Status of OMI Validation

Mark Kroon, Pieternel Levelt
on behalf of the international OMI validation team
KNMI FMI NASA Harvard OMI-AO
Launch of EOS-Aura July 15th, 2004

Image courtesy of NASA
OMI Validation

- NASA NRA
- ESA KNMI NIVR AO

Validation measurements used

Groundbased
In-situ
Aircraft campaigns
NASA NRA

- 32 OMI-related proposals
- Dutch review (14 KNMI, 1 RIVM)
- In general High Quality proposals
- Proposals also used for aircraft campaigns

Top priorities for OMI:

- NO2 and O3 profiles in polluted troposphere
- Level 1B calibration/validation
- Ozone retrievals for high SZA

People Involved

Mike Kurylo, Mark Schoeberl
OMI Announcement of Opportunity

**ESA KNMI NIVR AO**

- First ESA AO on Non-ESA instrument
- ESA provided website logistics
- 21 proposals (20 Europe + 1 US)
- International review (11 KNMI, 22 US)
- All proposals accepted!
- Most projects have started!
- AVDC access after Proof of Funding
- DOAS-WS posters and presentations!

**People Involved**

Claus Zehner, Yves Louis Desnos, Rita Malosti, Francesco Pallazo, Mark Kroon, Ellen Brinksma, Pieternel Levelt, Ernie Hilsenrath, Gilbert Leppelmeier, Joost Carpay
Air Craft Campaigns for Aura/OMI validation

- Aura Validation Experiment (AVE)
  - October 2004 Houston
  - January 2005 Portsmouth (Polar AVE)
  - June 2005 Houston
  - January 2006 Costa Rica

- INTEX-B March – May 2006
Polar-AVE : 03 February 2005 : Aura track, Boundary layer dip, Sun run

OMI NO2 Total Column : Orbit 2962-2963 : Detroit overpass of Orbit 2963 at 18:38 UTC
DANDELIONS

Dutch Aerosol and Nitrogen Dioxide Experiments for validation of OMI and SCIAMACHY

- Dutch National Funding (2 years)
- Led by KNMI, partners RIVM & TNO-FEL
- Aerosol and NO2 validation
- Polluted areas

AOD from ATSR-2, August 2000
(R. Schoemaker, L. Curier, TNO-FEL)
DANDELIONS NO2 Lidar

- RIVM mobile lidar (DIAL) system
- Campaigns & routine measurements 2005
- Comparison with NL surface sampler network

- **First measurement: December 20, 2004**
- **Multi angle measurement yields profile**

![Graph showing absorbance vs wavelength with 'off' and 'on' labels]

2005-05-28 10:31-12:33 UTC
RIVM mobile lidar

- **altitude range**
- **concentration NO₂ (µg/m³)**

Preliminary data

*Pictures courtesy of RIVM*
SAUNA

Ground based campaign for validation of ground-based measurements

- Brewer/Dobson
- DOAS
- Many others
- See talk Bojan Bojkov, Monday afternoon

Organising: NASA and FMI
The Aura Validation Data Center (AVDC) is a collaborative effort between NASA and universities to validate and calibrate the data collected by the Aura spacecraft. The AVDC provides access to a wide range of Aura validation data, including satellite data, model simulations, and ground-based measurements.

For further information on access to provisional OMI data products, please contact the AVDC.

### Contact Information

**AVDC Contact:**
- Bojan Bojanov
- bojan.bojanov@gsfc.nasa.gov

**Last Updated:**
- December 18, 2005

### Data Access

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<thead>
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<th>Data Product</th>
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<td>TOMS-10 Oxygen column and aerosol index - Gridded dataset (1.25°)</td>
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Note that access to some areas of the Aura Validation Data Center and the AVDC archive are guided by the AVDC data access policy. For further information on accessing the data protocol or data access, please contact the AVDC.
OMI Validation Priorities

**NO2 (air craft campaigns (INTEX, AVE/ACAM), DANDELIONS)**
most correlative measurements in pristine regions at dusk / dawn or in-situ polluted regions (remote sensing, ground based, airborne)
profiles in polluted regions at OMI overpass (retrievals)

**Ozone (air craft campaigns, SAUNA)**
multitude of total column observations available, mostly pristine
tropospheric ozone column and profile under polluted conditions (ground, airborne)
ozone validation for large solar zenith angles, clouds, snow etc.

**Aerosols (DANDELIONS)**
OMI measures aerosol absorption optical thickness in the UV spectral range
aerosol observations (AOD,SSA) in general
aerosol type and size distributions

**Other OMI products (INTEX, for clouds also AVE)**
SO2 , BrO , HCHO , OClO , cloud products
OMI Field of View Geolocation

**Distilling Level Ib RGB**
- Wavelength bands VIS channel
  - **Red** = [465-485 nm]
  - **Green** = [405-415 nm]
  - **Blue** = [340-360 nm]
- Histogram equalization enhances details

**World map alignment**
- Latitude = 8º/1000 ± 0.3º/1000
- Longitude = -3º/1000 ± 0.3º/1000
  Note: 1º/1000 = 111 m
  Nadir = 24x13 km²

RGB Data by Ruud Dirksen, KNMI
RGB Images by Mark Kroon, KNMI
OMI DOAS and TOMS total O3 column

21-27 March 2005 OMDOAO3 and OMTO3 (v002) on 1.0°x1.0° grid
Correlation > 90 %

OMDOAO3 [DU]  
OMTO3 [DU]
OMI DOAS total O3 column vs Brewer

OMI vs. Brewer ozone columns

av diff: 2.0%
av sdev: 3.4%

OMI 2 % bias (high)

Sep 28, 2004 – Sep 9, 2005 OMDAO3 v002 provisional release

Image courtesy of Ellen Brinksma, KNMI

Brewer Data courtesy of Dimitris Balis, LATP
OMI TOMS total O3 column vs Brewer and Dobson

Time Frame Sep 28, 2004 – Sep 9, 2005

Image courtesy of Gordon Labow, GSFC
OMI DOAS total O3 column vs Dobson

Image courtesy of Dimitris Balis, LATP [PI OMI AO proposal 2925]
OMI TOMS total O3 column vs Dobson

Image courtesy of Dimitris Balis, LATP [PI OMI AO proposal 2925]
Validation OMI NRT trop. NO₂ product

Comparison with ground based DOAS: 60%

Comparison with Chimere model

Blond, Boersma, Eskes

Comparison with RIVM in-situ ground based network: Rural 80%

Brinksma, Boersma, Aalbers, Richter
OMI trop NO2 column vs DANDELIONS

Correlation coefficients
All data: 0.21
Cloud free: 0.67  (f<0.2)

Correlation coefficients
All data: 0.42
Cloud free: 0.43  (f<0.3)

Image courtesy of Michel van Roozendael et.al. BIRA
## Validation and Availability (Apr 2006)

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<td>O3 Profile</td>
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OUTLOOK

**Ground based:**

DANDELIONS campaign in September (Holland) (NO2 & aerosols)
CESAR (Dutch funded follow-on project) focused on trop O3, NO2
Follow-on SAUNA Campaign in Tenerife (TBC)

**Aircraft:**

AVE campaign in 2007 (TBC)
TC4

*INTEX campaign, Boersma et al.*
OMI metingen luchtvervuiling door stikstofdioxide nu dagelijks online

Dinsdag, 18 oktober 2005.

Iedere dag kan men de luchtkwaliteit voor Europa bekijken in de Ozone Monitoring Instrument (OMI).

De ontdekkingen van OMI maken inderdaad deel uit van een belangrijk onderzoek naar de tropospherische stikstofdioxide (NOx).

http://www.knmi.nl/omi

mark.kroon@knmi.nl

Laatste Nieuws
- Overzicht
- Aura nieuws (Engels)
- Laatste nieuws aardatmosfeer onderzoek (Engels)

Over deze website
- Contact Informatie
- Website veranderingen

Meer over dit bericht
- Veel gestelde vragen (FAQ)
- NO2 metingen vandaag en gisteren
- OMI trop. NO2 archief op TEMIS
- KNMI Persbericht
- PIVM print deze pagina
- Andere terug naar boven metingen

Meer resultaten versies van de figuren