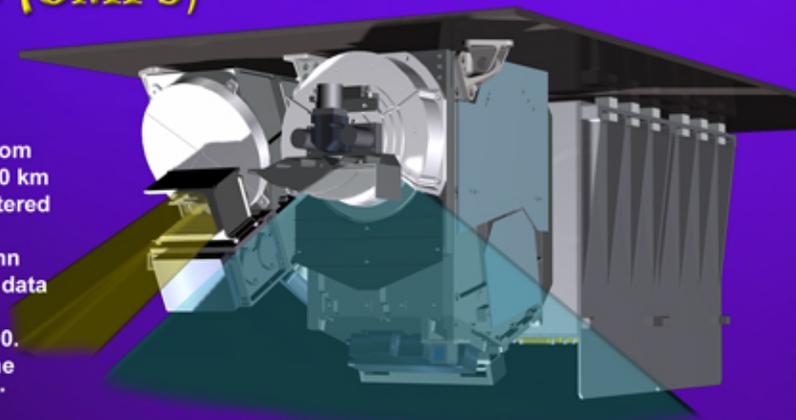


OMPS – The Next Generation Sensor Suite For Global Ozone Monitoring

Scott Asbury, Lester Farwell, Ken Eastman, Quinn Remund, and Juan Rodriguez

Ozone Mapping and Profiler Suite (OMPS)

The Ozone Mapping and Profiler Suite (OMPS) will monitor ozone from space in continuation of daily global data produced by the current ozone monitoring systems, but with higher fidelity. OMPS will collect total column and vertical profile ozone data with still greater precision than the current systems – the Solar Backscatter Ultraviolet radiometer (SBUV/2) and the Total Ozone Mapping Spectrometer (TOMS). The continuous monitoring of global ozone data contributes to fulfilling the U.S. treaty obligation for the Montreal Protocol. The OMPS is comprised of two sensors – a nadir viewing mapper and a limb viewing profiler. Measurements from the operational Nadir Sensor are used to generate total column ozone Environmental Data Records (EDRs), with better than 50 x 50 km resolution at nadir. The experimental Limb Sensor provides high resolution ozone profiles by measuring the along-track limb scattered solar radiance with 1 km vertical sampling. Both sensors will maintain long-term data product stability through periodic solar irradiance measurements. The OMPS program will comprise three operational ozone data products (high performance Total Column EDRs, heritage TOMS V7 total column data records, and heritage SBUV/2 Nadir Profiler data records) and one experimental ozone data product (high performance ozone profile measurements). The first OMPS flight unit will fly on NASA's National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) risk-reduction mission expected to launch in 2010. The second OMPS flight unit will fly on the tri-agency DOC, DoD and NASA NPOESS C1 operational mission slated for launch in the 2013 timeframe.



Nadir Sensor Characteristics

One telescope feeds two separate grating CCD spectrometers (total column and profile)

Spectral Range

mapper 300 to 380 nm
profiler 250 to 310 nm

Spectral Sampling Interval (Full Width Half Maximum)

mapper 2.4 pixels per FWHM
profiler 2.4 pixels per FWHM

Spectral Resolution (FWHM)

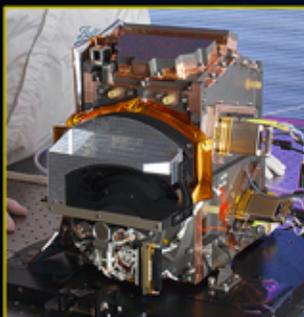
mapper 1.0 nm
profiler 1.0 nm

Field of View (FOV) (cross-track x along-track)

mapper 110.4 x 1.0 deg
profiler 16.6 x 1.0 deg

Swath Width

mapper 2800 km (35 cells, 50 km at nadir)
profiler 250 km (single cell at nadir)



Nadir Sensor Status

- Flight 1 delivered for NPP
- Flight 2 for NPOESS C1 in final assembly
- Flight 2 acceptance test July 2009 – July 2010

OMPS Mission Characteristics

Orbit: Sun-synchronous
NPOESS: 833 km Altitude
98.7-deg Inclination
1330 Local Time Ascending Node
NPP: 824 km Altitude
1330 Local Time Ascending Node

OMPS Suite Characteristics

Suite Mass 68 kg
Suite Dimensions
Sensors 57.0 x 51.0 x 35.0 cm
MEBs 50.5 x 25.5 x 45.2 cm
Suite Power, Average 108W

OMPS Mission Products

Primary

Ozone Total Column
Limb Vertical Ozone Profile
Nadir Vertical Ozone Profile
Calibrated Spectral Radiances

Secondary

SO₂ Index
Aerosol Index
Surface Albedo

Main Electronics Box Characteristics

PPC603r-based payload control processor board, Ball Aerospace-developed flight software

14-bit analog-to-digital converters

On-board linearity and gain corrections, data binning, hot pixel removal

Complete dual redundancy for 7-year reliability



MEB Status

- Flight 1 delivered for NPP
- Flight 2 for NPOESS C1 in production
- Flight 2 acceptance test July 2009 – October 2009

Limb Sensor Characteristics

Three vertical slits image the Earth limb along-track and at 250 km on either side of the satellite track.

A prism disperses three slits onto a single CCD.

The demanding dynamic range of the Earth limb is handled through two optical gain levels and two integration times.

Vertical Profile Coverage
tropopause to 60 km

Vertical Sampling Interval
1 km

Spectral Range
290 to 1000 nm

Spectral Sampling Interval
2.0 pixels per FWHM

Spectral Resolution (FWHM)
2.8 to 54 nm

Field of View
8.5 cross-track x 1.85 deg vertical

Swath Width
500 km cross-track



Limb Sensor Status

- Flight 1 delivered for NPP
- Limb sensor not manifested on NPOESS C1

