

NETHERLANDS

Observations at KNMI in De Bilt, Netherlands, (52.10N, 5.18E)

Brewer MKIII Spectrophotometer:

- Total ozone, continuous observations since 1994.
- Data deposited at WO3UDC.
- Near-real-time data “WMO Ozone Mapping Centre” and WO3UDC
- UV scans, about once per hour since 1994.
- Data deposited at EDUCE database
- Aerosol optical depth (experimental product)

Research and applications

- Validation of ozonesonde and satellite observations
- Radiative transfer model studies
- UV exposure estimations by RIVM
- Calibration of UV-index forecasts
- Algorithm development for global UV index forecast

Ozonesondes

- Profiles of ozone, temperature, humidity and wind, typically up to ~30 km.
- Approx. weekly balloon releases since 1992.
- Intensified releases during MATCH campaigns.
- Extra releases for ENVISAT / AURA validation.
- Data deposited at WO3UDC.
- Data deposited near-real-time at NILU database.

Research and applications:

- Stratosphere/troposphere exchange
- Validation of satellite observations (GOME and SCIAMACHY)
- Development of GOME/SCIAMACHY ozone profile retrieval.
- Near-real-time data “WMO Ozone Mapping Centre” and WO3UDC

Observations at the Suriname Meteorological Service (MDS) in Paramaribo, Suriname, (5.81N, 55.21W).

Brewer MKIII Spectrophotometer:

- Continuous total ozone and UV scans, plus Umkehr at dusk and dawn: since April 1999.
- Data deposited at NDSC, WO3UDC databases
- Near-real-time data “WMO Ozone Mapping Centre” and WO3UDC

Research and applications

- Validation of ozonesonde and satellite observations
- Radiative transfer model studies
- Calibration of UV-index forecasts
- Algorithm development for global UV index forecast

Ozonesondes:

- Profiles of ozone, temperature, humidity and wind, typically up to ~30 km.
- Weekly balloon releases since September 1999.
- Data deposited at SHADOZ (Southern Hemisphere Additional Ozone Sondes) and NDSC databases
- Data deposited near-real-time at NILU database.

Research and applications:

- Atmospheric transport, dynamics and chemistry in the Tropics
- Stratosphere/troposphere and inter hemispheric exchange
- Validation of satellite observations (GOME and SCIAMACHY)
- Development of GOME/SCIAMACHY total ozone and ozone profile retrieval.
- Algorithm development for global UV index forecast

Projects relating to satellite observations

- The EU/ESA project “PROMOTE” (PROtocol MONitoring for the GMES Service Element) (<http://www.gse-promote.org/>)
 - Coordinator of the project
 - Service provider for Ozone
 - Service provider for Ultra-violet radiation
 - Service provider for Air quality
 - Service provider for Climate Change
- The ESA project TEMIS (Tropospheric Emission Monitoring Internet Service) (<http://www.temis.nl/>)
 - Coordinator of the project
 - Ozone: Tropospheric and Stratospheric
 - Nitrogen dioxide: Tropospheric and Stratospheric
 - Ultra-violet radiation: UV-index and dose
 - Ozone profile (under development)
 - Aerosol absorbing index (under development)
- ENVISAT validation
 - Coordinator of the project
 - Validation of various ENVISAT products
- *Preparation of future satellite missions:*
 - Preparation for operational missions: GOME-2 (Ozone SAF) and Sentinels 4/5 (GMES)
 - KNMI is leading the TRAQ (TRopospheric and Air Quality) proposal in response to ESA Call for next Earth Explorer Missions of 15 March 2005. Collaboration between KNMI, CNRS/CNES/LMPAA, and SRON.
 - Participate in designing future ESA atmospheric chemistry research missions: GeoTROPE, and PREMIER.
 - CAMEO (Composition of the Atmosphere from Mid-Earth Orbit): A mission concept submitted in response to the 27 January 2005 request for information by the U.S. National Research Council Decadal Study on *Earth Science and Applications from Space*. Collaboration between NASA-JPL, KNMI, SRON and University of Edinburgh
 - Potential contribution to ESA sentinels 4 and 5 for monitoring atmospheric chemistry (CAPACITY project)

Ozone Monitoring Instrument (OMI)

KNMI is the principal investigator institute of the Ozone Monitoring Instrument (OMI) and responsible for operating and the in-flight calibration of the instrument and together with NASA and FMI for delivering data products (algorithm development & data processing) and performing their validation.

- OMI contributions:
 - Monitoring of the ozone layer: Continues the TOMS, SBUV and GOME ozone column and profile data. In addition OMI will continue the GOME column measurements of BrO, OCIO and NO₂
 - Air quality: Observe tropospheric pollution and its precursors due to biomass burning, industrial and traffic emissions such as NO₂, aerosols, SO₂, formaldehyde and ozone. The

small pixel size (13 km x 24 km at nadir) is the highest spatial resolution ever achieved from space for these trace gas measurements and increases sensitivity in the troposphere

- Climate change: Continues the TOMS, SBUV and GOME total ozone record. Provide a record of tropospheric ozone and UV absorbing aerosols
- OMI measurements:
 - OMI data products are: Total column amounts of ozone, NO₂, BrO, OCIO, SO₂, formaldehyde, tropospheric column amounts of ozone and NO₂; profile information for ozone; aerosol optical depth, aerosol single scattering albedo and in addition surface UV-B radiation, cloud top pressure and cloud coverage
 - OMI was launched in July 2004 and will operate till 2009/2010
 - First OMI total ozone data for the long term arctic ozone trend was delivered for the IPCC/TEAP Special Report: *Safeguarding the ozone layer and the global climate system: Issues related to the hydrofluorocarbons and perfluorocarbons, Summary for Policy Makers*, WMO/UNEP, 2005
 - The OMI total ozone column was publicly released in May 2005
 - Most OMI products will be publicly released mid 2006
 - Most OMI products are available with daily global coverage with a (nadir) footprint of 13 km x 24 km
 - The total ozone, NO₂, and volcanic SO₂ column and tropospheric NO₂ column will be delivered within 3 hours of observations with global coverage as of early 2006 for use in numerical weather forecast and air quality models as well as volcanic warnings applications for air craft traffic

Modelling

Chemistry-transport modelling:

- Tropospheric ozone budget.
- Effects of aviation
- Aerosols
- Lightning and surface NO_x
- Stratospheric ozone
- Methane

Dynamics:

- Stratosphere/troposphere coupling
- Age of stratospheric air
- Antarctic sudden stratospheric warming
- Stratosphere as predictor of the troposphere
- Tropical tropopause layer

Validation:

- Ozone soundings in De Bilt and Paramaribo
- Participation in ENVISAT validation

Assimilation of ground-based and satellite observations:

- EU project GOA: data assimilation of GOME ozone and GOME NO₂.
- TEMIS: Tropospheric Emission Monitoring Internet service, <http://www.temis.nl>
- EU-project ASSET: Assimilation of Envisat data, see <http://darc.nerc.ac.uk/asset/>

Contribution to Assessment reports:

- IPCC Assessment – Fourth Assessment Report (4AR)
- WMO/UNEP Ozone Assessment Report 2002
- European report on ozone- climate interactions (2003).