TEMPO Aerosol Layer Height Product: Brief Update

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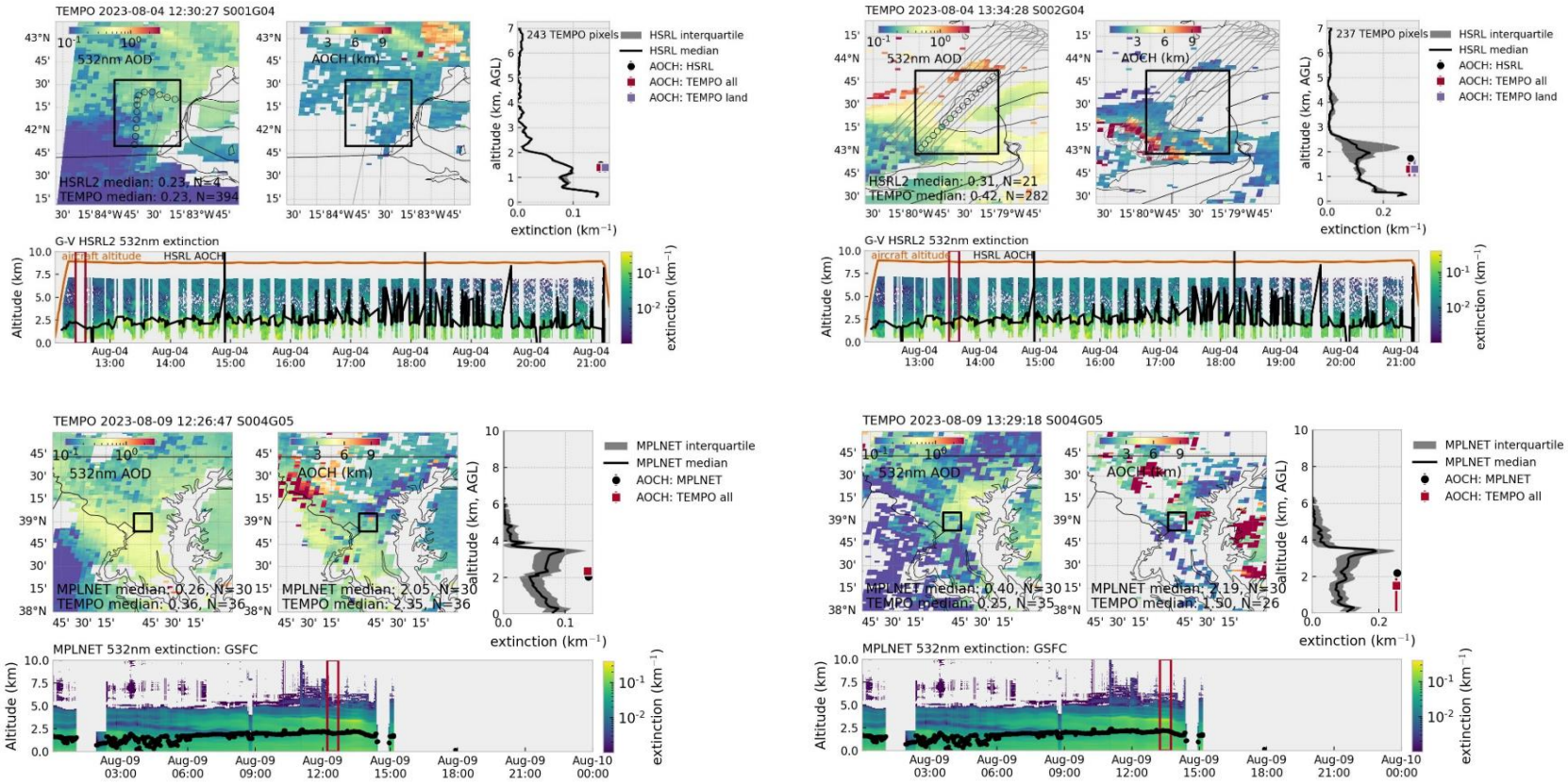
CEOS AC-VC 2025

TEMPO AOCH Evaluation

- Ground-based network: NASA MPLNET. Micro-Pulse Lidar.
- Ground-based network: NOAA NEXRAD Radar.
- Airborne campaign: NOAA/NASA AEROMMA/STAQS (summer 2023). NASA GV/HSRL2.
- Airborne campaign: NOAA USUS (summer 2024). NOAA Twin Otter/Doppler Lidar.
- High profile cases: e.g. Park Fire (#4 largest fire in California’s recorded history)

Robust Performance in Moderate AOD

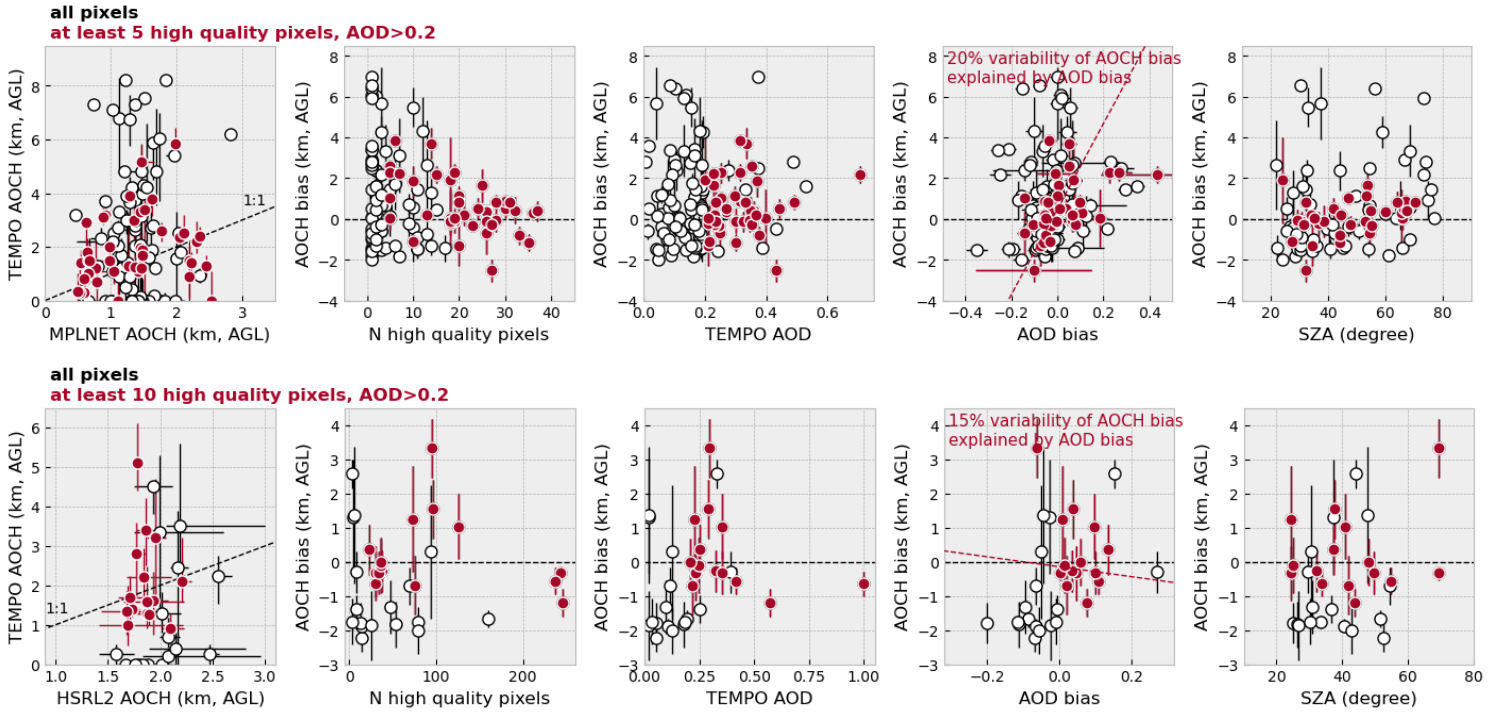


← Two examples using GV/HSRL2 data during AEROMMA/STAQS

← Two examples using MPL data at GSFC

Lidar window: TEMPO overpass ± 10 min.
Geographic footprint: MPLNET within 0.1 deg; airborne: dynamically determined but no bigger than 0.5 deg.
Data courtesy: HSRL2: Johnathan Hair (NASA), Taylor Shingler (NASA); MPLNET: Judd Welton (GSFC), James Flynn (UH-Liberty), James Sherman (Appalachian-State), Robert Sica (London-CDR)

Summary: MPLNET + AEROMMA



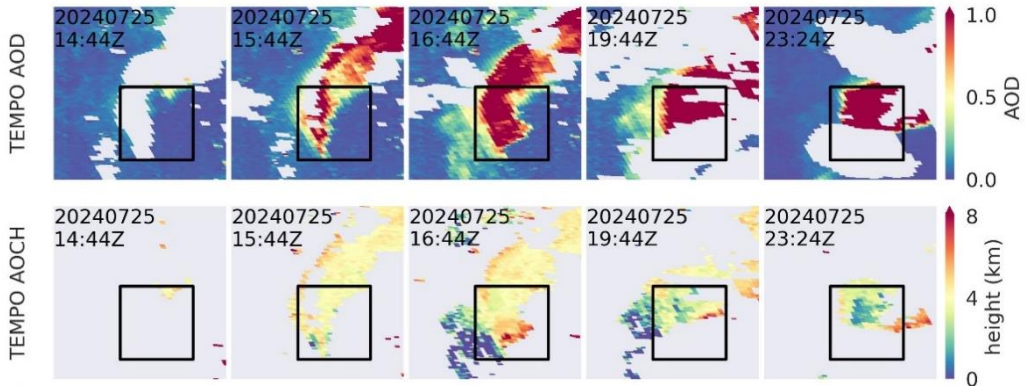
MPLNET
(GSFC, Appalachian State, UH-Liberty, London-CDN)

AEROMMA/STAQS
GV/HSRL2

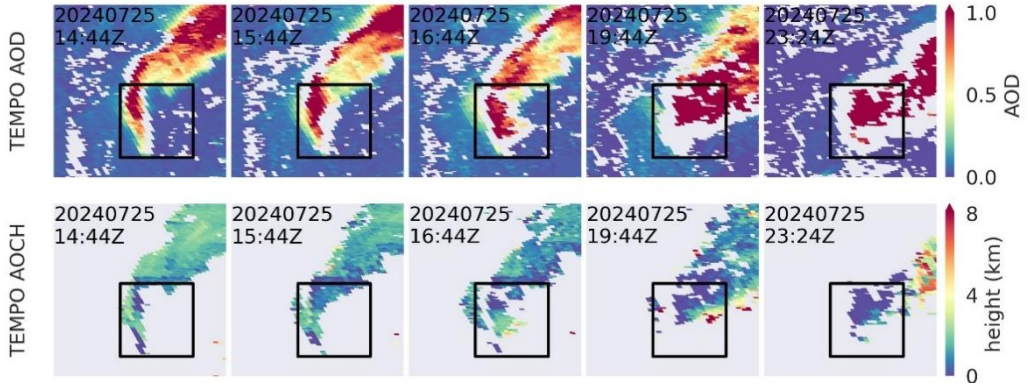
- Based on **August 2023**: 4 sites in MPLNET and 7 research flights during AEROMMA/STAQS.
- Currently working on analyzing one full year of TEMPO data (2023-2024).

Improved Performance with Extreme Smoke

- Park Fire in California: ignited on 24 Jul 2024. Preliminary TEMPO AOD struggled with the thick smoke. This is now greatly improved.



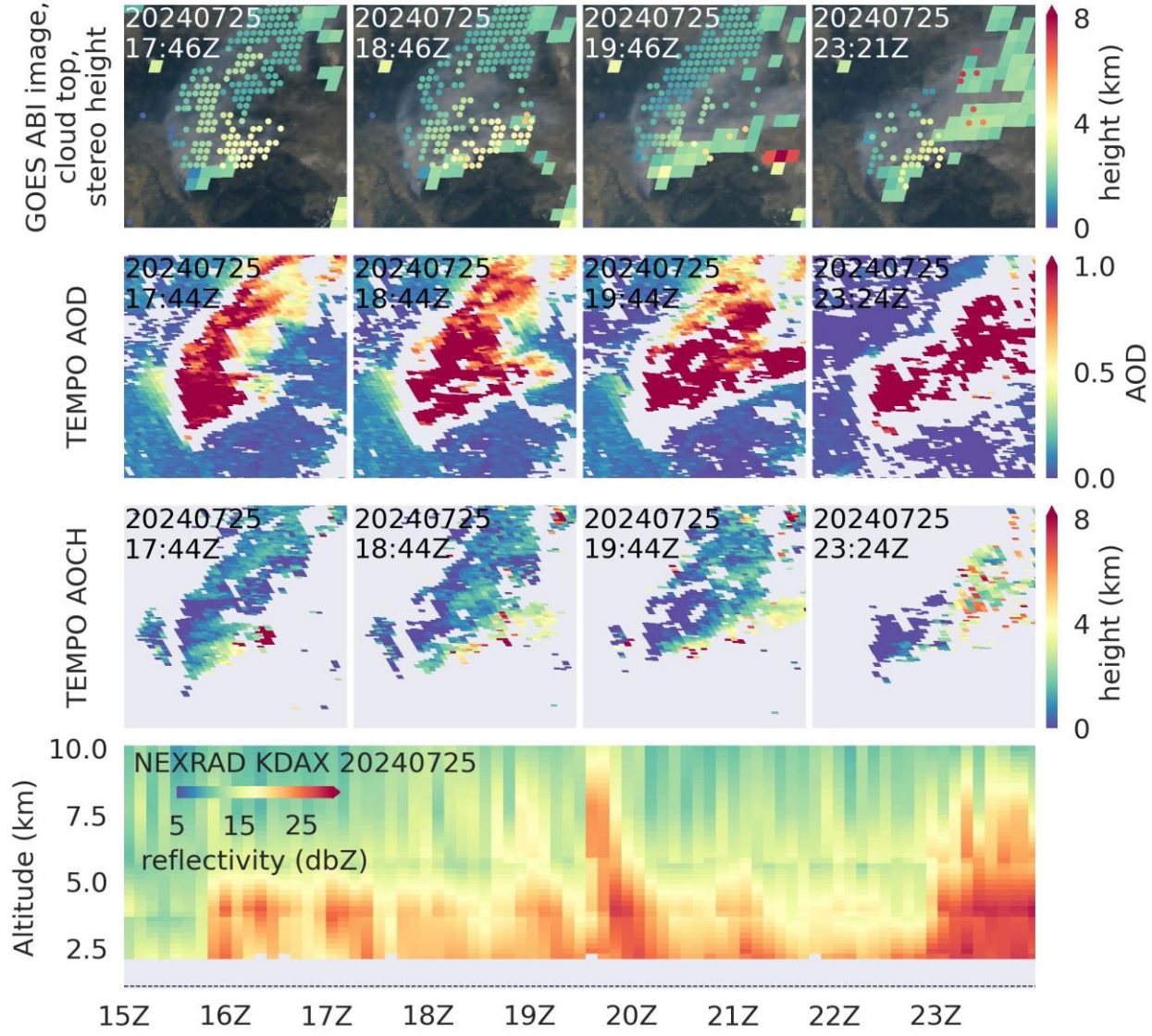
Preliminary
TEMPO AOD affected by thick smoke (known challenge in AOD retrievals), particularly so in the early morning and late afternoon. As a result, AOCH retrieval was affected.



Latest
TEMPO aerosol products (AOD and AOCH) greatly improved for extreme smoke!

Cross Evaluate with Other Products

- Park Fire in California: ignited on 24 Jul 2024.
- Generally good agreement with NEXRAD radar and stereoscopic GEOS-GEOS for this extreme event.



Data courtesy: Stereoscopic GEO+GEO: Mariel Friberg (UMD/NASA).