



TRACER-AQ | HGB Technical Information Meeting

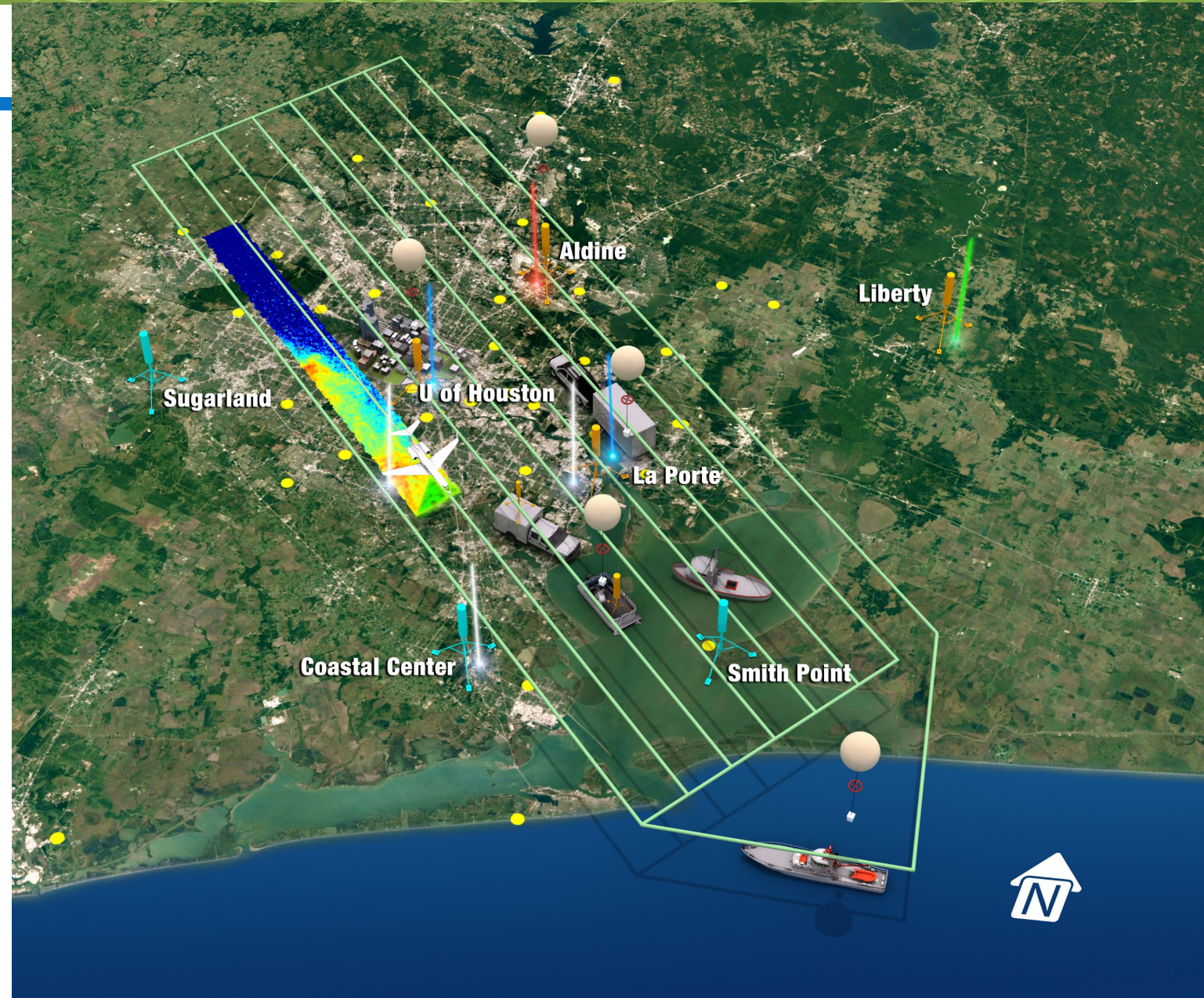
July 28, 2022

Madison Knapp & Doug Boyer

What is TRACER-

Tracking Aerosol Convection Experiment- Air Quality

- Collaboration between TCEQ, NASA, DOE, and Texas universities.
- Many platforms on land, over water and in the air!
- Research activities taking place September 2021 and Summer 2022.



Goals of TRACER-AQ

- Investigate ozone photochemistry and meteorology;
- Evaluate models and satellite data; and
- Understand the intersection of air quality and socioeconomic factors.

More information:

<https://www-air.larc.nasa.gov/missions/tracer-aq/>

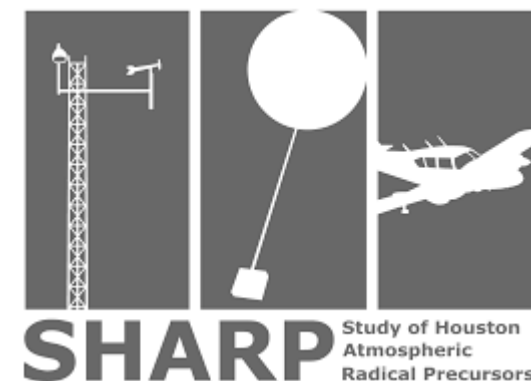
How has ozone formation changed over time?



TexAQSt 2000 2000

TexAQSt II 2005-06

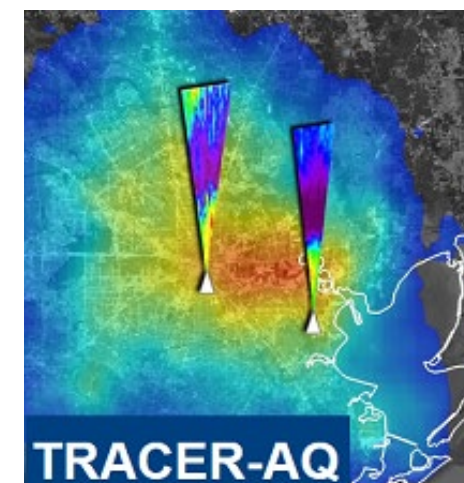
SHARP 2009



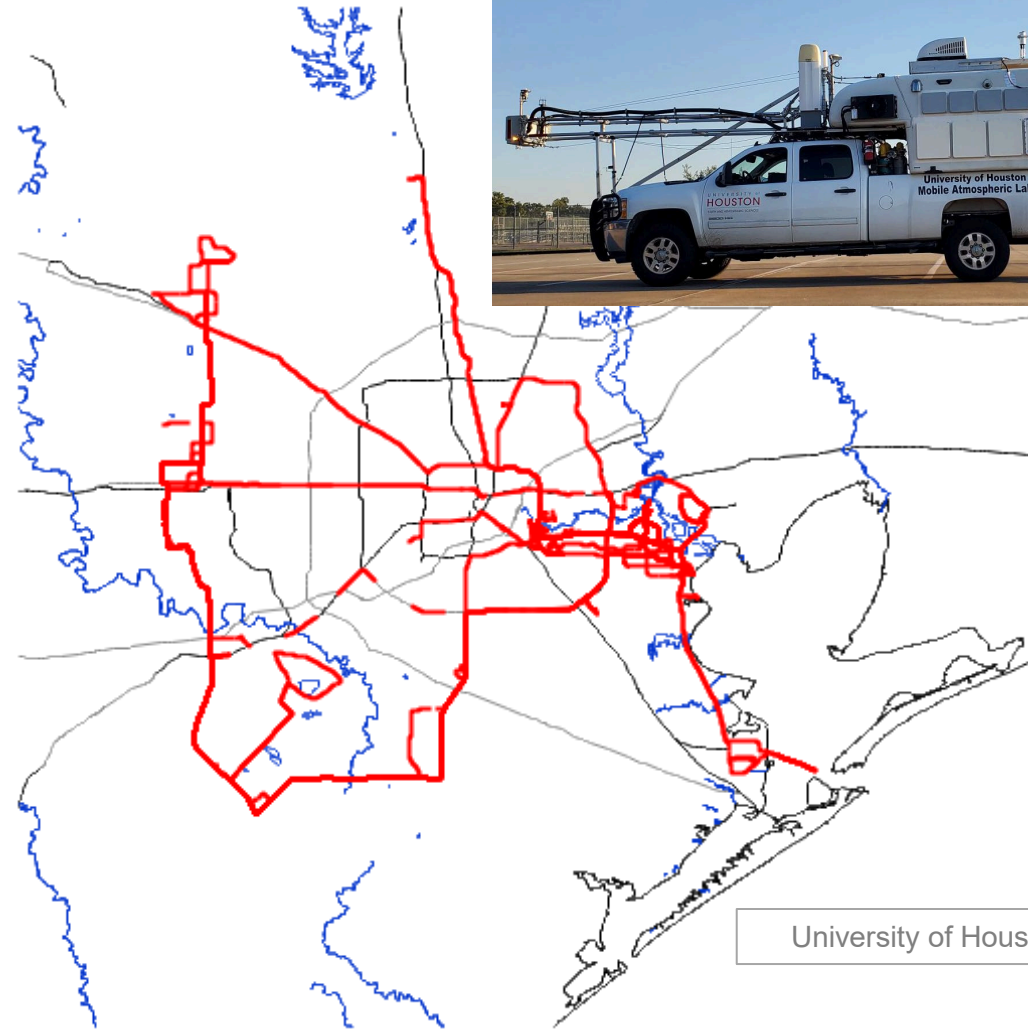
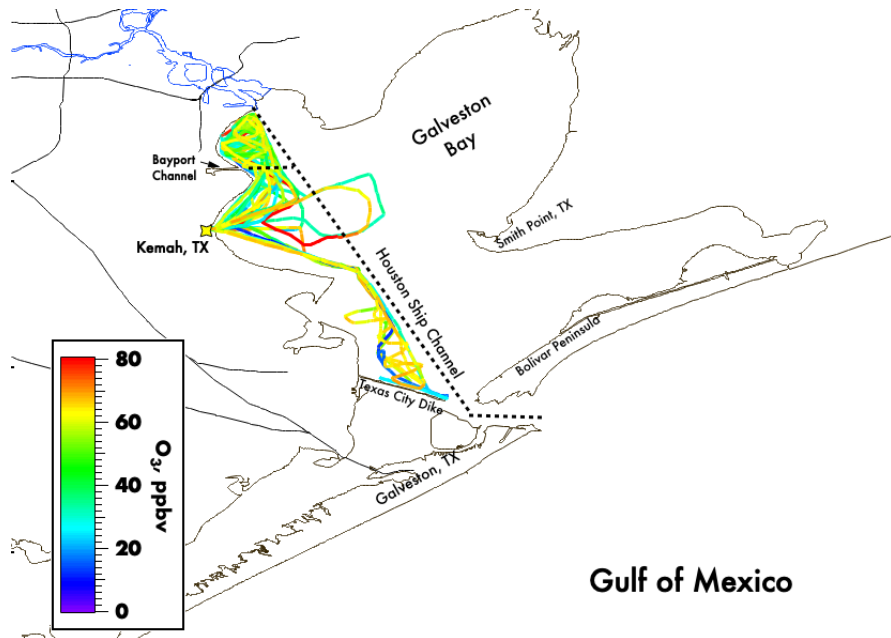
DISCOVER-AQ 2013

TRACER-AQ 1 2021

TRACER-AQ 2 2022



How does ozone formation vary spatially?



University of Houston

How does the coastal environment influence ozone formation?



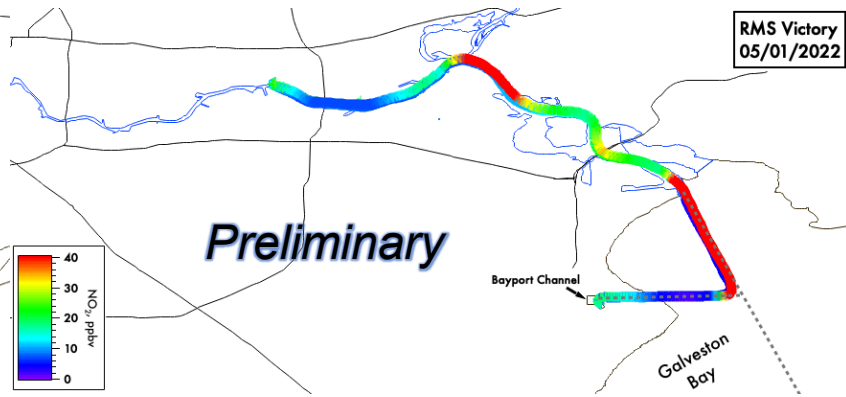
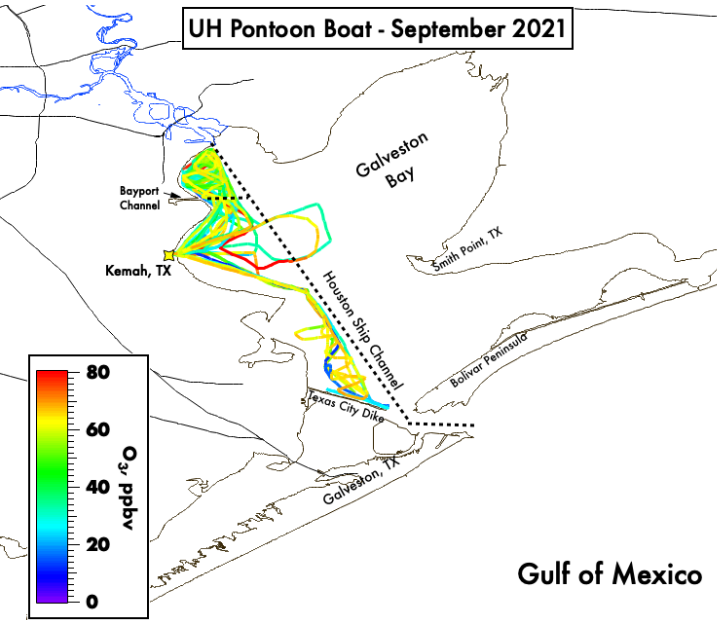
UH Pontoon Boat - September 2021



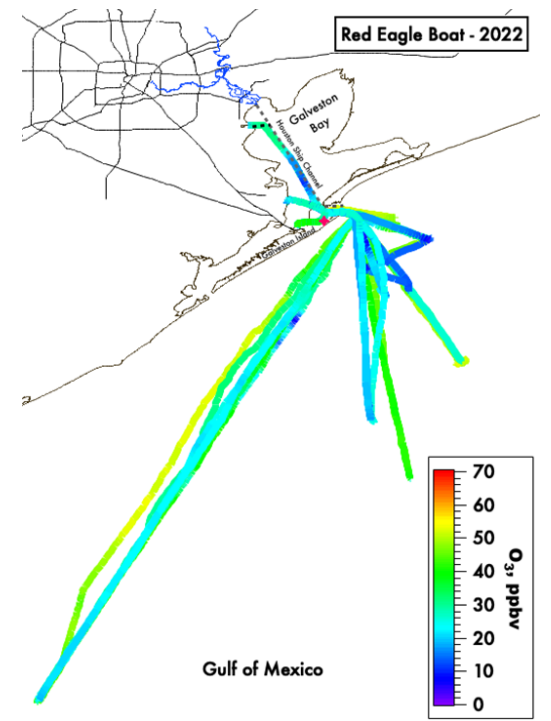
RMS Victory
05/01/2022



Red Eagle Boat - 2022



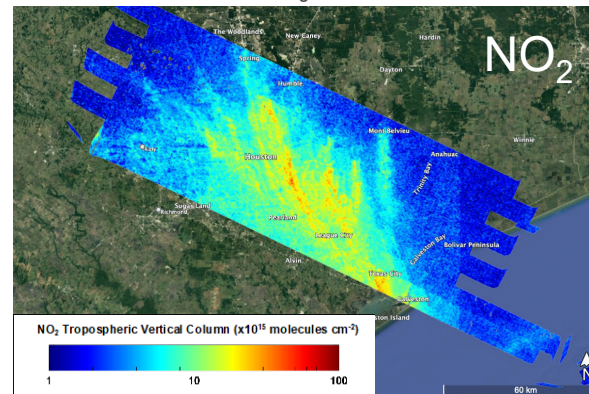
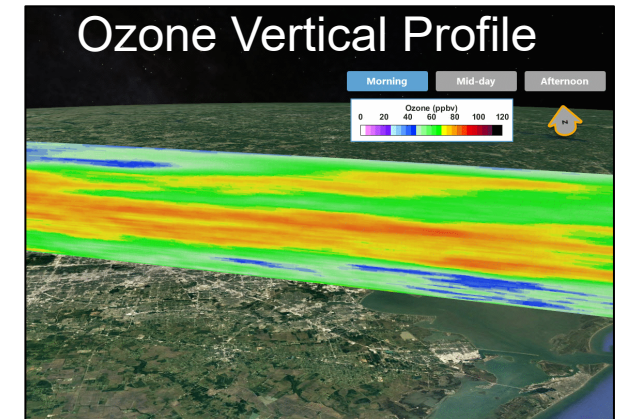
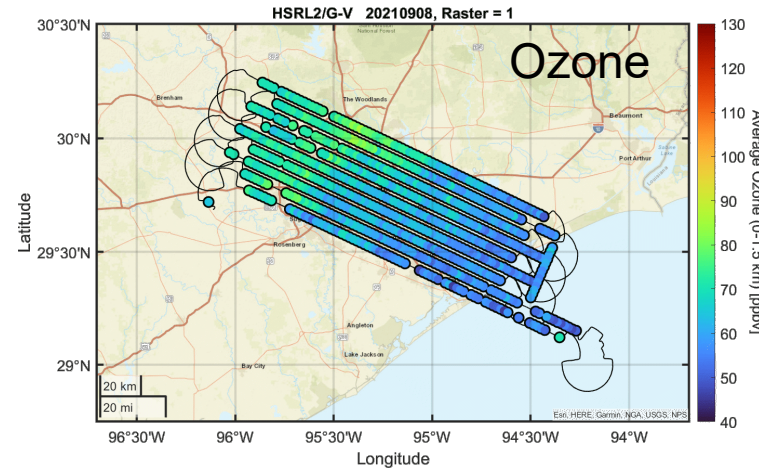
University of Houston



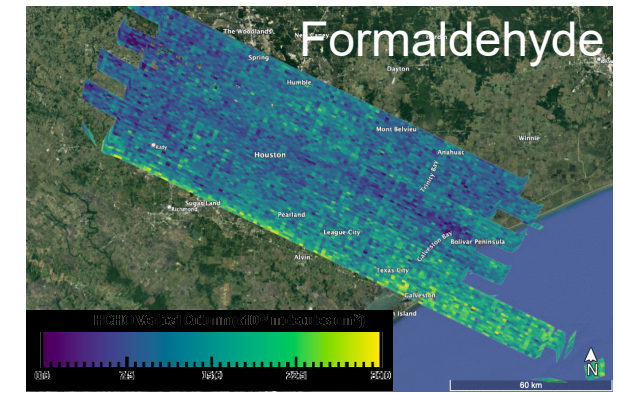
How do pollutants vary spatially, vertically, and temporally?

Aircraft remote sensing data example: September 8, 2021

- Courtesy of Dr. Laura Judd, NASA.

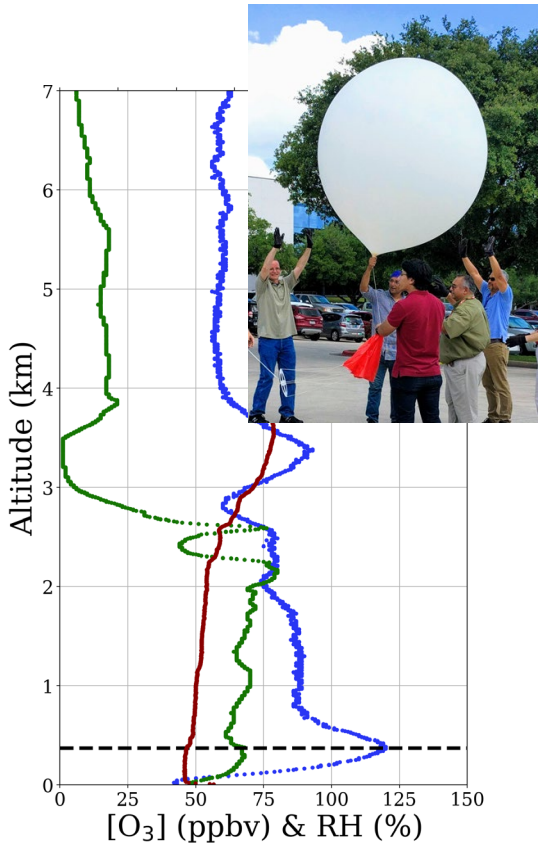


NO₂ = Nitrogen Dioxide



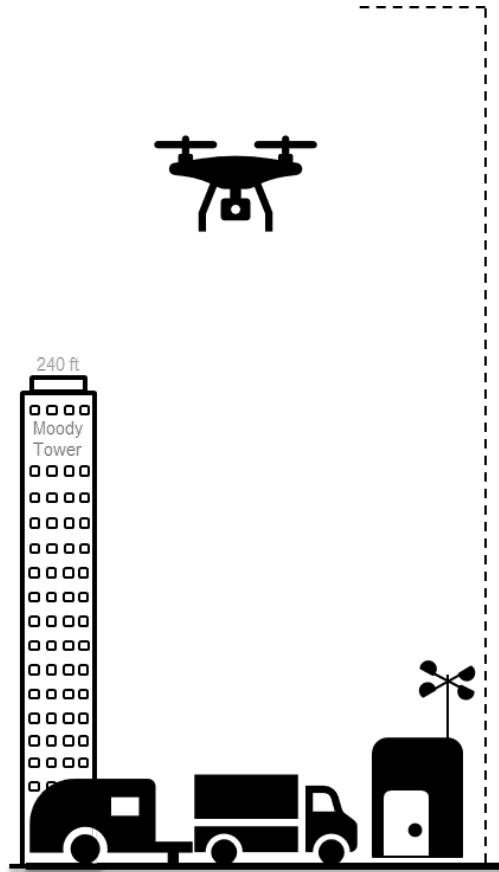
How are pollutants distributed vertically?

Ozonesondes (2021-22)

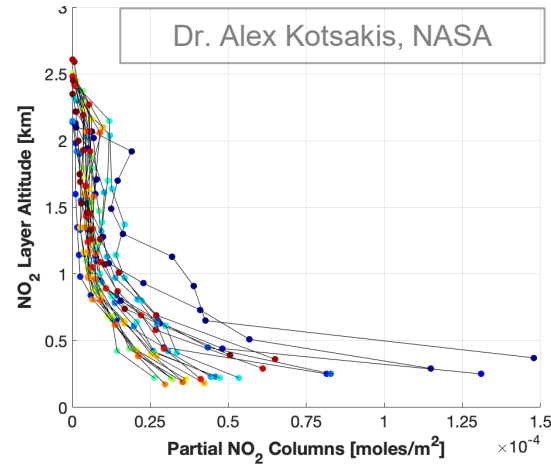


Dr. Paul Walter, St. Edward's

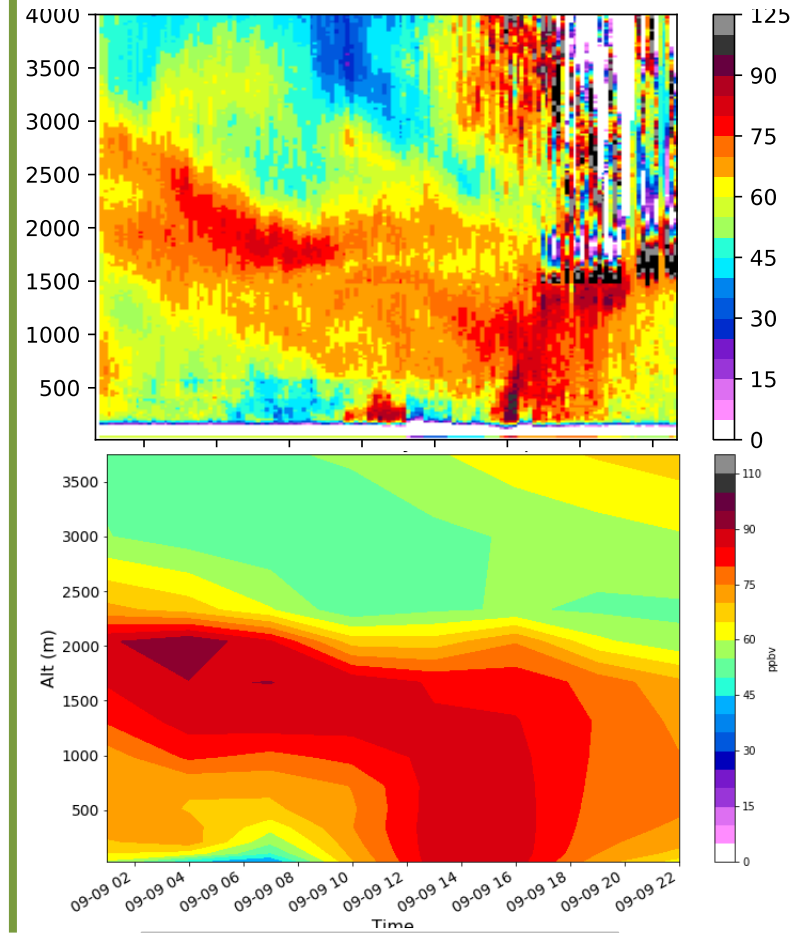
Drone (2022)



Pandora (2021-22)



Lidar (2021)

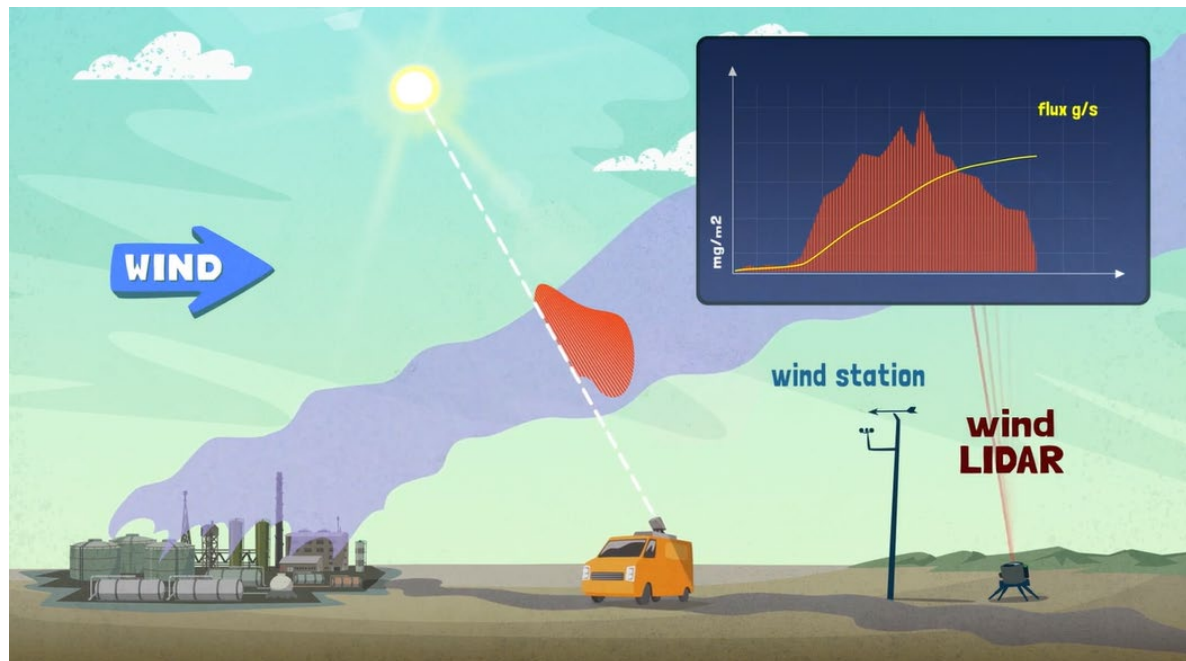
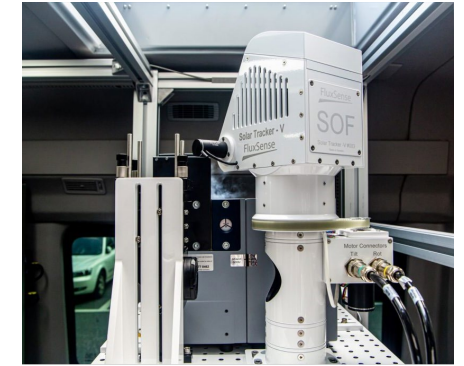


Dr. John Sullivan, NASA

Is our emissions inventory accurate?

New in 2022: FluxSense Mobile Lab

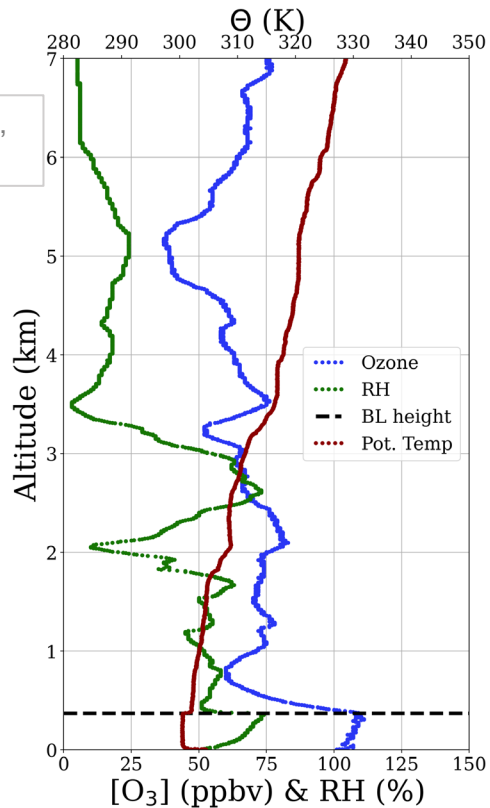
- Estimate VOC, SO₂, NO₂, HCHO emission rates.
- Compare to emissions estimates and modeling inputs.



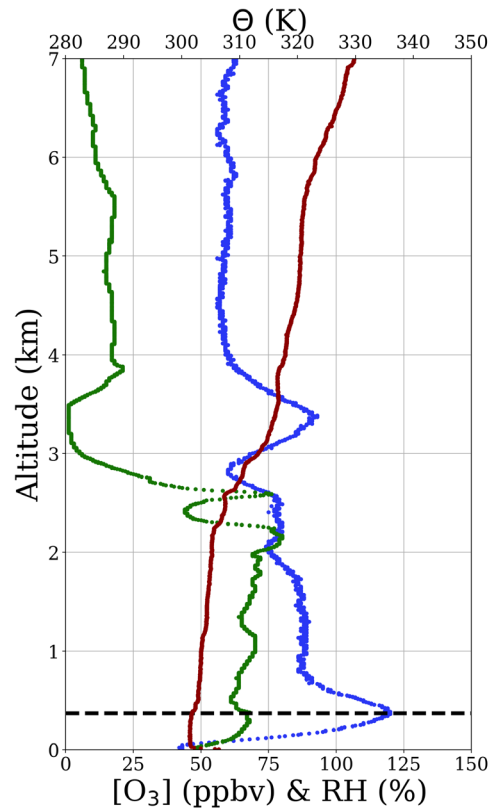
Case Study: September 9, 2021 Ozonesondes

- 9 ozonesonde launches:
 - 3 Gulf, 2 Galveston Bay, 2 UH, 2 La Porte.
- Boundary layer height was 370 m in the Gulf.

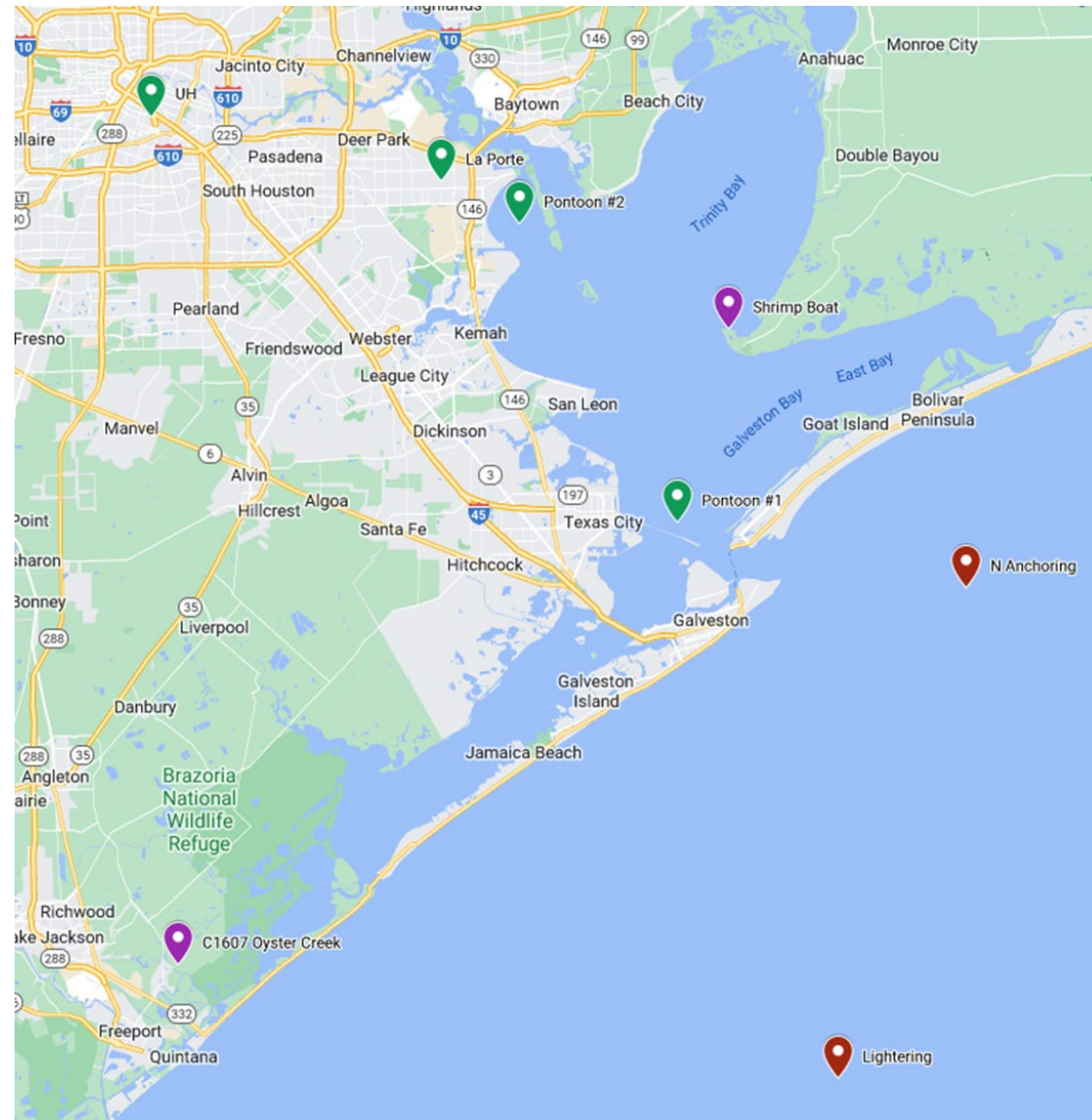
Gulf (Lightner 16:45 UTC)



Gulf (N Anchorage 19:27 UTC)



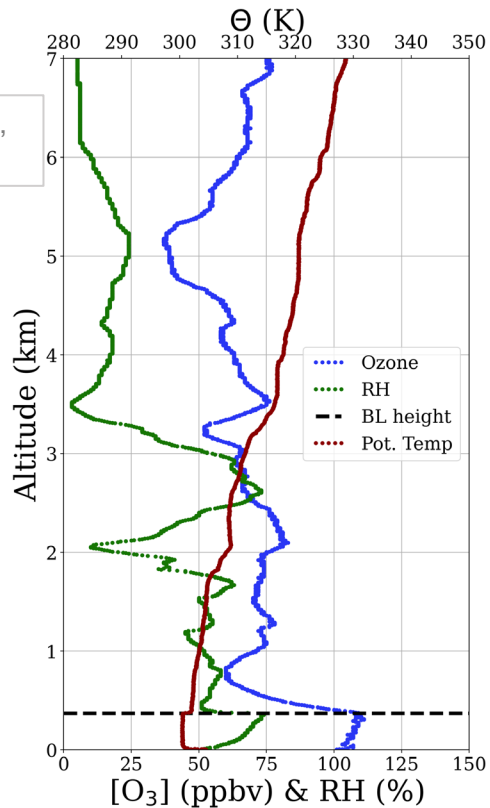
Dr. Paul Walter,
St. Edward's



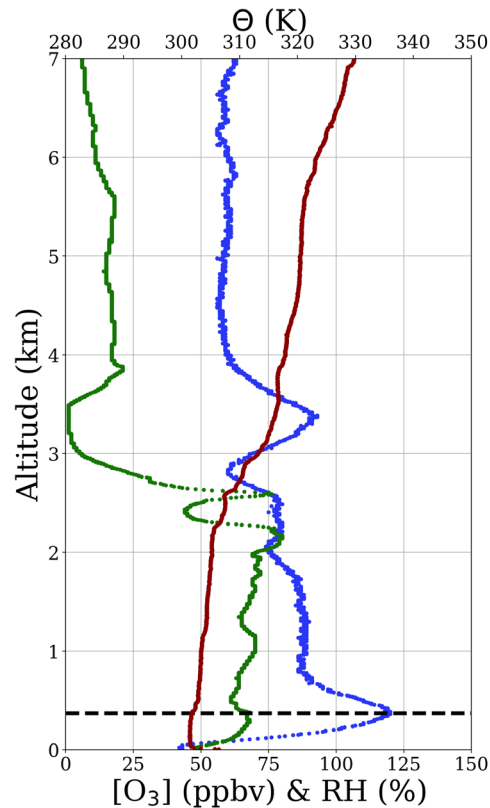
Case Study: September 9, 2021 Offshore Ozone

- 9 ozonesonde launches:
 - 3 Gulf, 2 Galveston Bay, 2 UH, 2 La Porte.
- Boundary layer height was 370 m in the Gulf.

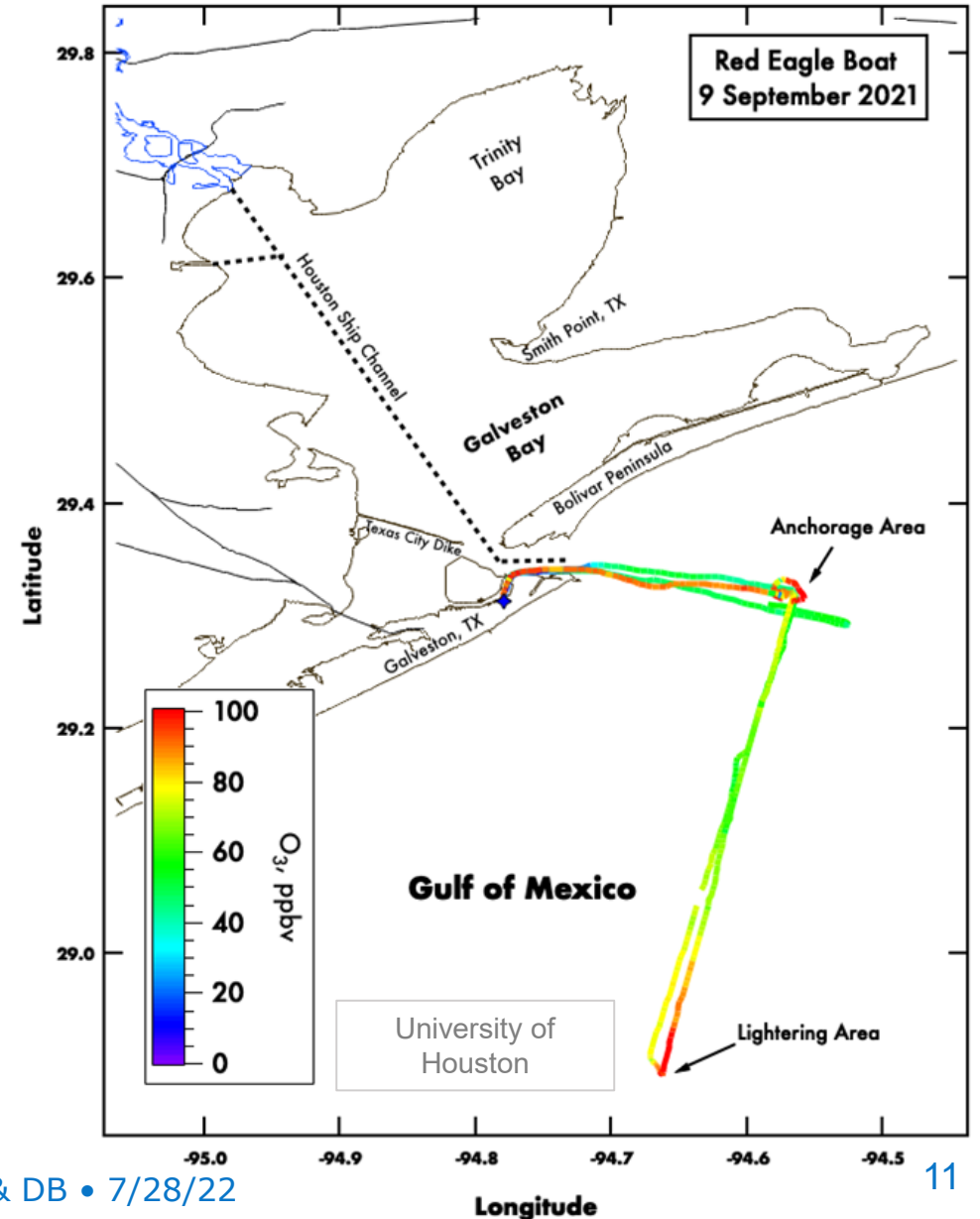
Gulf (Lightnering 16:45 UTC)



Gulf (N Anchorage 19:27 UTC)

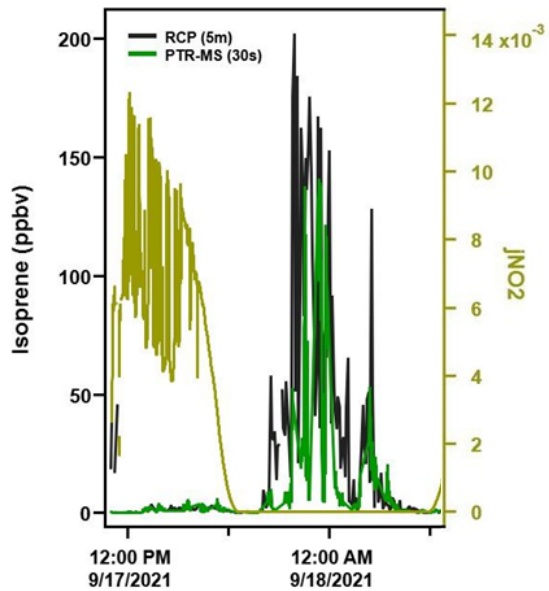


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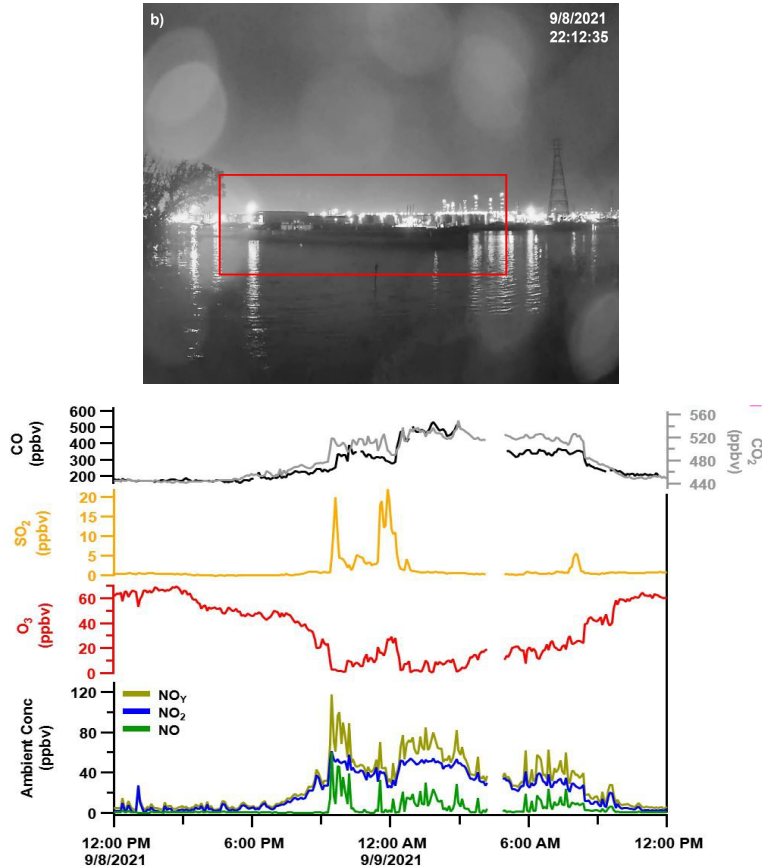


Preliminary Findings

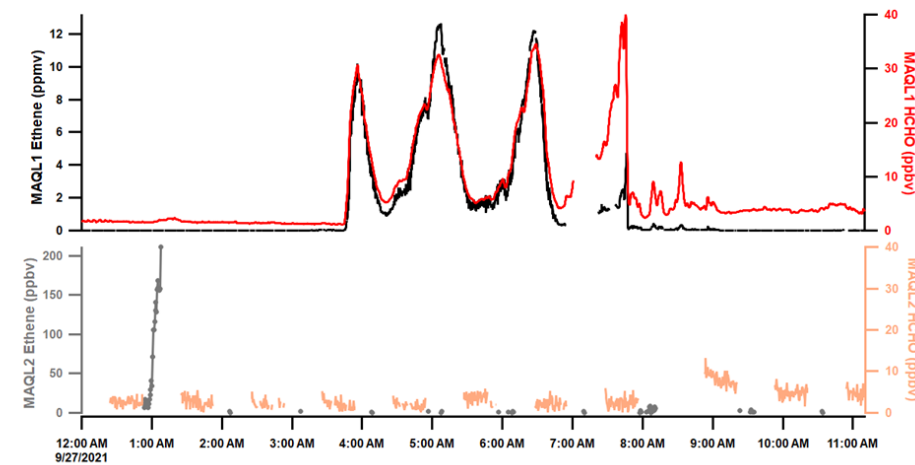
Nighttime Isoprene



Ship Emissions

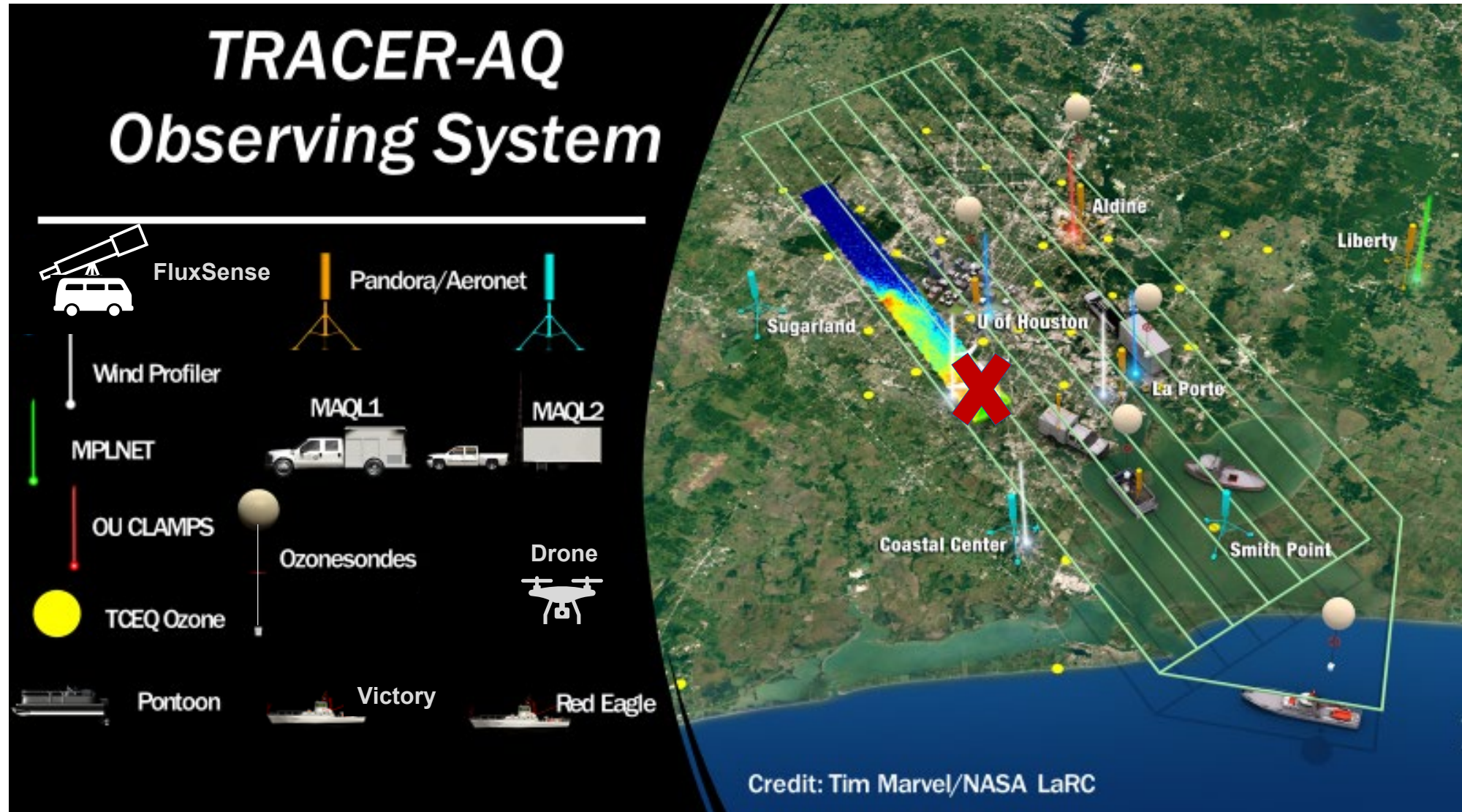


High Ethylene Concentrations



Monitor	Peak ethene, Sept 27 (ppbv)	Peak ethene, 2011-2020 (ppbv)
Deer Park	2500	60
HRM16 in Deer Park	1300	NA
Milby Park	220	26
Cesar Chavez HS	180	56

2022 TRACER-AQ



Resources

- TRACER-AQ 2021 data:
<https://www-air.larc.nasa.gov/missions/tracer-aq/>
- DOE TRACER Campaign:
<https://www.arm.gov/research/campaigns/amf2021tracer>

Thank you for your attention.

Questions?

Contact Information:

Doug Boyer: Doug.Boyer@tceq.texas.gov

Madison Knapp: Madison.Knapp@tceq.texas.gov