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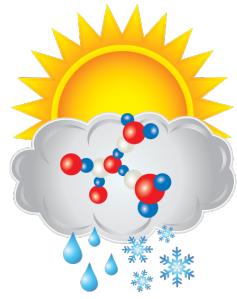
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Introduction to TRACER-MAP and the Mobile Air Quality Laboratory (MAQL2), with a case study from the Texas coast 2021

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 U.S. DEPARTMENT OF
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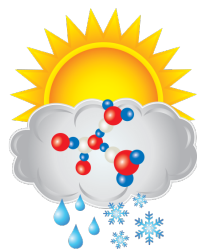
Baylor University

 TEXAS COMMISSION
ON ENVIRONMENTAL QUALITY

TRACER-MAP (Mapping Aerosol Processes) seeks to strengthen TRACER and expand scientific questions regarding the interactions between aerosol pollution and urban convective storms. The MAQL2 will conduct particle size, distribution and detailed composition, cloud condensation nuclei (CCN) concentration and activity, aerosol optical properties, gases (volatile organic compounds (VOC) and trace gases) and meteorology (including boundary layer height) measurements at satellite sites across Houston. These detailed atmospheric measurements will be integrated with atmospheric modeling using WRF-Chem.

TCEQ supported a field campaign through AQRP this Apr-May with an inaugural run of the MAQL2 in Corpus Christi-San Antonio.





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MAQL2 – on the road and at the site

- MAQL2 includes an instrument package for aerosol, gas and meteorological measurements. This package can change by deployment.



- A generator keeps instruments running during transport between sites.
- The sample tower extends 30 ft.
- AC is plumbed directly to each instrument.
- Instruments can be checked remotely when stationary or in transit.
- Aerosol, trace gas and VOC have collocated inlet lines.

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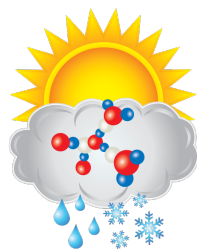
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Aerosol	Gas	Meteorology
Aerodyne high-resolution time-of-flight aerosol mass spectrometer (HR-ToF-AMS),	Thermo 42C Ozone monitor via chemiluminescence (CL) with NO	Ceilometer (Vaisala CL-31)
Brechtel tricolor absorption photometers (365, 520, and 640 nm)	Molybdenum oxide catalytic converter and subsequent CL (Thermo 42i) for total NO _y	Airmar 220WX with RH sensor
TSI 3563 nephelometer (450, 550, and 700 nm)	SO ₂ with pulsed fluorescence (Thermo 43i-TL).	Meterologie Consult, GmbH filter radiometer for j _{NO2}
Scanning Mobility Particle Sizer	Air Quality Designs, Inc., high-sensitivity NO _x instrument, using CL and photolysis	61302V barometric pressure sensor
Cloud Condensation Nuclei Counter (CCNc)	CO instrument (off-axis integrated cavity output spectroscopy)	
Aerodynamic Particle Sizer	VOCs using a proton transfer reaction mass spectrometer (PTR-MS, Ionicon)	
Condensation Particle Counter		



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The MAQL2 observed a biomass burning event on the Texas coast in April 2021



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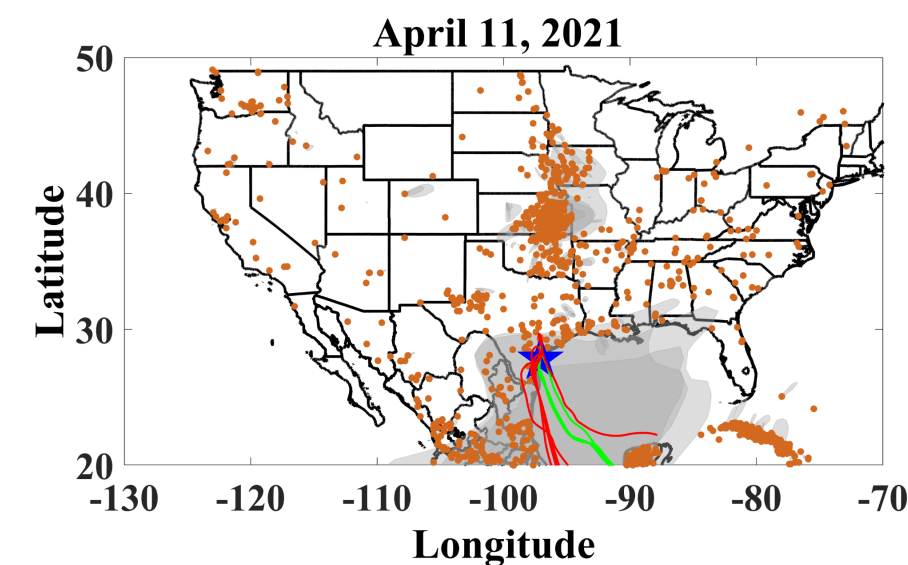
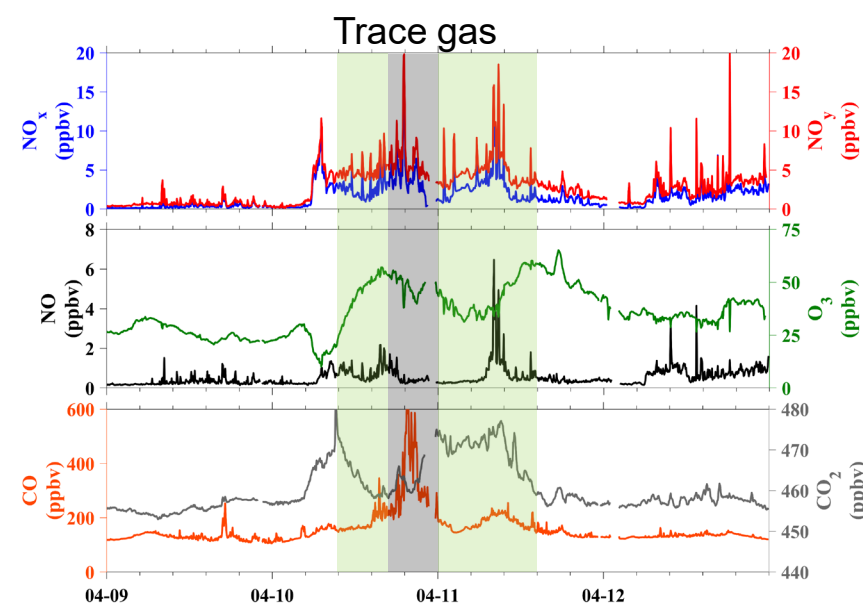
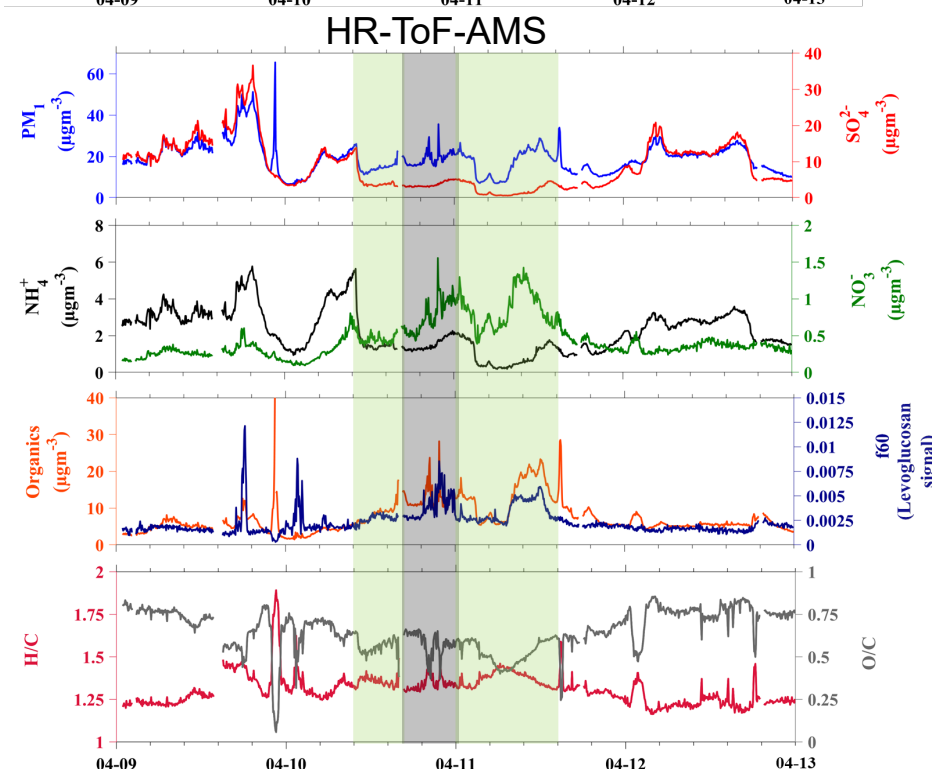
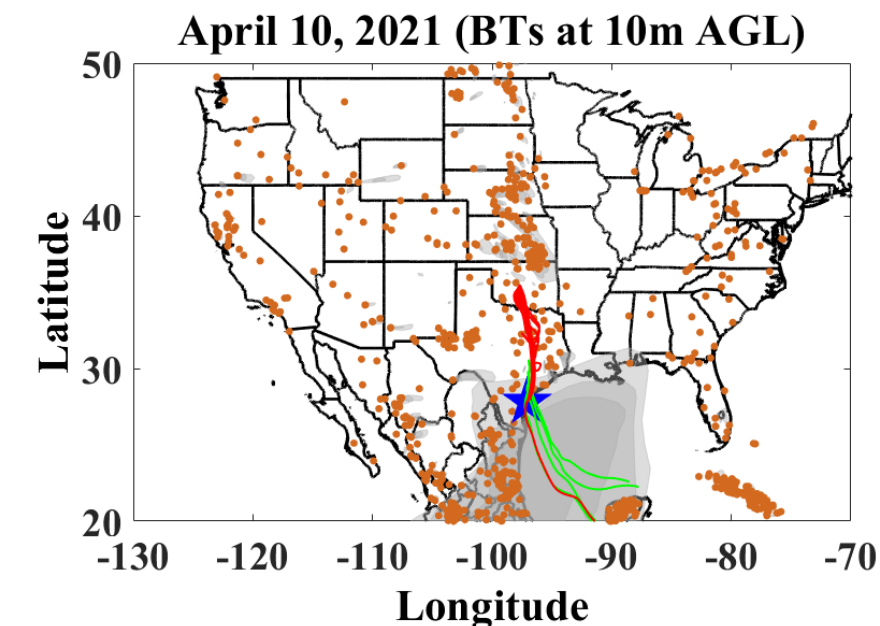
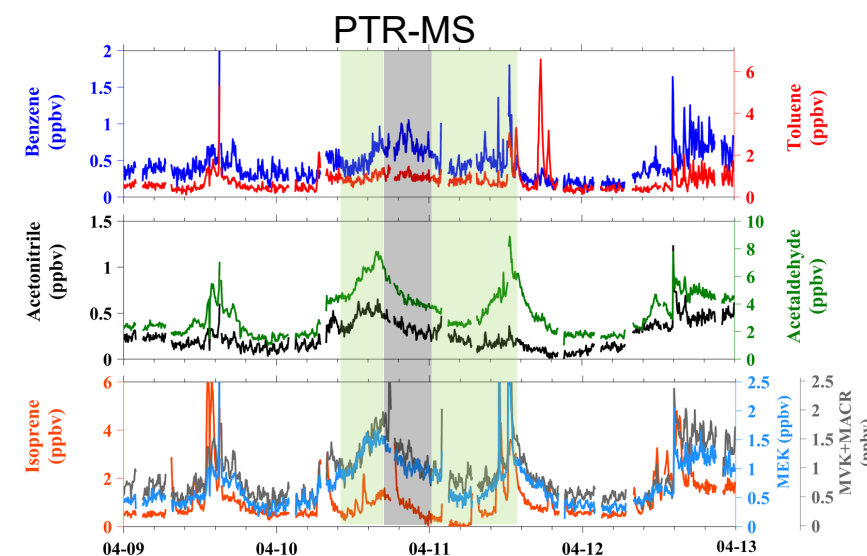
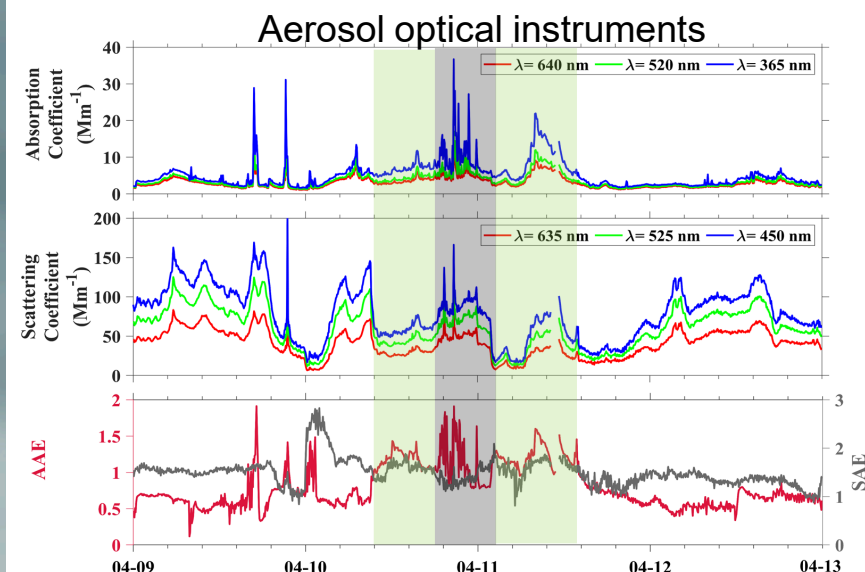
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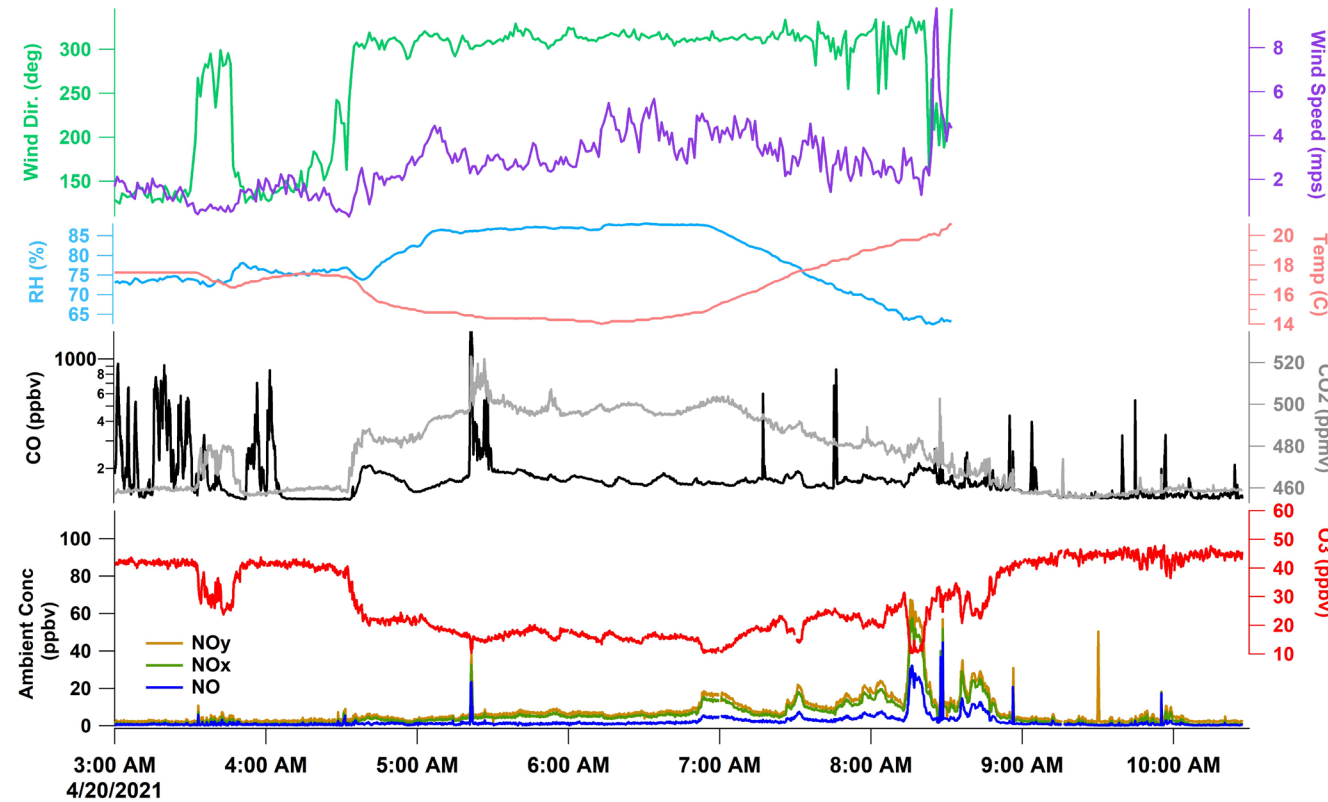
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• Fire Spots — Back Trajectory at 500m AGL — Back Trajectory at 10m AGL ★ Study Site ■ NOAA HMS smoke cover

The MAQL2 observed a land/sea breeze event on the Texas Coast

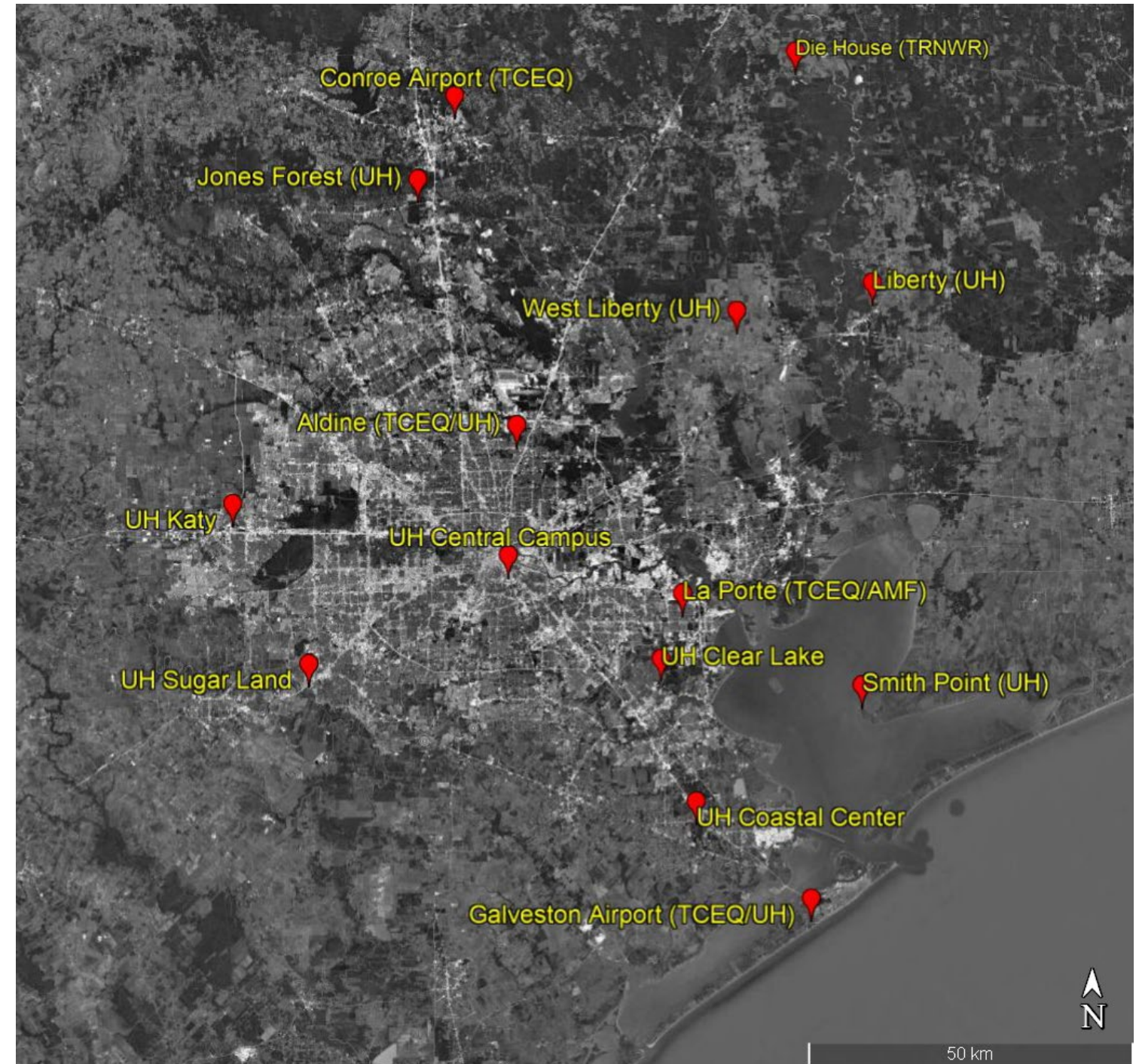


- Brief land breeze around 4 am CST
- Sea breeze returns before the land breeze sets up for several hours
- Land breeze begins to erode after sunrise, ending with the line of clouds visible in the sky cam
- Trace gas and met data clearly show this exchange of land and sea breeze over the morning hours



The MAQL2 will operate during the TRACER IOP in Jul-Aug 2022 in portable mode

- During TRACER-MAP the MAQL2 will make measurements across the Houston metro area.
- UH maintains these sites across the Houston area with support from the TCEQ.
- UH/Baylor will also run two portable/mobile labs in Houston during TRACER-AQ in 2021.
 - MAQL1 mobile
 - MAQL2 portable



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