Global and daily monitoring of three dimensional distribution of ozone and other constituents

**Nadir Mapper**
Grating spectrometer, 2-D CCD
110 deg. cross track, 300 to 380 nm spectral, 1.1 nm FWHM bandpass

**Nadir Profiler**
Grating spectrometer, 2-D CCD
Nadir view, 250 km cross track, 270 to 310 nm spectral, 1.1 nm FWHM bandpass

**Limb Profiler**
IDPS produces 18 types of Data Record from OMPS nadir instruments:

- 9 RDRs
- 6 SDRs
  - 2 Calibration SDR
  - 2 Calibration SDR GEO
  - 2 Earth View (Science) SDR – focus of the review
- 2 EDRs and 1 IP
Milestones

• 2011-10-28: Launch
• 2012-01-27: Door open, 1st image
• 2012-03-12: Beta status for EV SDR (45 days after door open)
• Provisional:
  – Planned for March 2013 (15 months after launch)
  – To be approved in January 2013.
## Instrument Performance – NM

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification/Prediction Value</th>
<th>On-Orbit Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-linearity</td>
<td>&lt; 2% full well</td>
<td>&lt; 0.46%</td>
</tr>
<tr>
<td>Non-linearity Knowledge</td>
<td>&lt; 0.5%</td>
<td>~0.1%</td>
</tr>
<tr>
<td>On-orbit Wavelength Calibration</td>
<td>&lt; 0.01 nm</td>
<td>average ~0.01 nm RMS</td>
</tr>
<tr>
<td>Stray Light NM</td>
<td>≤ 2</td>
<td>average ~± 2%</td>
</tr>
<tr>
<td>Out-of-Band + Out-of-Field Response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intra-Orbit Wavelength Stability</td>
<td>&lt;0.02 nm</td>
<td>&lt; 0.013 nm</td>
</tr>
<tr>
<td>SNR</td>
<td>&gt;1000</td>
<td>&gt; 1000 from SV and EV</td>
</tr>
<tr>
<td>Inter-Orbital Thermal Wavelength Shift</td>
<td>&lt;0.02 nm</td>
<td>&lt;0.013 nm</td>
</tr>
<tr>
<td>CCD Read Noise</td>
<td>&lt;60 –e RMS</td>
<td>&lt; 25 –e RMS</td>
</tr>
<tr>
<td>Detector Gain</td>
<td>&gt;46</td>
<td>~42</td>
</tr>
<tr>
<td>Absolute Irradiance Calibration Accuracy</td>
<td>&lt; 7%</td>
<td>5%</td>
</tr>
<tr>
<td>Absolute Radiance Calibration Accuracy</td>
<td>&lt; 8%</td>
<td>&lt; 5%</td>
</tr>
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</table>
## Instrument Performance – NP

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<td>&lt;0.02 nm</td>
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<tr>
<td>CCD Read Noise</td>
<td>&lt;60 –e RMS</td>
<td>&lt; 25 –e RMS</td>
</tr>
<tr>
<td>Detector Gain</td>
<td>&gt;43</td>
<td>~45</td>
</tr>
<tr>
<td>Absolute Irradiance Calibration Accuracy</td>
<td>&lt; 7%</td>
<td>1~10% , average: ~7%</td>
</tr>
<tr>
<td>Absolute Radiance Calibration Accuracy</td>
<td>&lt; 8%</td>
<td>&lt; 5%</td>
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</table>
Version Track and Baseline

• Software version follows IDPS Build number (currently Mx6.3).

• One code change was implemented successfully without impact on data
  – Mx6.3, Aug 2012, severe CAL and EV SDR.

• Two calibration updates were implemented successfully with the expected impacts on data
  – Day 1 solar, May 2012
  – Wavelength scale, June 2012

• Operational status is tracked at the Satellite Operation Center (SOC, http://ozoneaq.gsfc.nasa.gov/omps).
On-orbit Linearity Performance

Max. Nonlinearity %

Left CCD Half
Right CCD Half

System Requirement 2%

Measurement GMT changed 3 times: Nov. 08 – Mar. 09; May 29 – June 06; July 4-current
OMPS linearity is **exceptionally** stable

17 January 2013 NCWCP
Solar measurement SNR meets the system requirement of 1000
This image shows the effective reflectivity for the 380-nm Channel for part of an orbit of small Field-of-View (5 KM X 10 KM at Nadir) made by the OMPS Nadir Mapper in a special diagnostic mode. The Qatar peninsula sticking into the Persian Gulf in the middle of the picture lies along the nadir view of the orbital track and gives a preliminary assurance of the geolocation at better the 5 KM.
OMPS Products are stable
Known Issues with Provisional Products

1. NP Dark
2. Weekly update of dark
3. Day-1 spectral solar irradiance
4. Wavelength
5. SAA
6. NM stray light
7. NP stray light
8. Large amount of fill values
9. Smear
10. NM geo-location
Known Issues with Provisional Products

1. NP Dark
2. Weekly update of dark
3. Day-1 spectral solar irradiance
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Observed solar irradiance is within ~2% of predicted synthetic solar spectra. Will be finalized before Validated.
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Wavelength Shifts from Ground to Orbit

Wavelength changed less than 0.16 nm from ground to orbit. Slightly larger than pre-launch prediction. Being monitored.
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On-orbit Dark Current Performance

- 0.01 cnt/sec per week, or 0.5 cnt/sec per year, relative to baseline of ~2 cnt/sec
- Radiance error is small in general.
- Can be large in extreme cases, but most of those are not used

# (X1000) of Hot Pixels

Dark Current

17 January 2013 NCWCP
On-orbit Dark Current Performance

2%/wk, 100%/yr, or more

0.1%/wk, 5%/yr
1. NP Dark
2. Weekly update of dark
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South Atlantic Anomaly (SAA) Impact

OMPS NP V8PRO initres on 2012/01/26

V8pro initres Ch10252nm
V8pro initres Ch42288nm
V8pro initres Ch70302nm
V8pro initres Ch20274nm
V8pro initres Ch50292nm
V8pro initres Ch80306nm
V8pro initres Ch30283nm
V8pro initres Ch60298nm
V8pro initres Ch90313nm
South Atlantic Anomaly (SAA) Impact

OMPS and MLS Matchups within ±30° Latitudes, June, 2012 (page 4)
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Example of Stray Light

Stray Light

G. Jaross
Known Issues with Provisional Products

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Current Focus – Long Term – Non-Issue