:C ratios and evolution are consistent.
- ▶ Yields are not consistent.

# Acknowledgements

- ▶ Funding: The US DOE's ARM Climate Research Facility and Atmospheric System Research Program.
- ▶ G1 pilots: B. Hannigan, B. Svancara, M Hubbell, D. Hone.
- ▶ G1 mechanics: G. Dukes, B. Svancara.
- ▶ ACRF operations team: B. Schmid, J. Hubbe, C. Kluzek, J. Comstock, J. Tomlinson.



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# June 28<sup>th</sup> Afternoon Flight: PTR-MS

