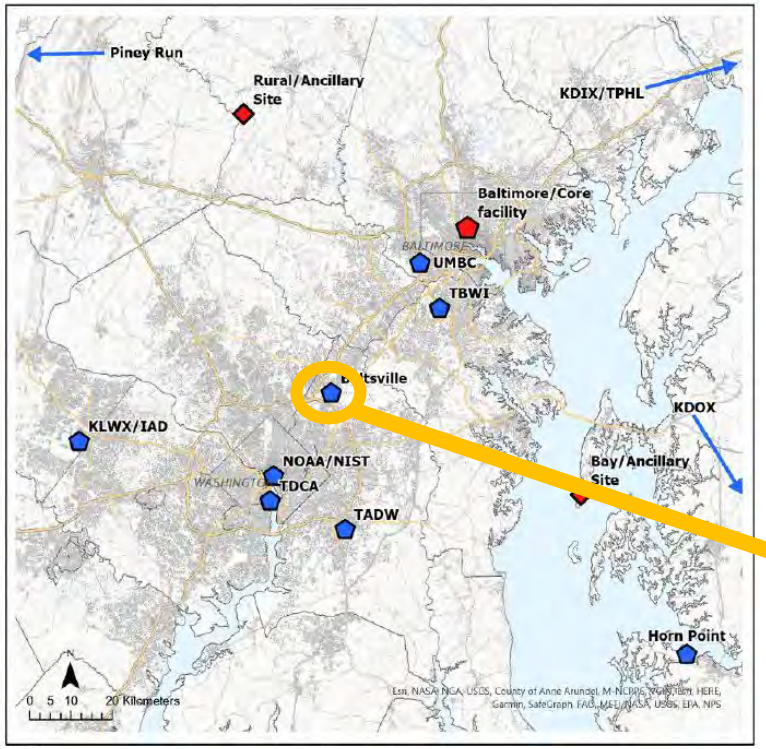
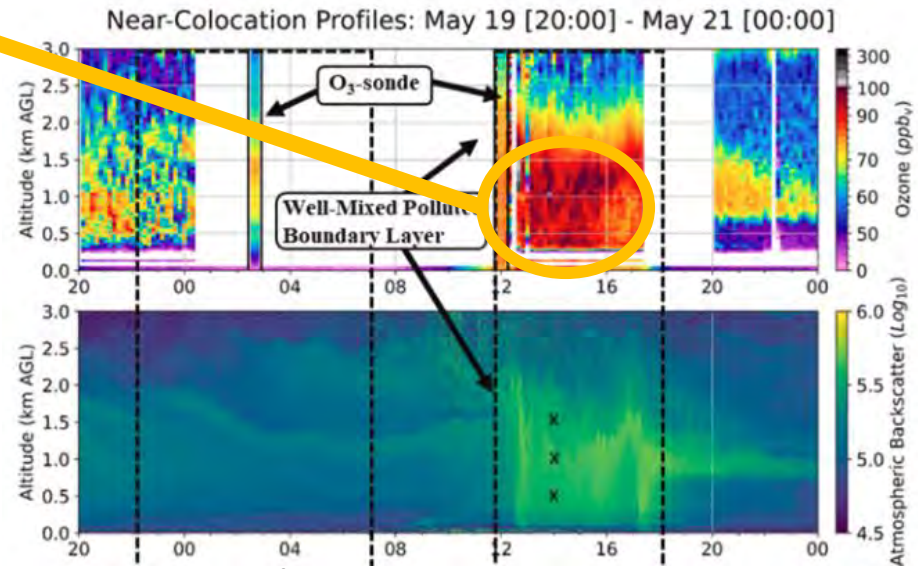
TOLNet Support of AiRMAPS



https://tolnet.larc.nasa.gov/

TOLNet SMOL (right) – Smaller, portable ozone lidar system perfect for profiling at Bay or Clifton Park sites (need permits and funding, up to 3 SMOLs).

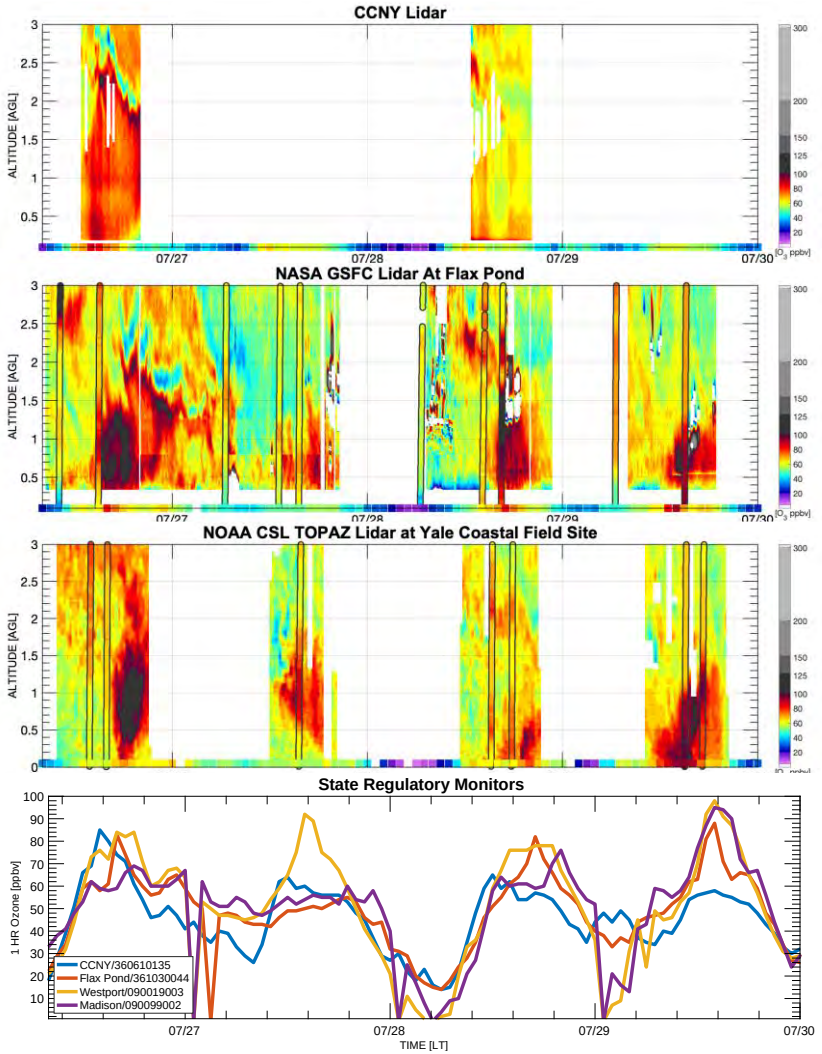
GSFC TROPOZ (below): Atmospheric composition observatories: Ozone lidar, ceilometer, surface o3/no2/met, sondes (with funding). Likely UMBC or Howard-Beltsville given funding constraints.



Roots et al., 2022

TOLNet at AMF1/TRACER

Using TOLNet to Contextualize Ozone Aloft and Surface Exceedances

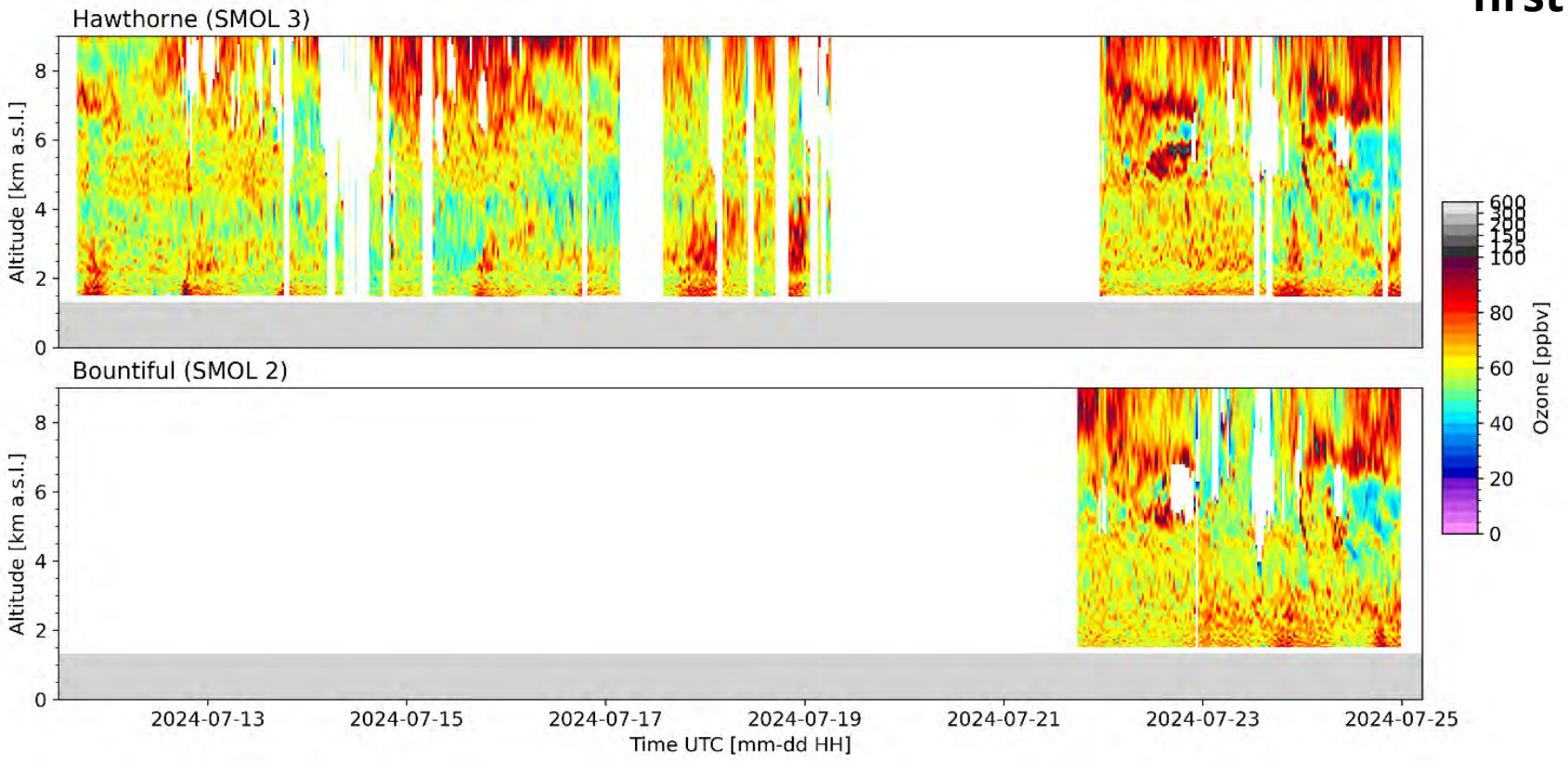


Westport, CT O3 Exceedance all 4 days

- TOLNet ozone curtains + sondes + surface ozone at multiple sites from July 26th to July 30th
- July 26th and July 28th aircraft flights from STAQS/AEROMMA/CUPIDS
- Elevated ozone indicated in all ozone lidars on July 26th and July 28th, with a delay in reaching the coastal sites (Flax Pond, Westport, and Yale Coastal).

TOLNet Support of AirMAPS – 2024
Salt Lake City (USOS) – SMOL Data

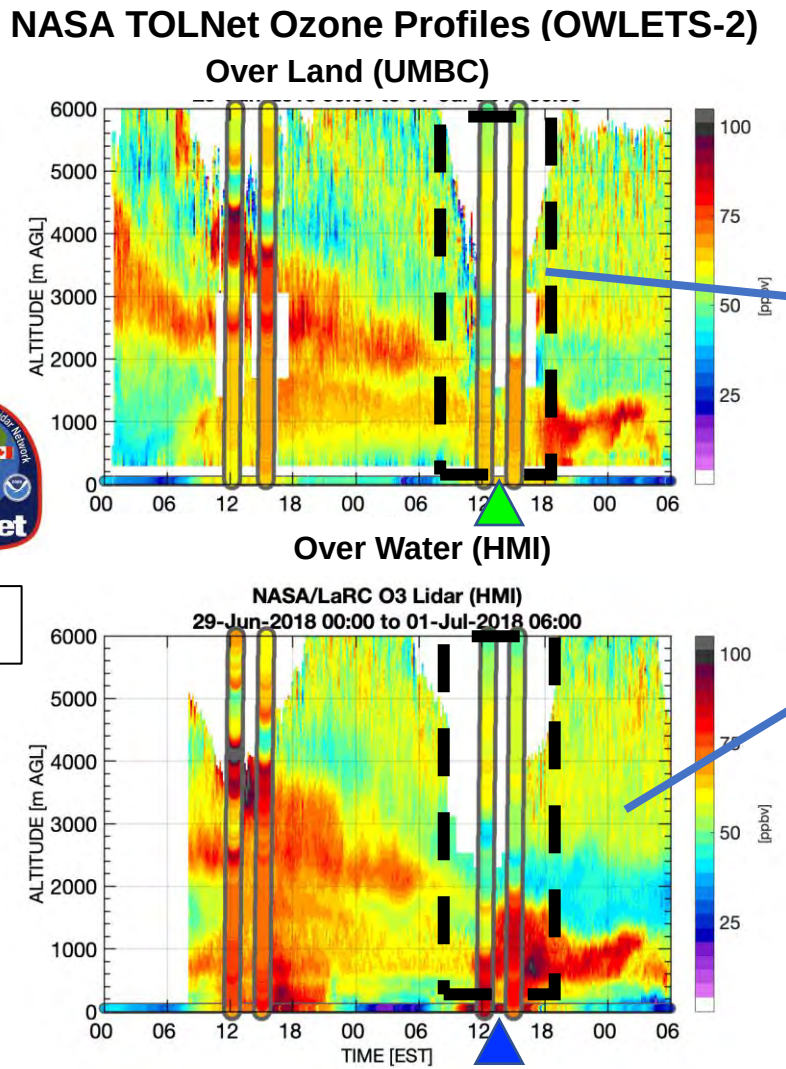
- Nearly continuous ozone lidar data during flight days or high ozone episodes
- SMOL 2 acquired ~ 380 hours, Bountiful, UT
- SMOL 3 acquired ~ 500 hours, Hawthorne, UT
- Trying to bridge the R2O gap with field testing in 110F

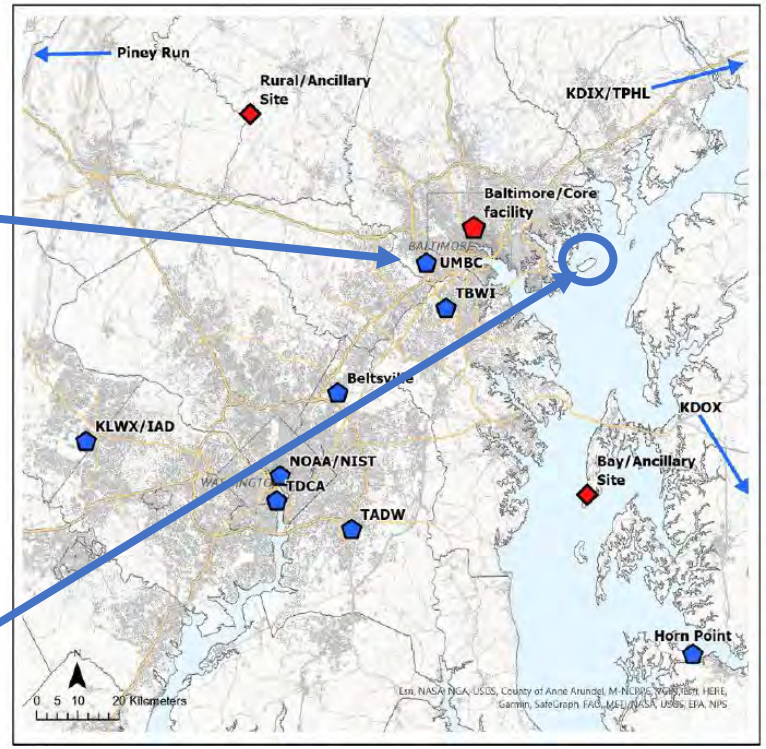


Received: 03 Sep 2024 (hours ago...)

The Small Mobile Ozone Lidar (SMOL): instrument description and first results

Previous 'Bay' Example





- Current spaceborne PBL measurements provide *either* high-resolution vertical sampling with poor horizontal/temporal coverage, or near-once-daily global afternoon coverage with lower vertical resolution and accuracy
- Ground-based networks of observing platforms, particularly during intensive campaign-based operations, are requisite to the understanding and evaluating the coastal PBLH and its exchange processes.

(**Left**) Time series of ozone lidar profiles at d) UMBC and e) HMI are also shown with an overlay of ozonesonde profiles (blue/green triangles) and surface ozone analyzer data. (bottom)

Summarizing TOLNet Broad Support for Future Needs

1 - Improve fundamental understanding of the diurnal PBL cycle

- recirculation
- entrainment nocturnal residual layers
- long-range transport

TOLNet can help identify aloft layers or recirculation patterns persisted were the days generally driving exceedances of the ozone NAAQS.

2 – Quantify chemical perturbations from offshore transport of urban emissions, ships, boats (both commercial and personal/recreational) and offshore oil and gas drill sites, as they interact with the onset of a bay/sea breeze in the shallow marine boundary layer.

Without accurate over/near water emissions, chemical transport models are not capable of simulating current and future regulatory scenarios

3 - Identify novel and viable pathways derived from the interaction of the land-ocean-atmosphere that can drive PBL content and structure in coastal communities.

4- Capacity Building and Engaging Stakeholders
Ex: ARSET – Aug 2024 - NASA Atmospheric Composition Ground Networks Supporting Air Quality and Climate Applications (~800 participants!)

GODDARD EARTH SCIENCES