

Advances in Characterizing Pollution Transport with Ground-Based and Airborne Profilers: Case Studies within Houston, TX

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There have been recent advances in field observations relating to quantifying pollution transport from many instrument suites operated by NASA and collaborating institutions. In September 2021, NASA coordinated TRACER-AQ (website: <https://www-air.larc.nasa.gov/missions/tracer-aq/>), an air quality study in Houston Texas measuring air quality relevant constituents at high spatial and temporal resolutions, which brought together many of these instrument suites. This paper will explore and highlight the remotely-sensed (both active and passive) profiling capabilities of ground-based platforms such as ozone lidars, ceilometers, aerosol lidars, spectrometers and radars. Airborne profiles will also be emphasized to provide further regional context for select case study dates.

With this combination of profilers, the synergistic deployment approach aimed to address research questions under the umbrella of three focus areas: 1) Ozone Photochemistry and Meteorology; 2) Modeling and Satellite Evaluation; and 3) Intersection of Air Quality and Socioeconomic Factors.

This presentation will provide an overview of TRACER-AQ with a focus on its connections with the importance of profiling pollution in this coastal urban environment through different case studies at both continental and over-water field sites. This effort aims to illustrate the complexity of pollution transport in the complex coastal region, while also offering compelling insight into evaluation and knowledge pathways forward for future geo-stationary capabilities.

Specific NASA observations presented during this seminar include but are not limited to, ozone profiles from a subset of instruments from the Tropospheric Ozone Lidars Network (TOLNET), profiles of NO₂ from the ground-based Pandora spectrometers, ozone and aerosol profiles from the High Spectral Resolution Lidar-2 (HSRL-2/DIAL) and aerosol profiles from MPLNET. Additional context will be provided from TRACER-AQ partners, which includes suites of atmospheric composition and meteorological measurements from ground-sites, mobile laboratories, and boat platforms.