



TEMPO/GeoXO/TOLNET Workshop

Applying New Generation NASA UV-VIS Aerosol Algorithm to TEMPO

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New generation of UV-VIS capable sensors

Sensors with combined UV-VIS (including O₂B) observing capabilities

Agency	Sensor	Satellite	Spectral range of observations (nm)	Resolution	Period
NASA	EPIC	DSCOVR	318,340, 388, 443,551,680,688,764,780	~ 18 km	2015-Present
EU (Copernicus)	TROPOMI	Sentinel 5 Precursor	270-500; 675-775 & 2305-2385 (Hyp.)	3.5X5.5 km	2018-Present
NASA-SAO	TEMPO	Intelsat-40	290-490 & 540-740 (Hyp.)	2.1x4.7	2023-Present

TEMPO is the latest of several recently deployed sensors with UV-VIS spectral observing capability at improved spatial resolution (UV).

Near UV observations have been historically used to characterize aerosol absorption (TOMS, OMI) in terms of single scattering albedo (SSA).

Retrieved SSA is aerosol layer height dependent (ALH)

TEMPO includes the O₂B band, that enables ALH capability. Improved accuracy in near UV AOD/SSA is expected.



Use of UV-VIS Satellite Observations for retrieving aerosol properties

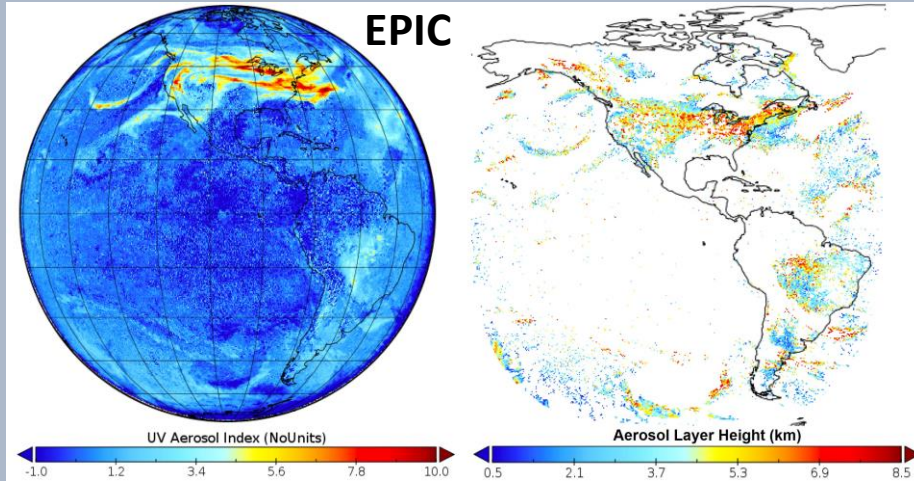
Recent Theoretical Advances:

- Climatological data set of UV–visible aerosol absorption using AERONET and OMI–MODIS synergy (Kayetha et al., 2022)
- Availability of 466 nm GLER Surface Albedo Product (Qin et al., 2019; Fasnacht et al., 2019)
- Oxygen-B band observations in the latest generation of hyper-spectral sensors offers, for the first time, the possibility of a complete characterization of the aerosol load in terms of AOD, SSA, and ALH (Xu et al., 2017; Xu et al., 2019)

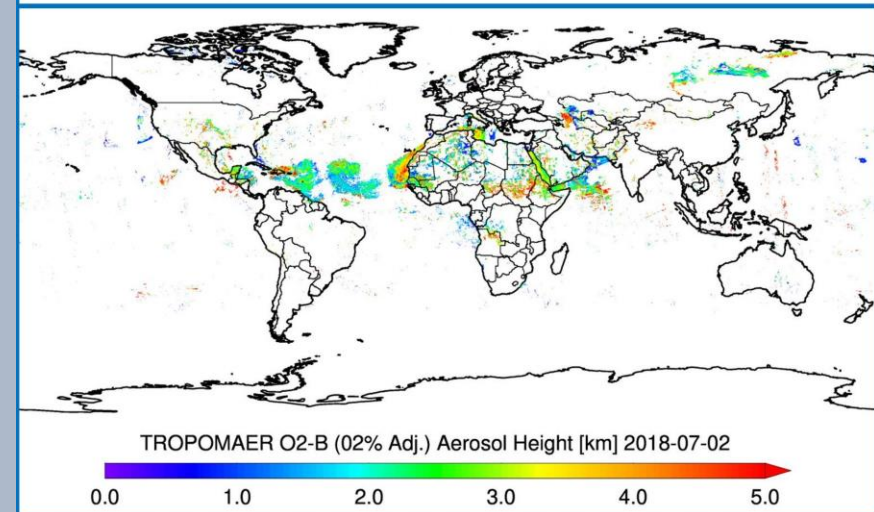
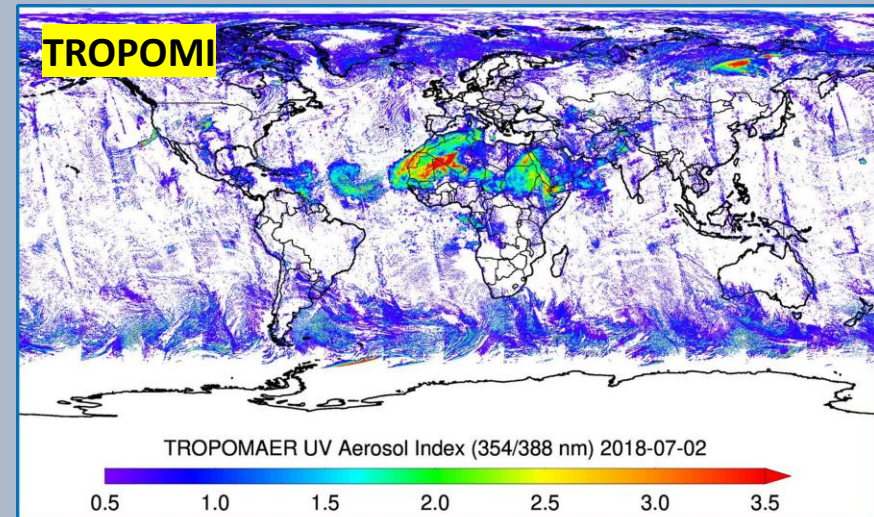
These advances have been integrated into a new-generation uv-vis algorithm that retrieves aerosol properties at UV and visible wavelengths along with aerosol layer height from O₂B band EPIC and TROPOMI observations.

A similar algorithm applicable to TEMPO observations is under development.

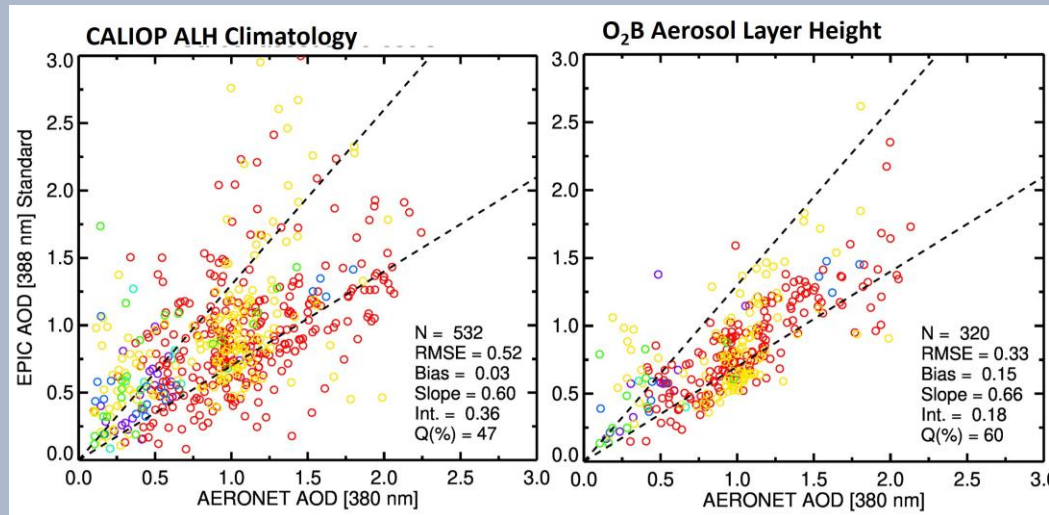
Application to EPIC and TROPOMI Observations



US West Coast Fires, 09-15-20 18:37:99



Saharan Dust Transport on 2018-07-22



EPIC AOD Validation over South America

Inferring aerosol absorption in the visible from retrieved UV single scattering albedo

