

# OMPS LIMB PROFILER AEROSOL PRODUCT

## OVERVIEW

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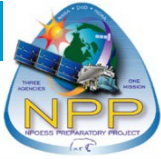
September 23-28, 2019

## Stratospheric aerosol observations over the last 20 years

Satellite/Sensor	Record Length
ENVISAT/SCIAMACHY	2002-2012
ENVISAT/GOMOS	2002-2012
ENVISAT/MIPAS	2002-2012
ODIN/OSIRIS	2004-Present
CALIPSO/CALIOP	2006-Present
SNPP/OMPS_LP	2012-Present
SAGE-III	2017-present



# OMPS Limb sensor



## Heritage:

SOLSE / LORE, OSIRIS, SCIAMACHY, GOMOS

## Wavelength coverage:

280 –1000 nm

## Vertical range:

105 km (5 - 80 km consistently)

## Vertical Sampling: 1 km

## Vertical resolution: ~2 km

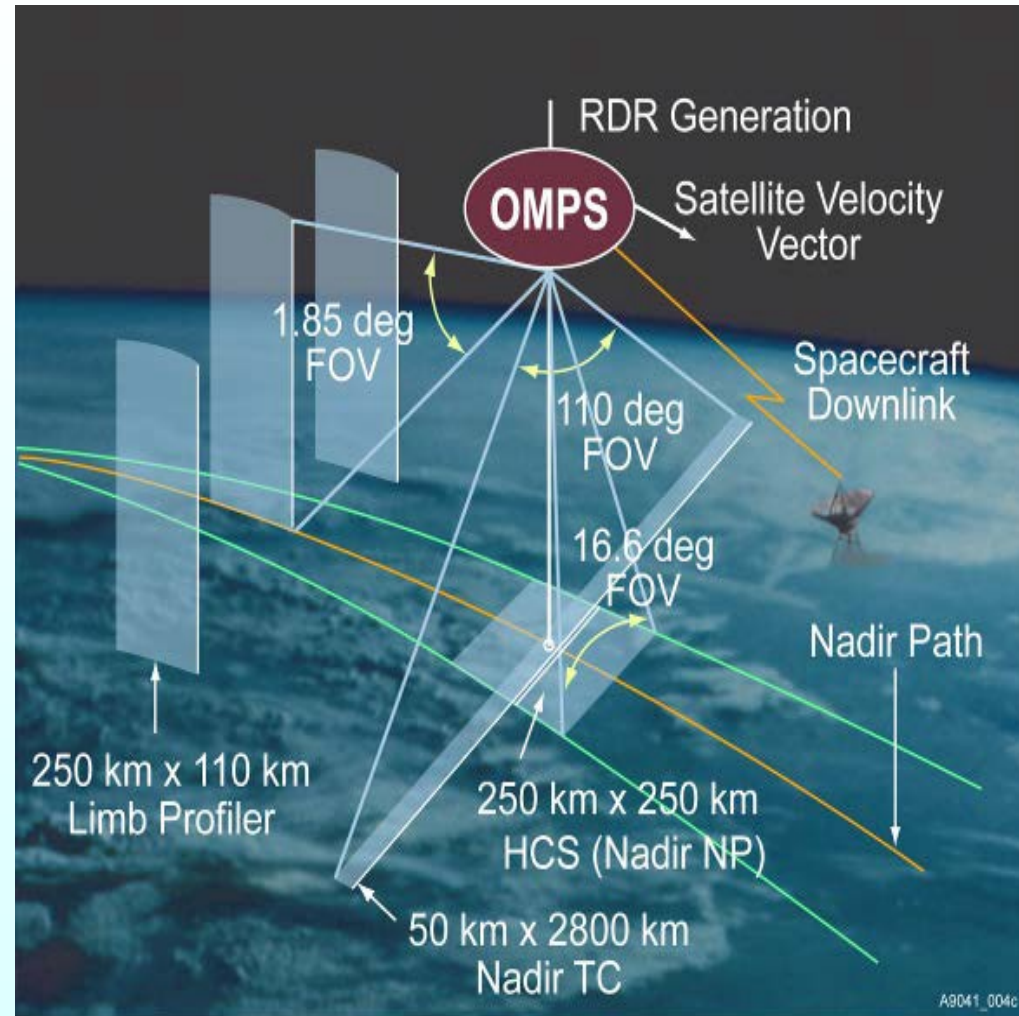
## Along-track sampling: 125 km

## Platform: Suomi NPP Satellite

## Start operations: 2012

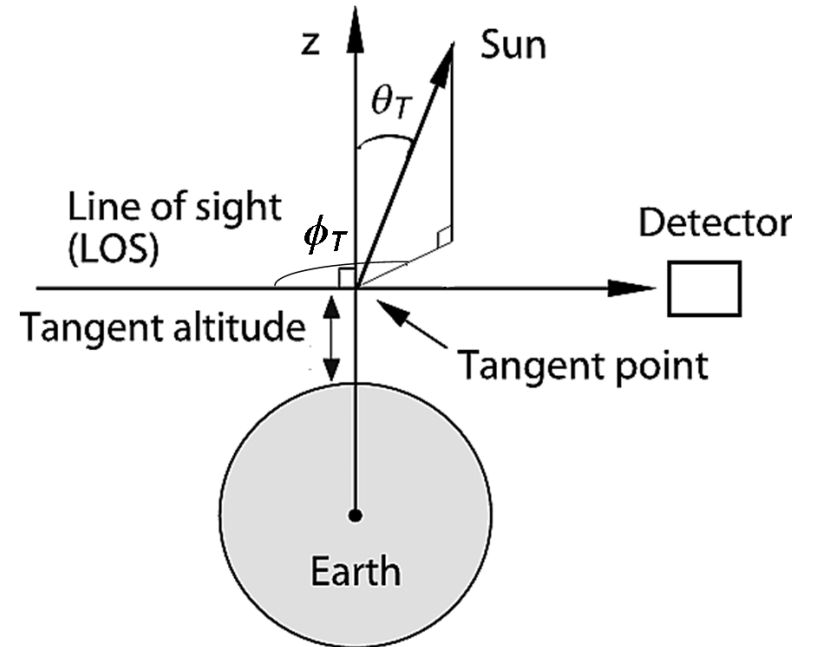
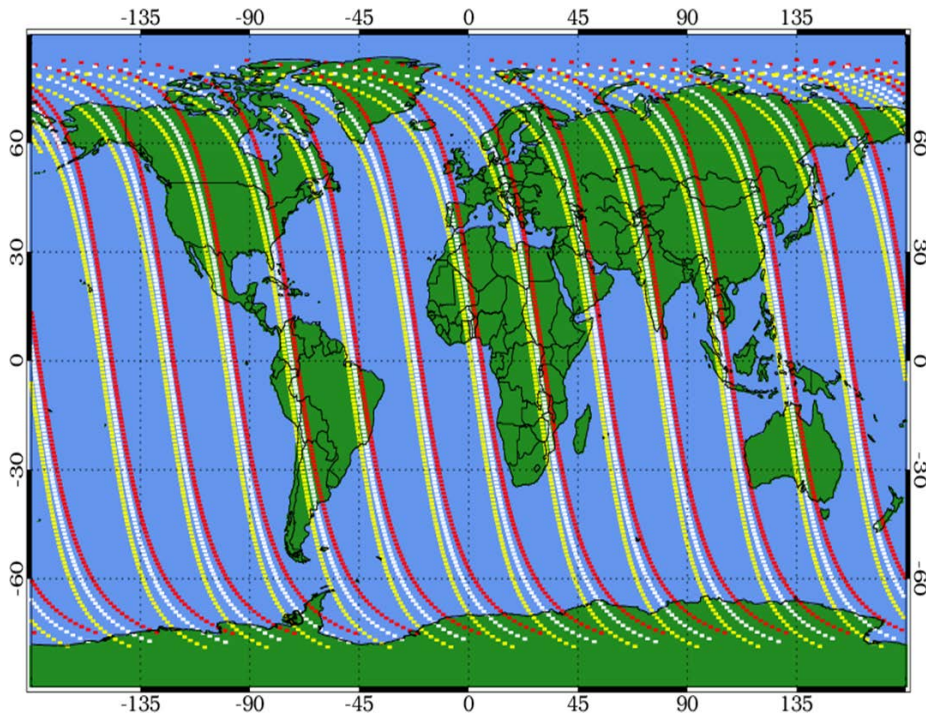
## Products:

Ozone, Aerosols and Temperature profiles



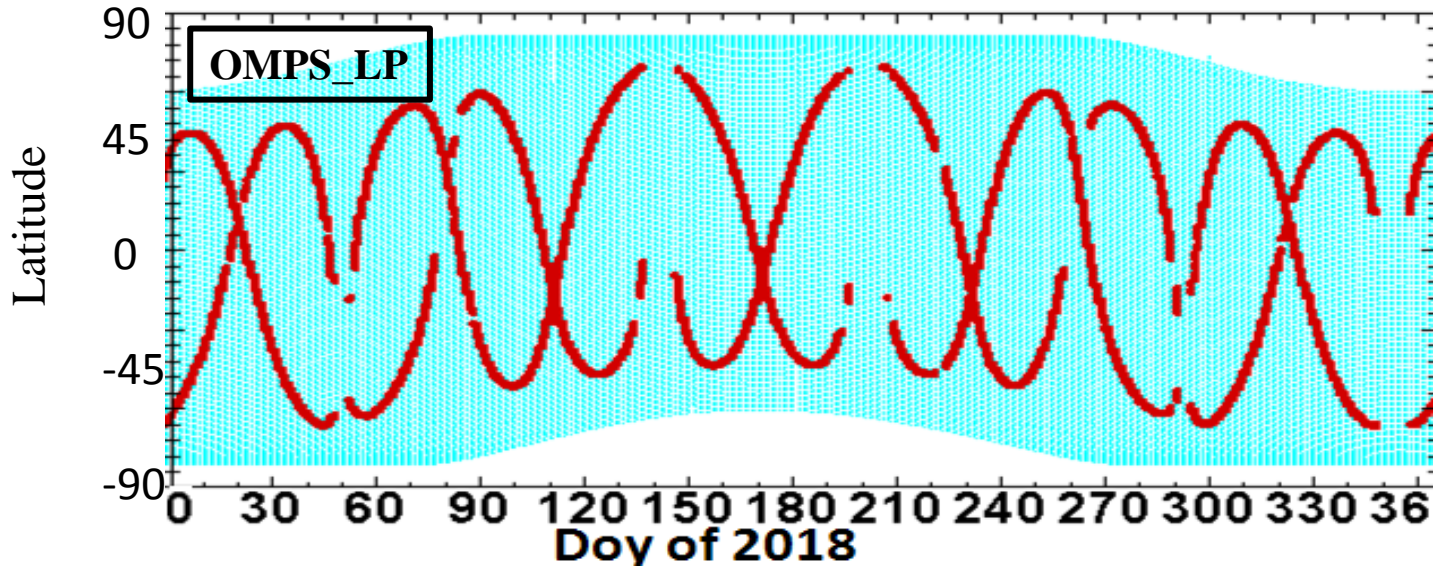
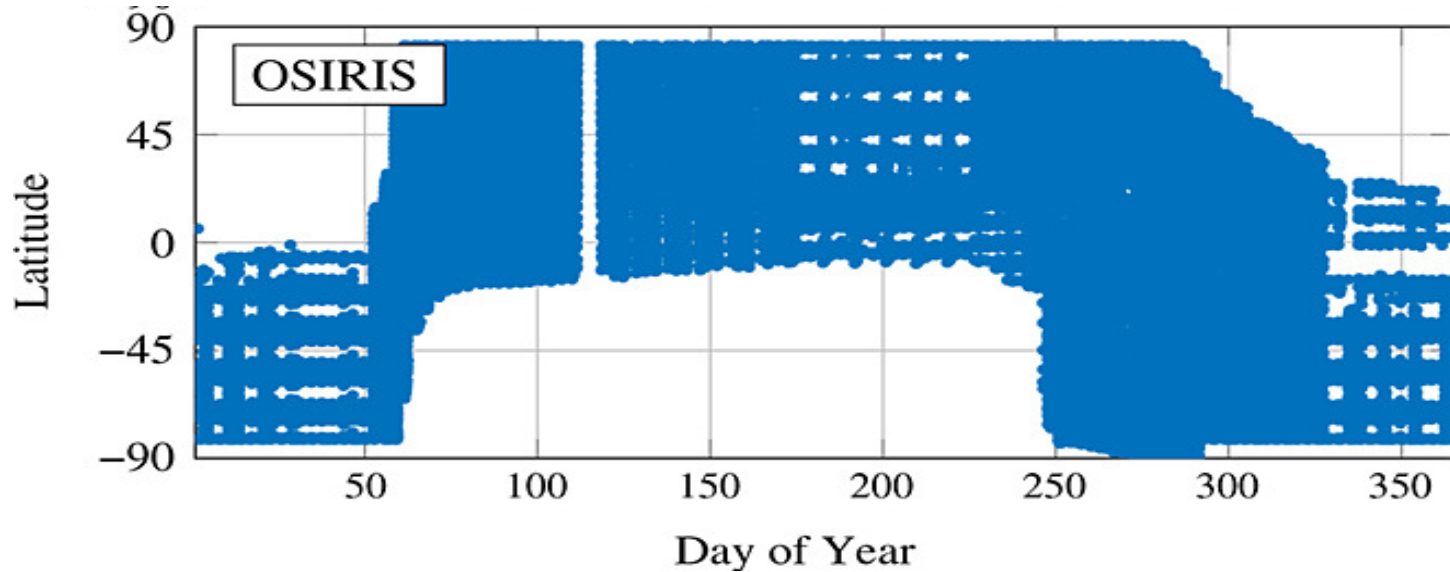
# Orbit Characteristics

- Sun synchronous orbit
- 13:30 Ascending node
- Mean altitude 833 km
- 14 orbits per day



Instrument orientation is fixed relative to the satellite

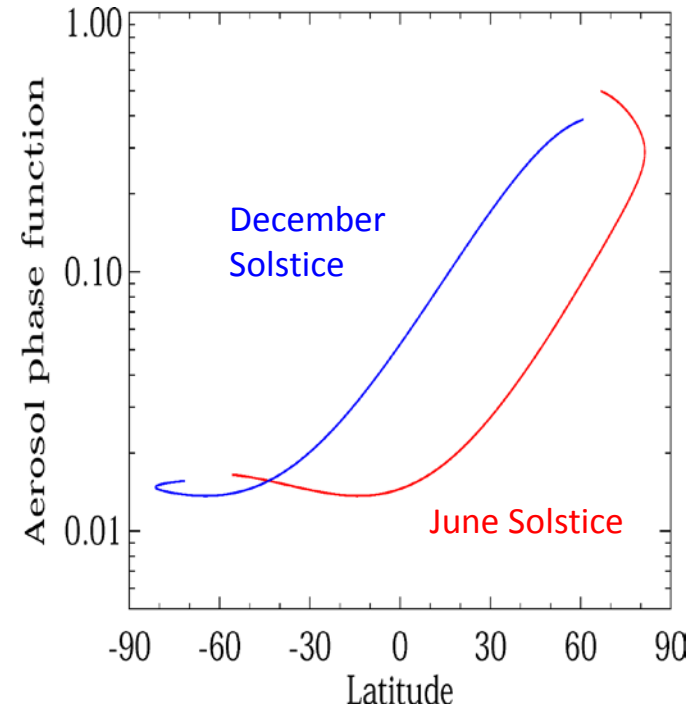
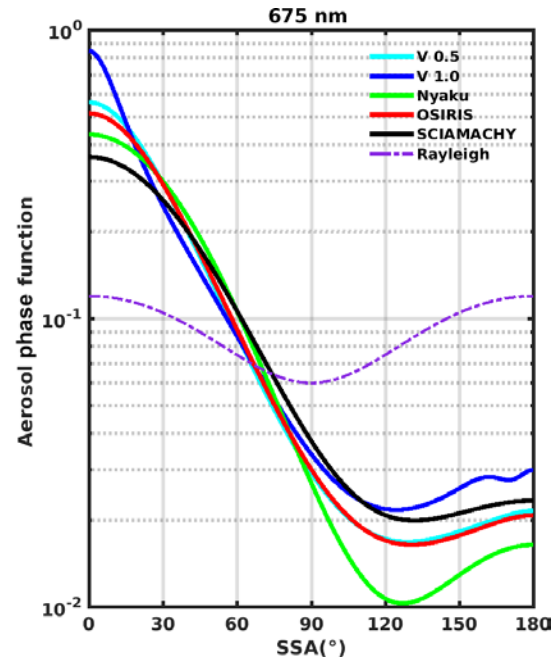
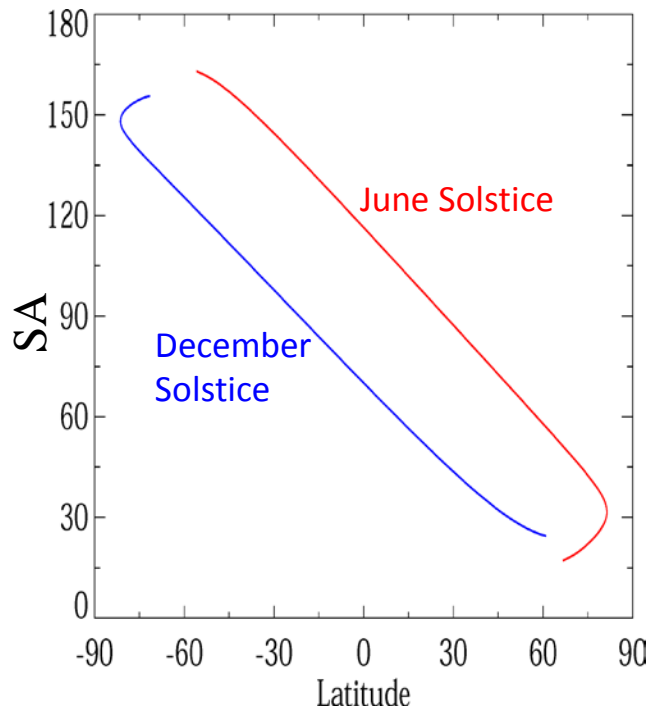
## Space/Time Coverage of Currently Operational Passive Str. Aerosol Sensors



OMPS\_LP achieves the best global coverage (space and time)



# Latitudinal Variability of OMPS\_LP measured aerosol signal



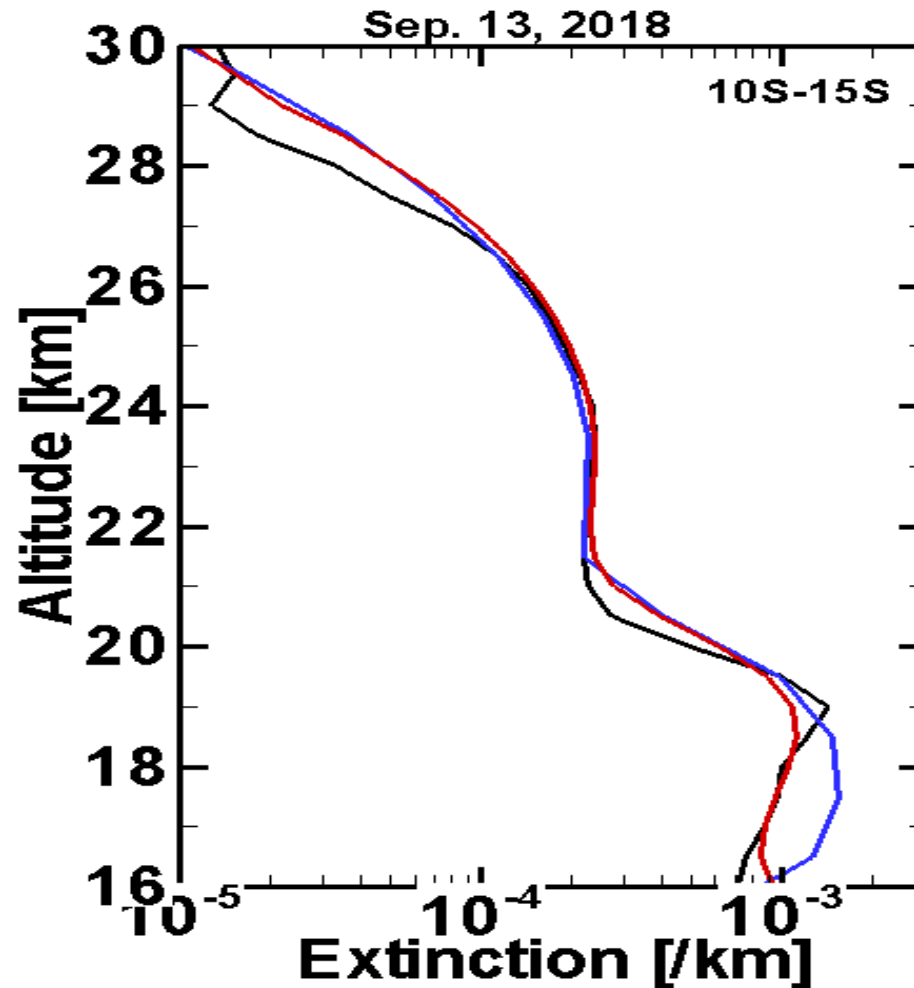
Because of S-NPP orbit characteristics the scattering angle (SA) associated with LP observations varies with latitude.

Measured signals in NH high latitudes are much stronger (about 50 times) than in SH LP observations can accurately measure the low SH signal..(as low as  $10^{-5}$ )

# Retrieval Algorithm

- Tangent height determination (*Moy et al., AMT, 2017*)
- Cloud height estimation (*Chen et al., AMT, 2016*)
- V1.5 Retrieval Algorithm (*Loughman et al., AMT, 2018*)  
Particle Size Distribution (height independent)  
Measurement vector: 675 nm radiance as function of altitude
- Inversion scheme (Chahine, 1970)
- Multi-wavelength approach under development

# Comparison of LP retrievals to SAGE III/ISS measurements



Vertical Resolution homogenization

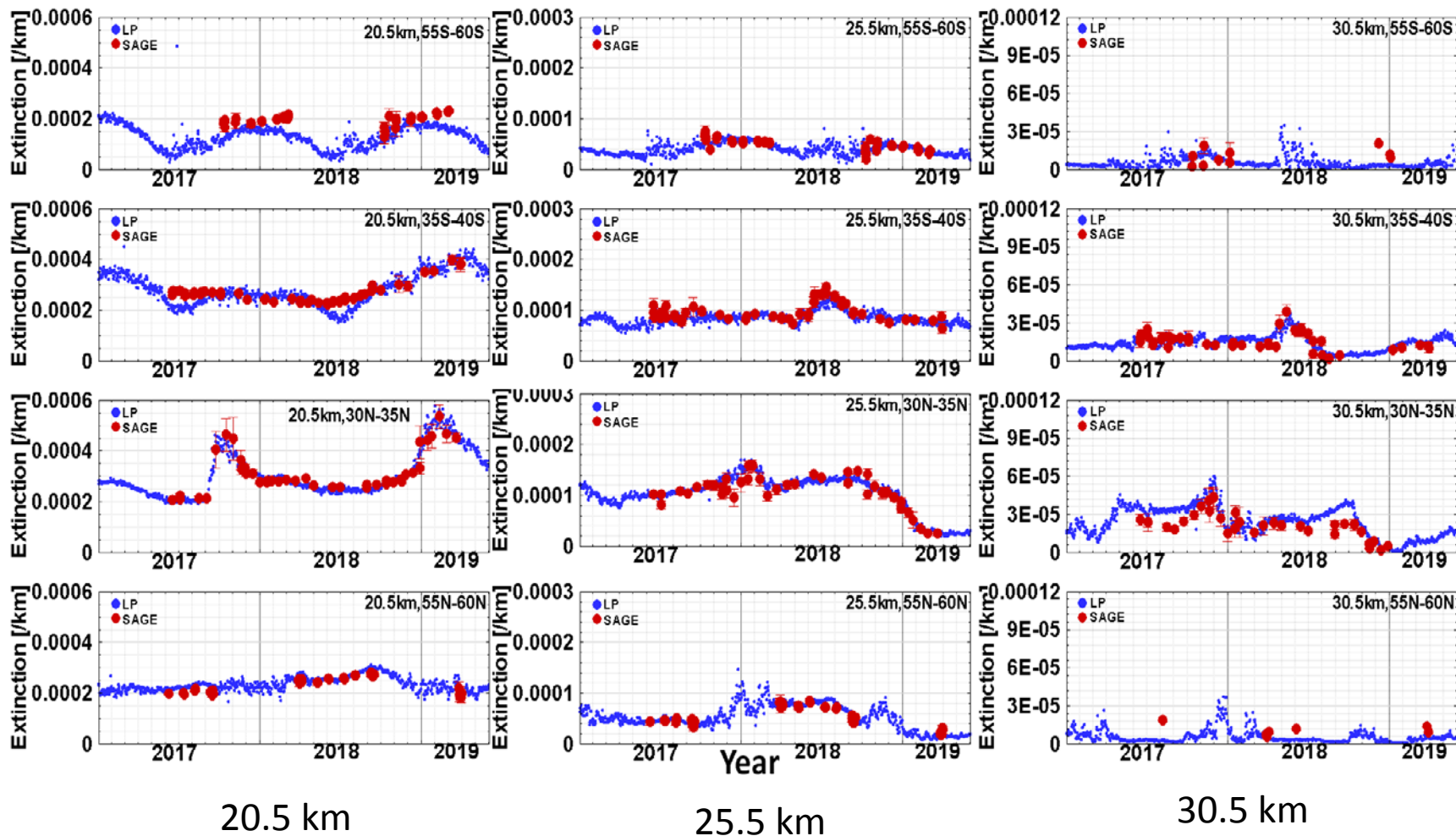
LP

SAGE original (0.5 km)

SAGE (smoothed)

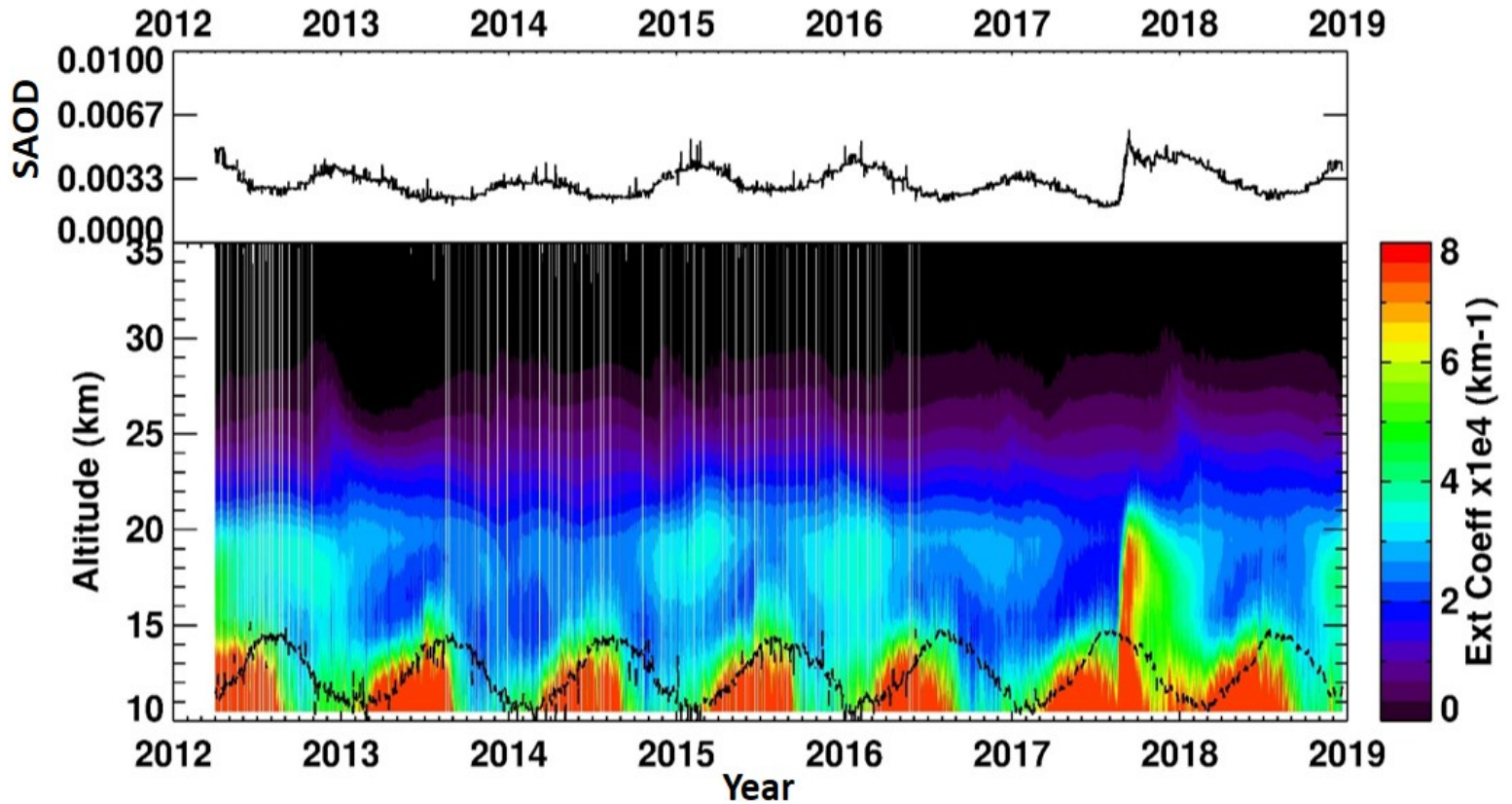


# Comparison of SAGEIII/ISS (red) and LP V1.5 (blue) extinction measurements Mid/High latitudes



Latitude bands in 55°S-60°S, 35°S-40°S, 30°N-35°N and 55°N-60°N (from top to bottom).

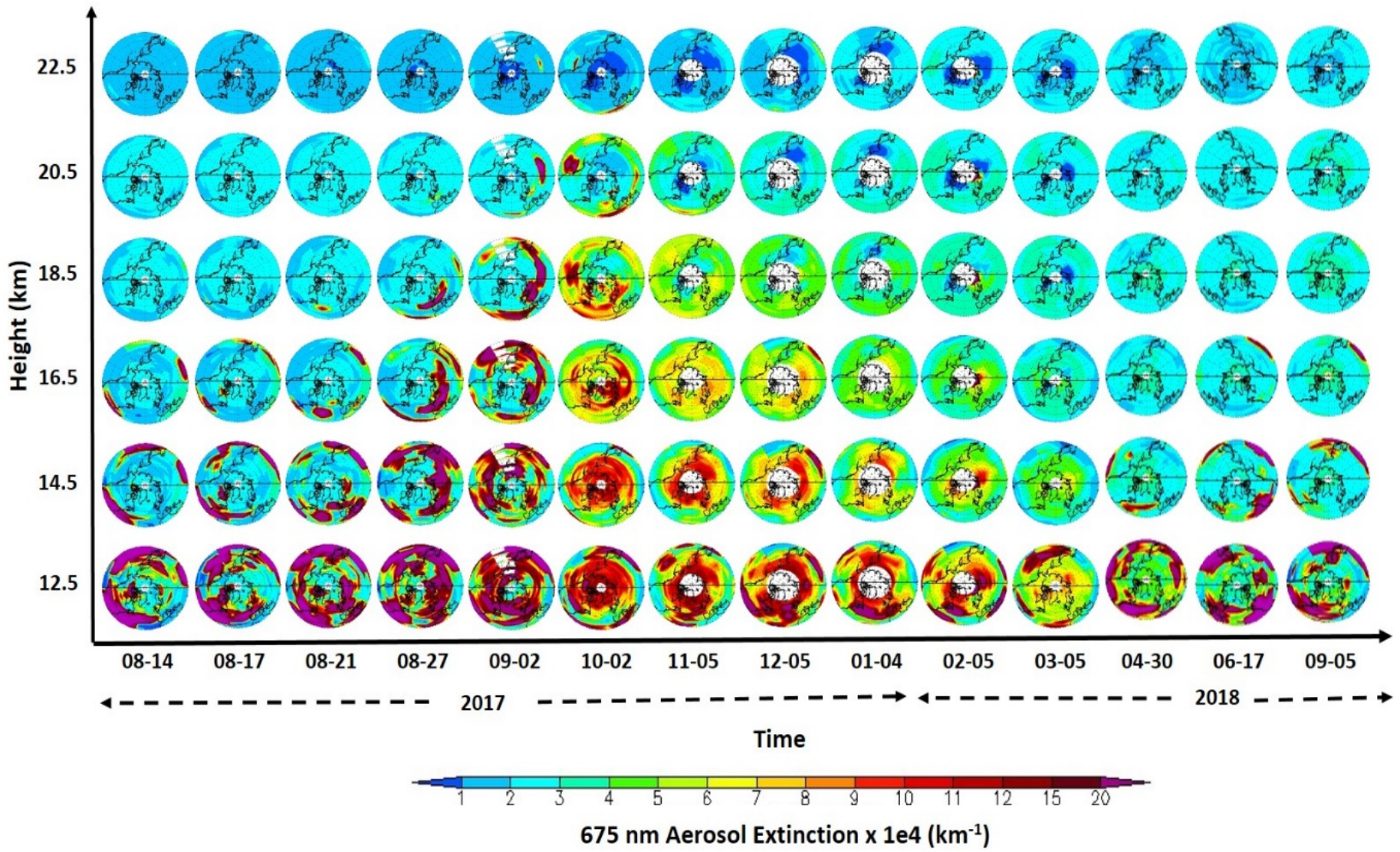
# LP Stratospheric Aerosol Load (30°-50°N) since March 2012



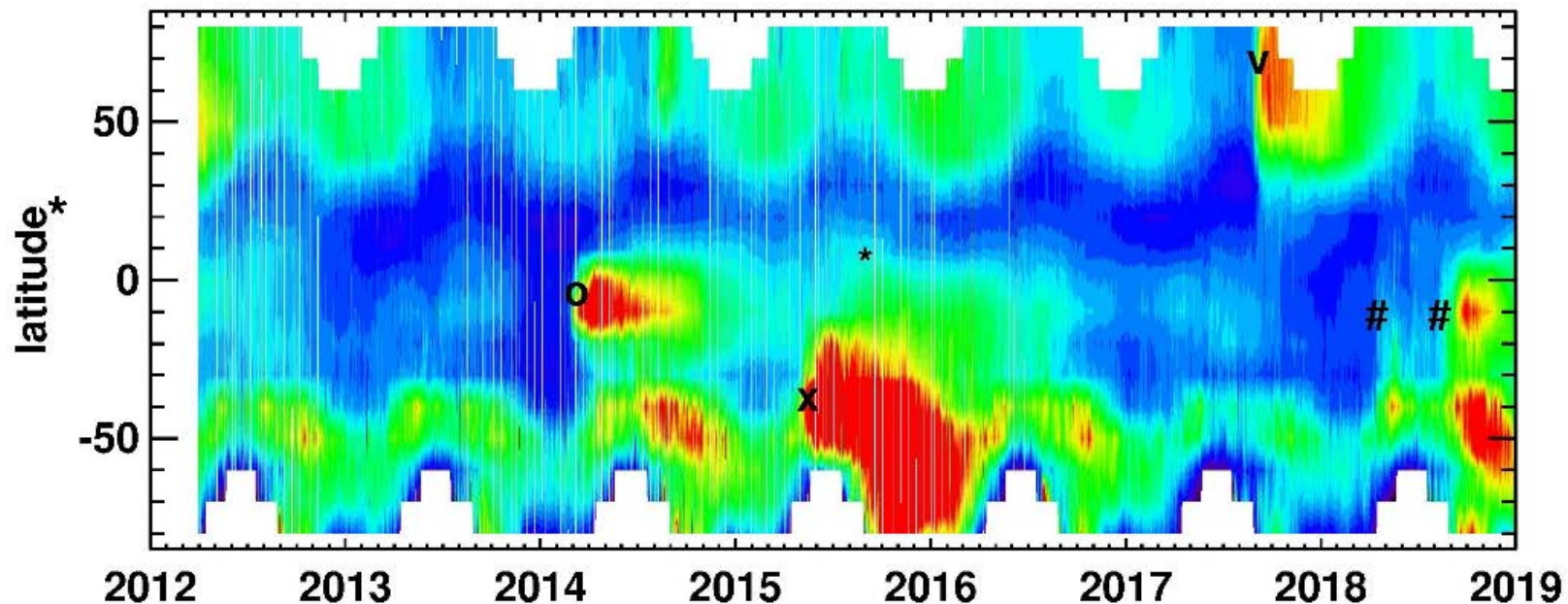
Zonal average of daily mean extinction coefficient profiles (bottom)  
Stratospheric Aerosol Optical Depth (Tropopause to 35 km)



# Lifetime and 3D spatial variability of 2017 Carbonaceous Aerosol Plume



# OMPS\_LP Global SAOD Record



\* Nabro

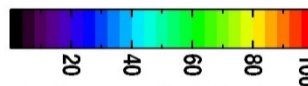
o Kelut

x Calbuco

v BC fires

\* Cotopaxi

# Aoba



Stratospheric aerosol total column (x1e4)

# Summary

- The OMPS\_LP stratospheric aerosol data set has been released
- OMPS\_LP measurements have been validated using SAGE III observations
- Good agreement between 20 and 25 km has been found
- Work continues on validation work and algorithm enhancement
- LP observations have proven extremely useful in the tracking of occurrence of rapid sudden/unusual stratospheric aerosol perturbations

The OMPS LP Aerosol Data product can be directly downloaded from:

[https://snpp-omps.gesdisc.eosdis.nasa.gov/data/SNPP\\_OMPS\\_Level2/OMPS\\_NPP\\_LP\\_L2\\_AER675\\_DAILY.1](https://snpp-omps.gesdisc.eosdis.nasa.gov/data/SNPP_OMPS_Level2/OMPS_NPP_LP_L2_AER675_DAILY.1)