OMPS LP aerosol extinction data evaluation and comparison with OSIRIS and CALIPSO

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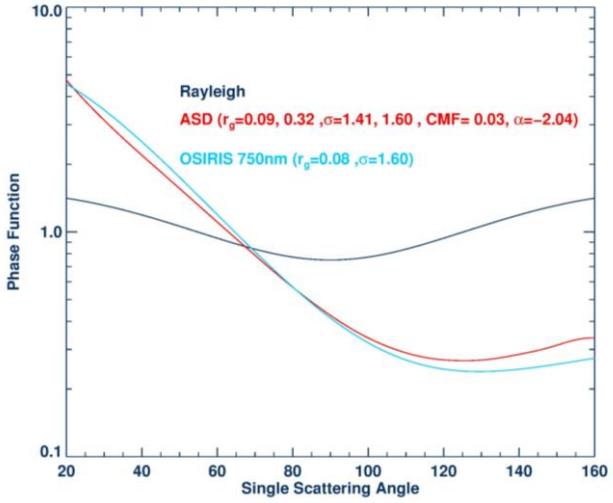
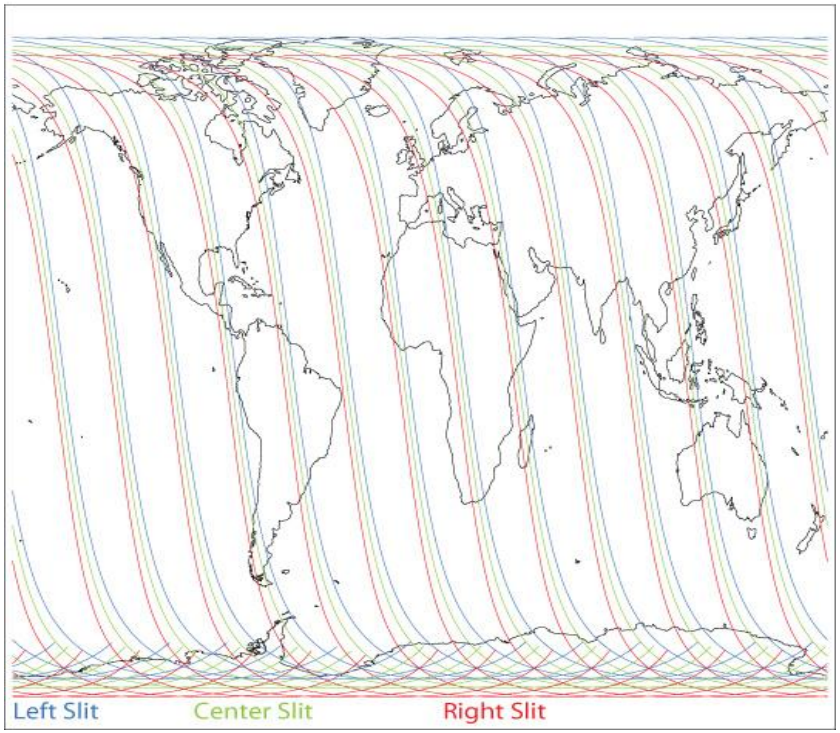
Aerosol retrieval algorithm

- **OMPS LP current aerosol retrieval algorithm uses Chahine's non-linear relaxation method**
- **Uses 675 nm Rayleigh-corrected radiances $(I-I_0)/I_0$**
  - **– I_0 is calculated using GMAO data assuming no aerosols and 45.5 km reflectivity**
- **Aerosol phase function determined by aerosol size distribution, refractive index and shape**
  - **Use a constant aerosol size distribution (ASD), bi-mode log-normal, with no altitude variation: (r_0, σ) = (0.09,0.32 μm, 1.4, 1.6), CMP=0.03**
  - **Current data Version 1.0**
- **Data are screened for clouds using Chen et al. [2016]**

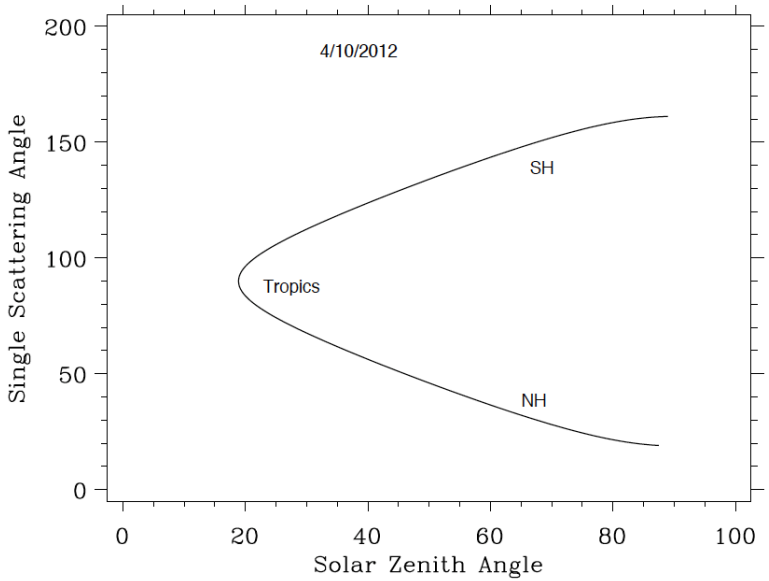


Phase function vs. Single Scattering Angle

OMPS LP daily coverage

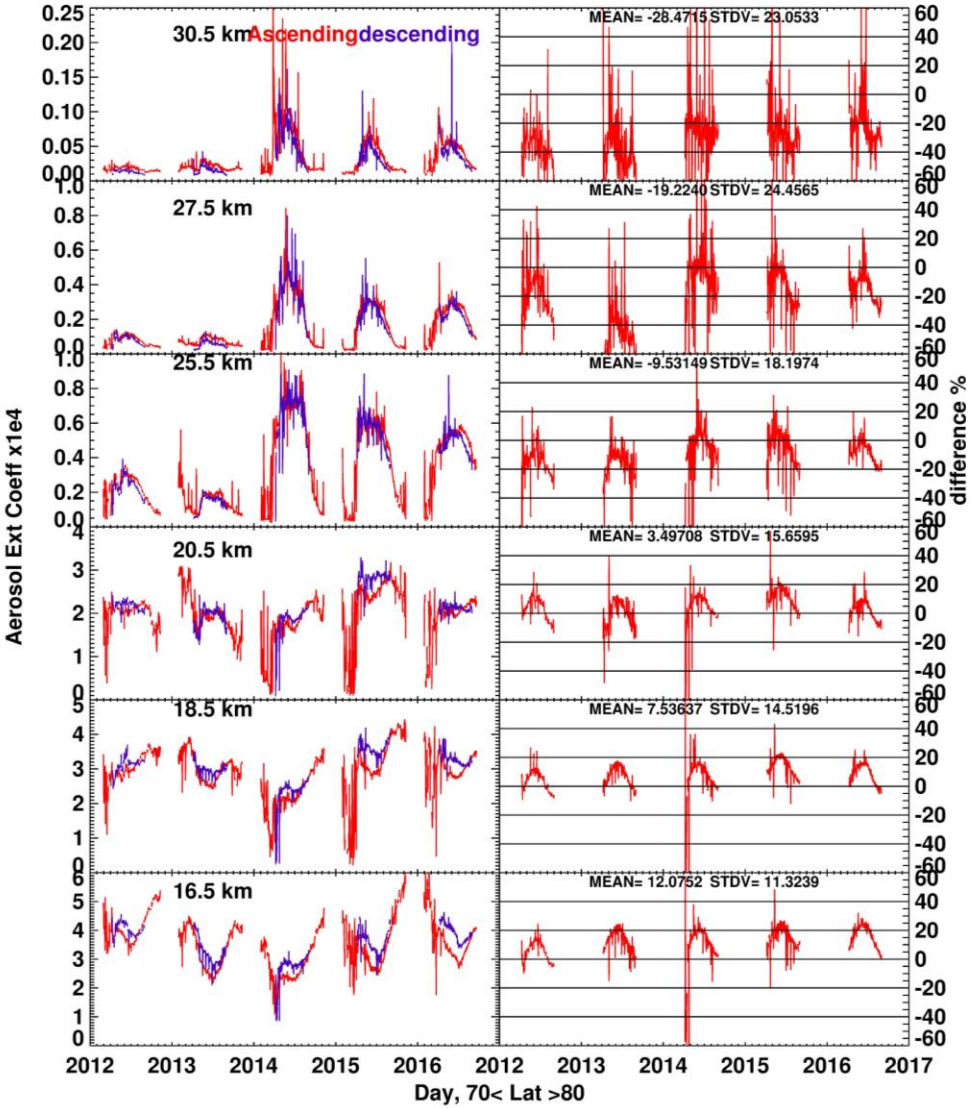


Variation of OMPS LP SSA



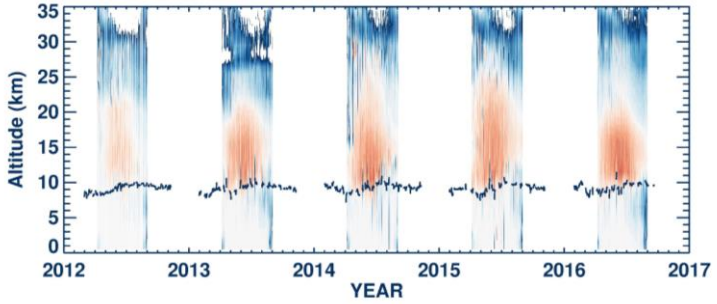
3 slits, 14-15 orbits each day, 160 events, ~7200 measurement daily

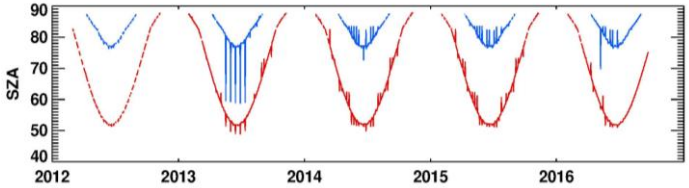
OMPS Ascending vs. Descending differences 70 – 80 N

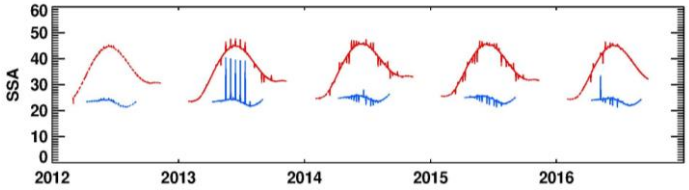


70 - 80 N

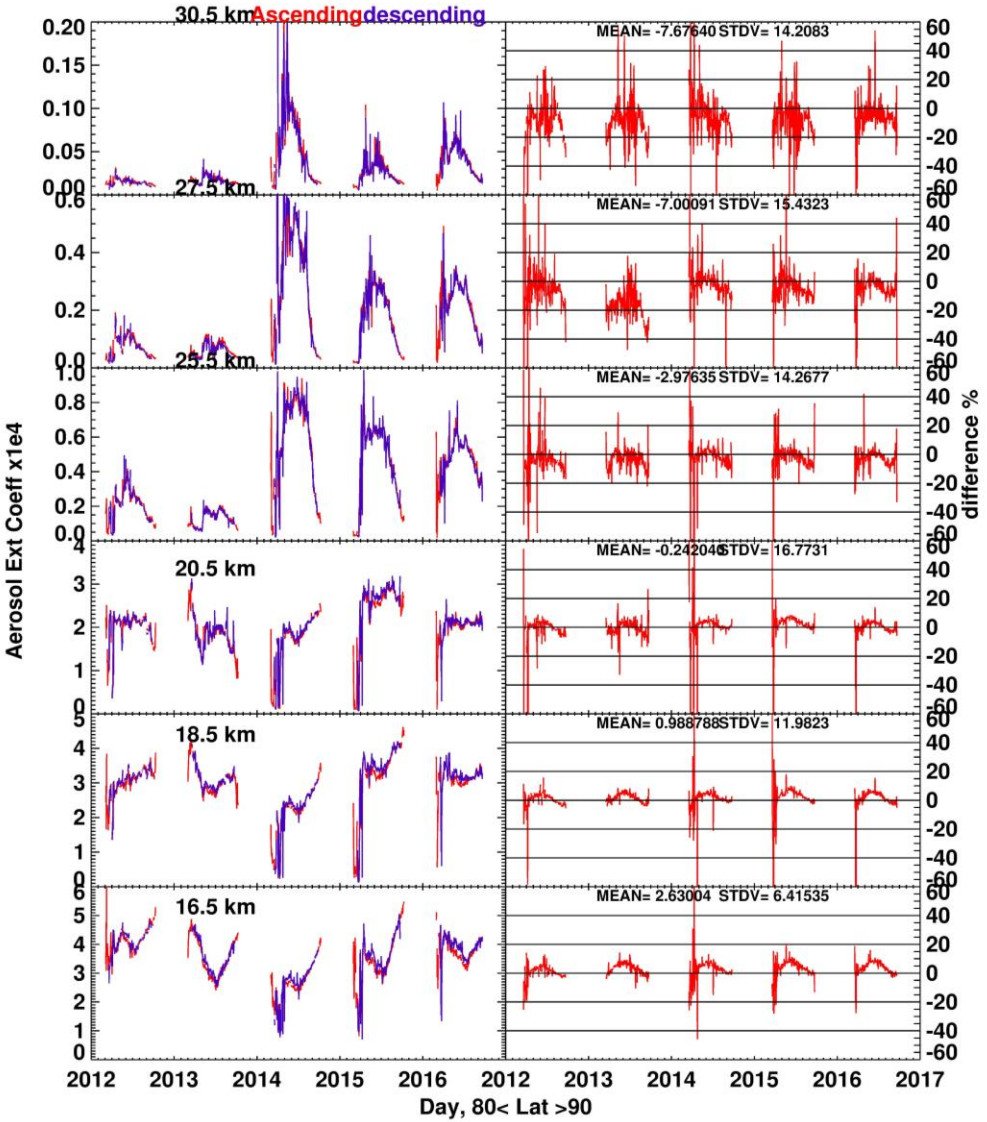
Ascending - Descending





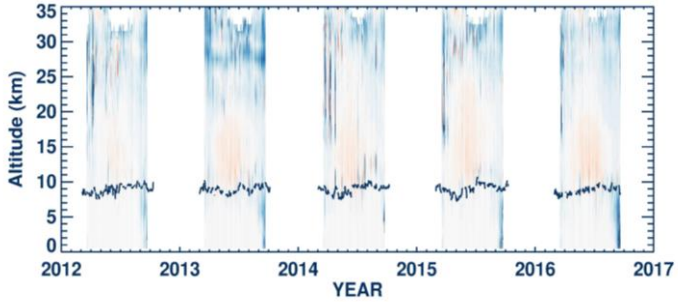


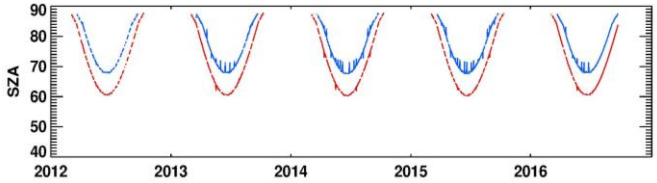
OMPS Ascending vs. Descending differences 80 - 90 N

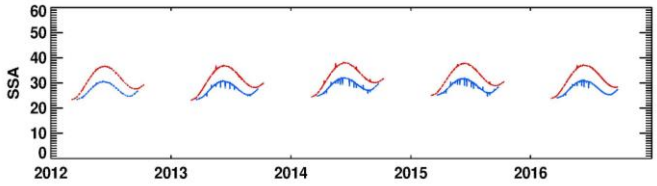


80 - 90 N

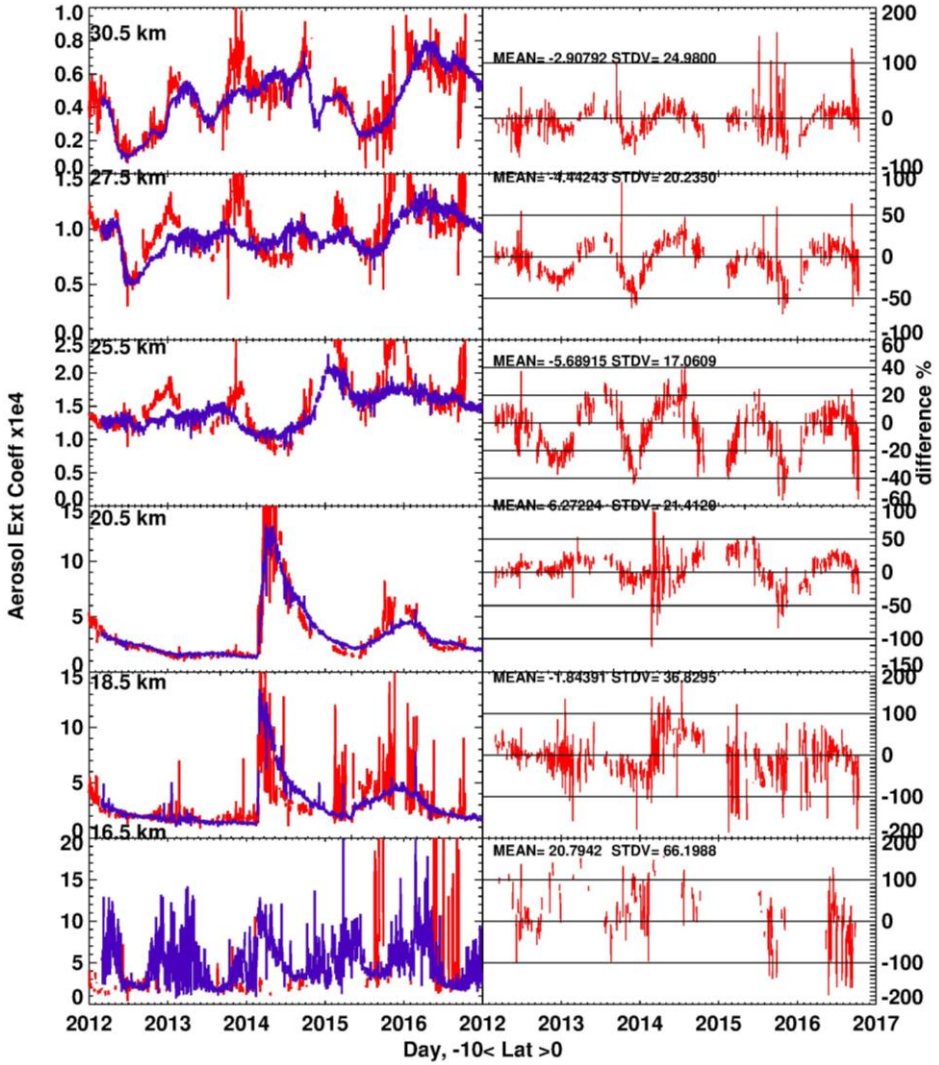
Ascending - Descending





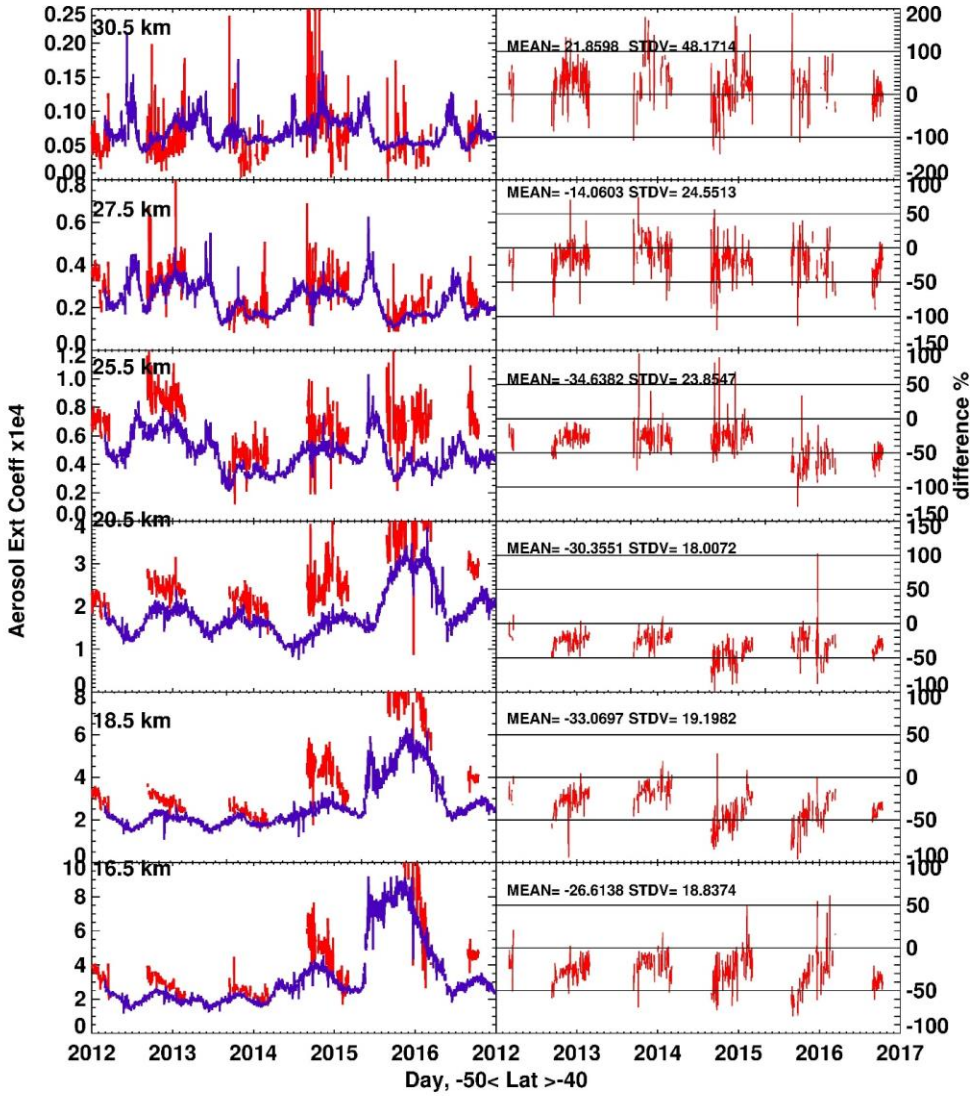


OMPS vs. OSIRIS daily zonal mean comparison -Tropics



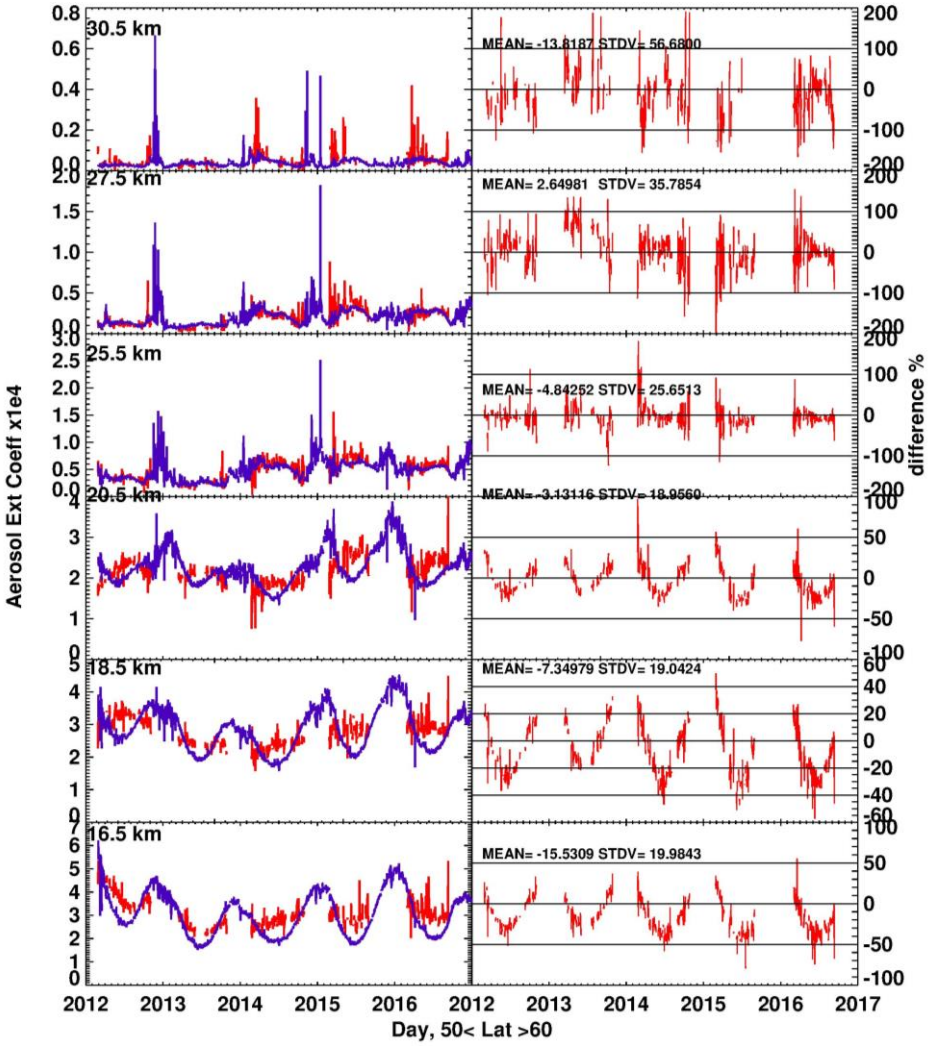
10S – 0
OMPS - OSIRIS

OMPS vs. OSIRIS daily zonal mean comparison -SH



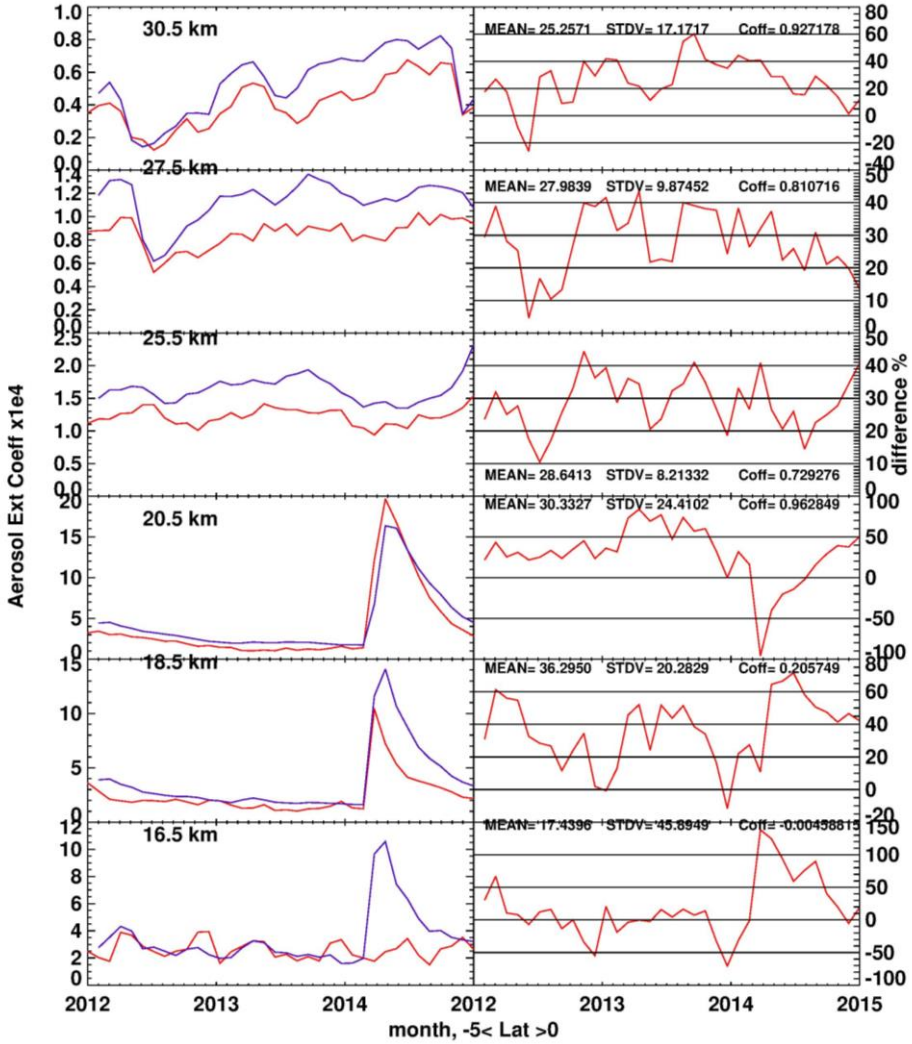
50 – 40S
OMPS - OSIRIS

OMPS vs. OSIRIS daily zonal mean comparison -NH



50 – 60N
OMPS - OSIRIS

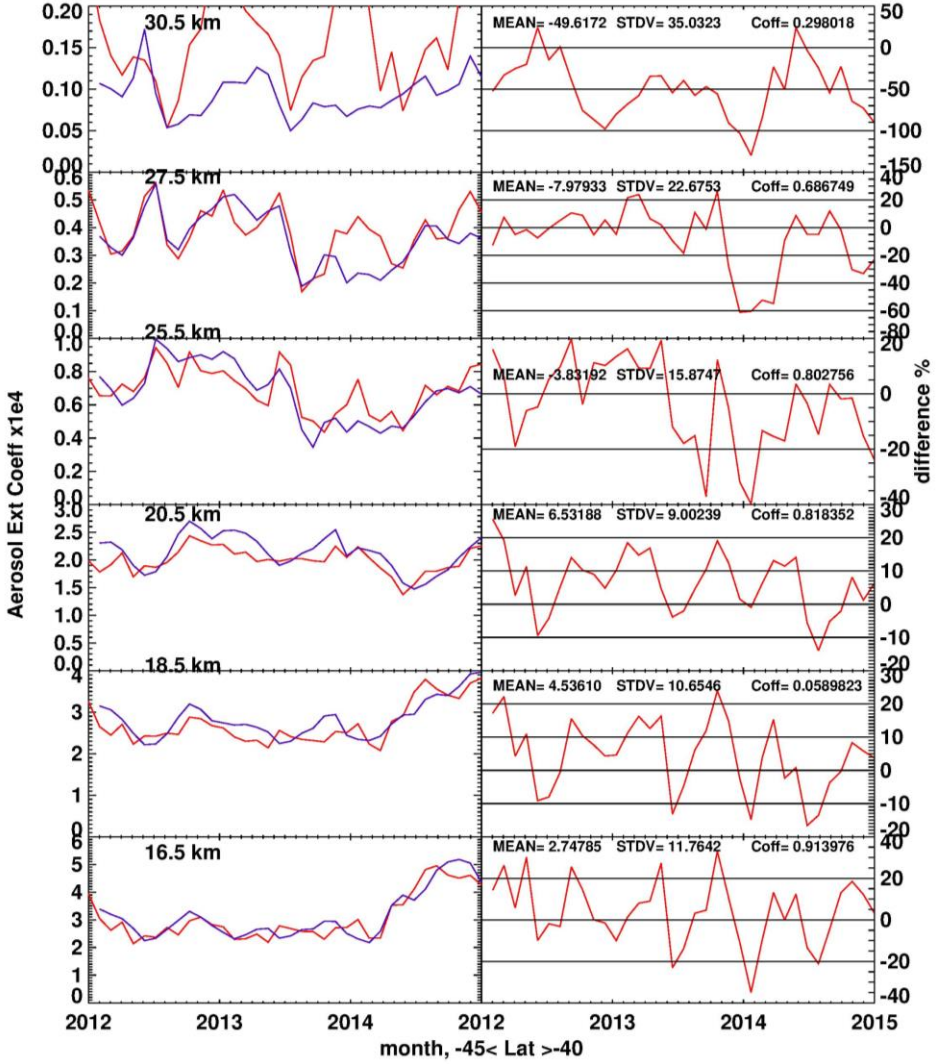
OMPS vs. CALIPSO monthly zonal mean comparison -Tropics



5S – 0

OMPS - CALIPSO

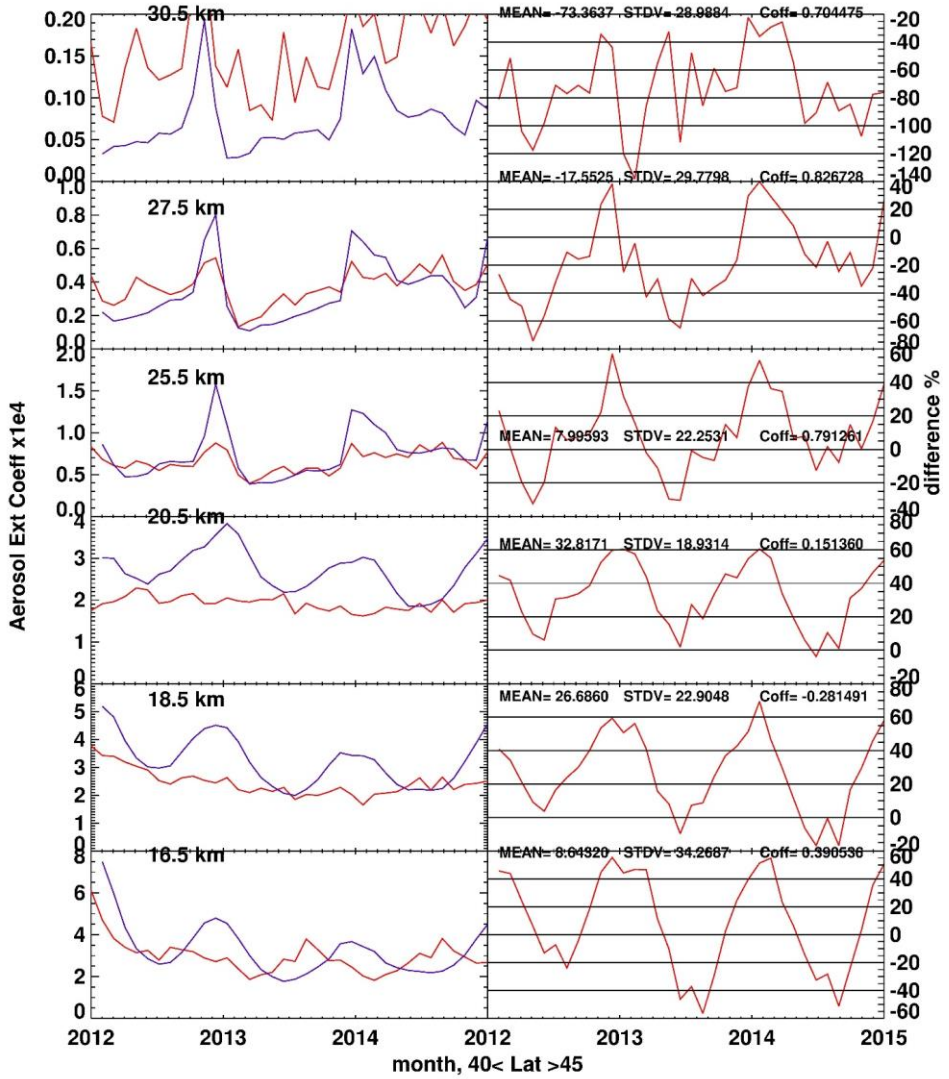
OMPS vs. CALIPSO monthly zonal mean comparison -SH



40 – 45S

OMPS - CALIPSO

OMPS vs. CALIPSO monthly zonal mean comparison -NH

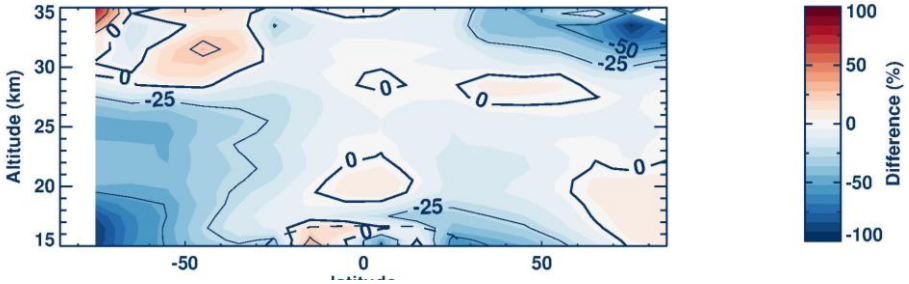


40 – 45N

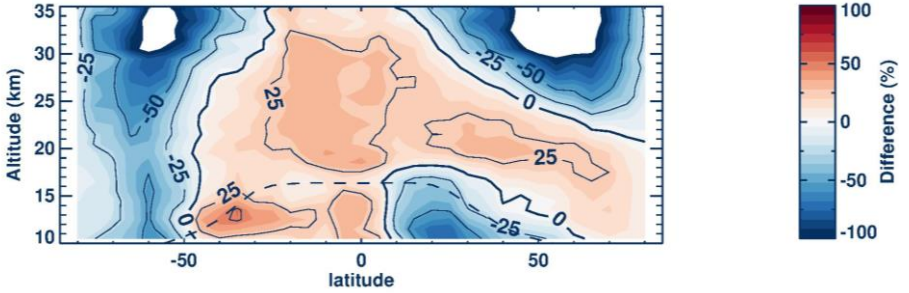
OMPS - CALIPSO

Summary zonal mean difference

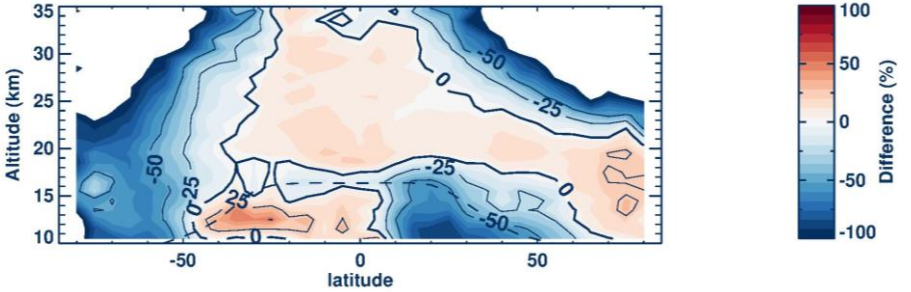
OMPS – OSIRIS %



OMPS – CALIPSO %
Lidar ratio = 50 sr^{-1}

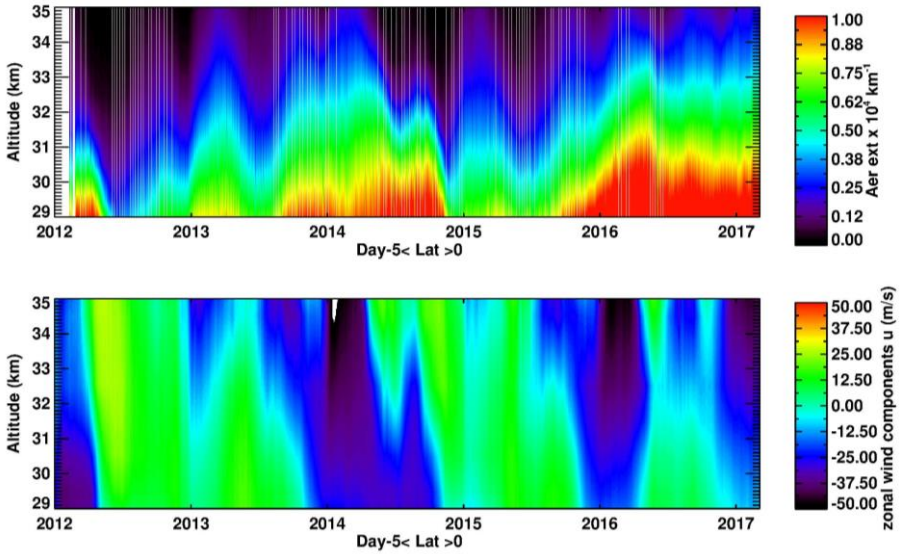


OMPS – CALIPSO %
Lidar ratio = 60 sr^{-1}

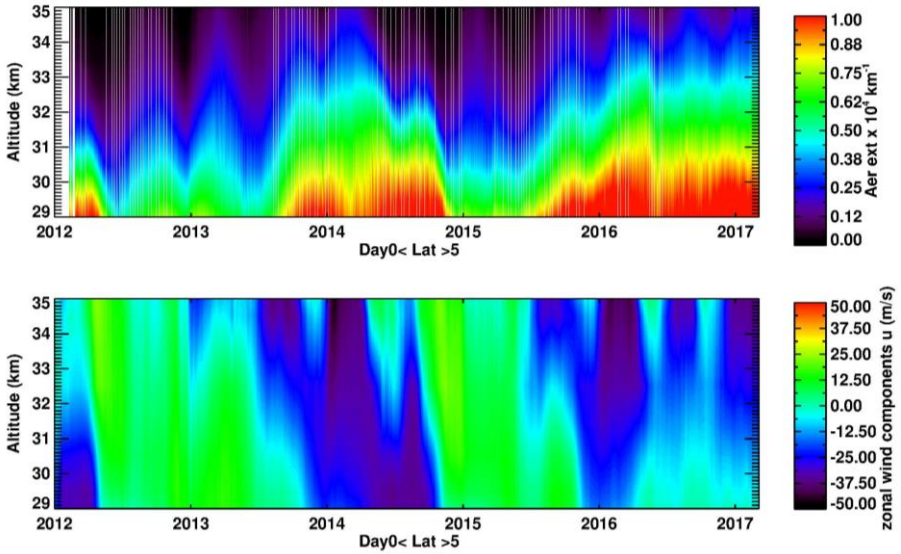


OMPS QBO signature

0 - 5S

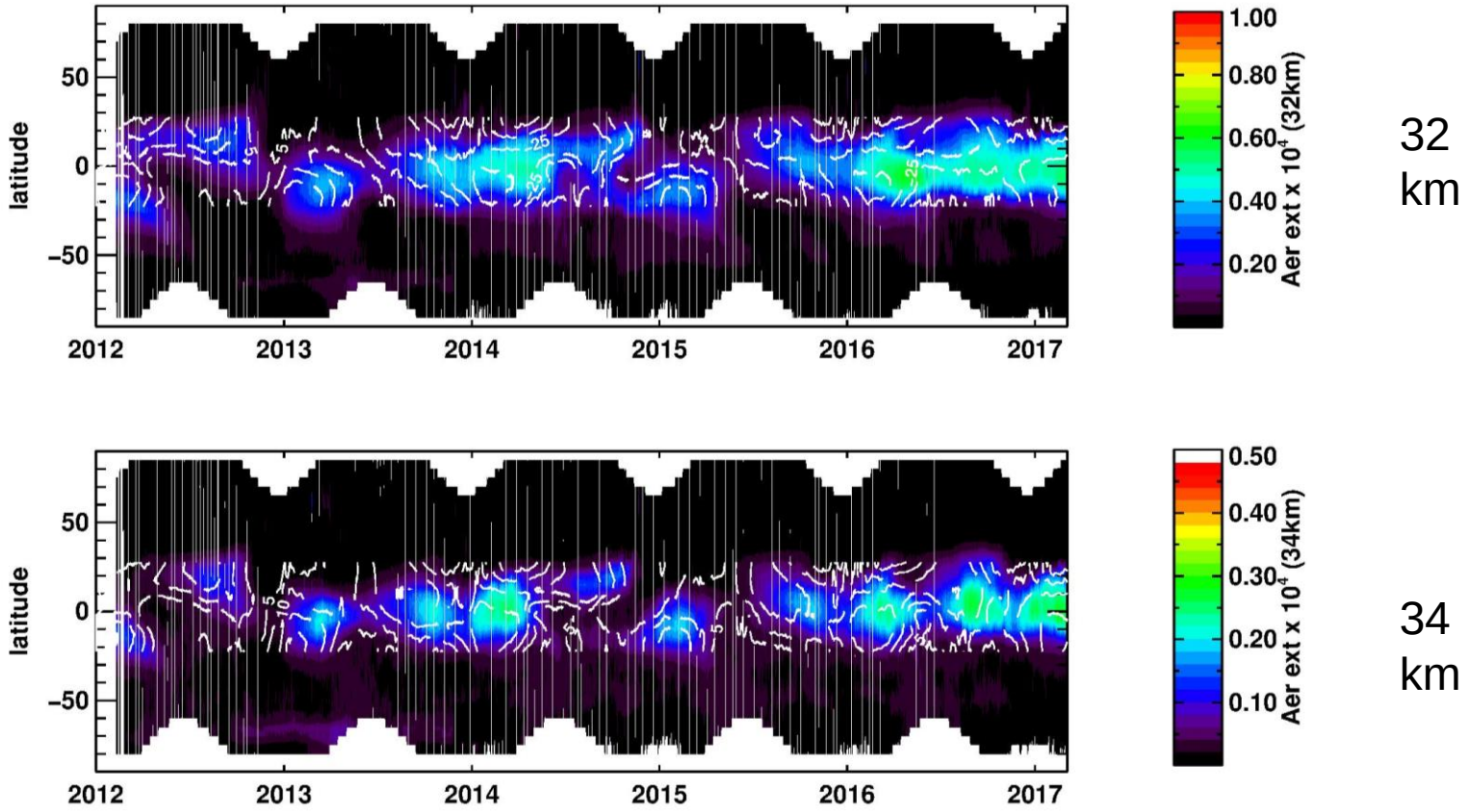


0 - 5N



Top: Aerosol extinction daily zonal mean
Bottom: MERRA2 daily zonal mean zonal wind U(m/s)

OMPS QBO signature

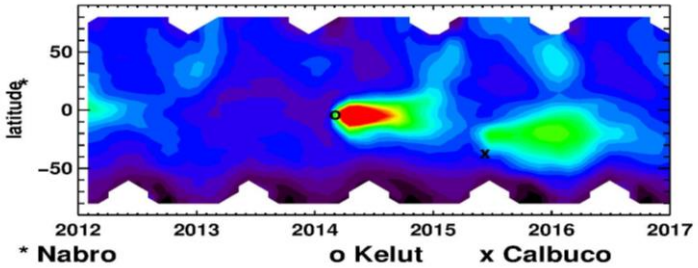


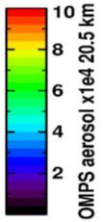
32 km

34 km

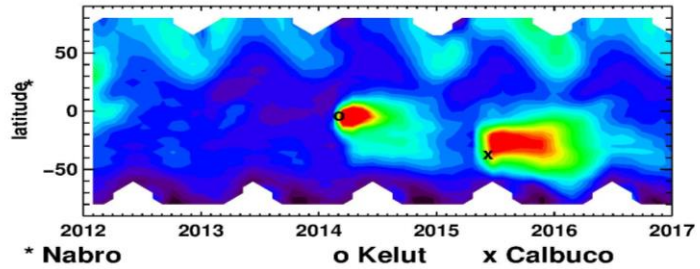
OMPS aerosol extinction zonal mean. Contour lines are negative zonal wind u (easterly)

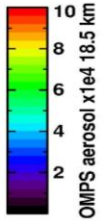
OMPS aerosol data records at different altitudes



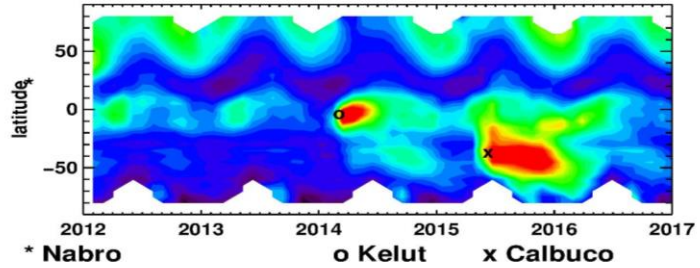


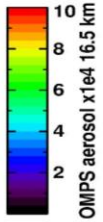
20.5 km



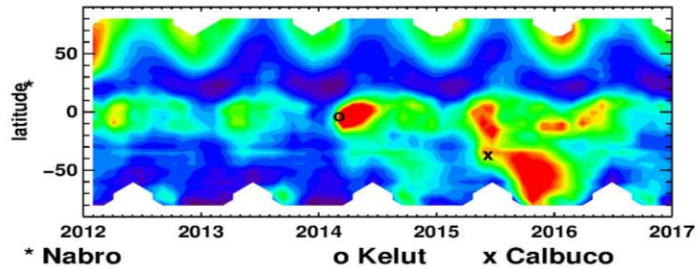


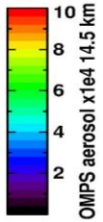
18.5 km





16.5 km





14.5 km

Future plans

- Validate OMPS LP with SAGE III aerosol measurements and utilize SAGE III multi-wavelength and aerosol size information
  - Improve the assumed aerosol model
- Investigate the use of longer wavelength (750 and 867 nm) to improve the retrieval at lower altitudes.
- Use CALIPSO and CATS polarization measurements to validate and improve the cloud detection algorithm