OMPS LP aerosol extinction profile measurements in the stratosphere

Ghassan Taha$^{1,2}$, P.K. Bhartia$^2$, Philippe Xu$^{2,3}$, Robert Loughman$^4$, and Glen Jaross$^2$

$^1$Universities Space Research Association, $^2$NASA GSFC, $^3$SAIC, $^4$Hampton University
OMPS Limb sensor

**Limb Profiler**

**Heritage:** SOLSE / LORE, SAGE III, OSIRIS, SCIAMACHY, GOMOS

**Wavelength:** 280 – 1000 nm

**Vertical range:** 105 km (5 - 80 km consistently)

**Vertical Sampling:** 1 km

**Vertical resolution:** ~1.8 km

**Along-track sampling:** 125 km

**Detector:** 0.25 megapixel CCD at -45 °C
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 MERRA 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), single-mode log-normal, with no altitude variation: \((r_0, \sigma) = (0.06 \mu m, 1.73)\)
  - Current data Version 0.5

- Data are screened for clouds using Chen et al. [2016]
OMPS LP daily coverage

3 slits, 14-15 orbits each day, 160 events, ~7200 measurement daily
OMPS & OSIRIS daily zonal mean comparison Latitude 10S - 0

OMPS - OSIRIS %

-10< Lat >0

[Graphs showing data comparison over years for different altitudes (16.5 km to 30.5 km)]
OMPS vs. OSIRIS global zonal mean comparison
OMPS vs. OSIRIS stratospheric column

Statospheric aerosol column (17.5 km to 35.5 km)

* Nabro  o Kelut  x Calbuco

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Enhanced tropical aerosol extinction values during easterlies (upward lofting) and drop in aerosol values during westerlies (downward descent).

February 2012 (Easterly phase)

May 2012 (Westerly phase)
Tracking Kelut volcanic eruption – first month

- Weekly maps at 20.5 km
- Superimposed MERRA zonal winds
Tracking Kelut volcanic aerosol

- Aerosol transport poleward in synoptic scale tongue of air
- Aerosol transport via anticyclone poleward and trapped inside for weeks.
Injection of Calbuco aerosol in the polar vortex
Future plans

- New V1.0 aerosol data in Sept 2016
  - Improved straylight correction results in better agreement between 3 slits, and improved retrieval in polar region
  - New bimodal lognormal size distribution model with coarse mode fraction of 0.003. Only minor change in aerosol extinction
  - Provides residuals at 8 wavelengths for diagnostics and future improvements.

- Validate OPMS LP V1.0 with OSIRIS, CALIPSO and Models

- Use CALIPSO and CATS polarization measurements to validate and improve the cloud detection algorithm

- Investigate the use of longer wavelength (867 nm) to improve the retrieval at lower altitudes.

- Validate OMPS LP with SAGE III solar and limb measurements (after launch) and utilize SAGE III multi-wavelength and aerosol size information