NETHERLANDS

The contribution of the Netherlands to ozone monitoring and research are summarized in this report, for the Royal Netherlands Meteorological Institute (KNMI), the National Institute for Public Health and the Environment (RIVM), and the Institute for Marine and Atmospheric Research, Utrecht University (IMAU).

Royal Netherlands Meteorological Institute (KNMI):

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

Research and applications

- validation of ozonesonde and satellite observations
- radiative transfer model studies
- UV exposure estimations by RIVM

Brewer MKIII Spectrophotometer (continued)

- UV scans, about once per hour since 1994.
- Data deposited at EDUCE database

Research and applications:

- Calibration of UV-index forecasts
- Radiative transfer model studies

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 during GOME (ERS-2) overpasses.
- Data deposited at WO3UDC.
- Data deposited near-real-time at NILU database.

Research and applications:

- stratosphere/troposphere exchange
- validation of satellite observations
- development of GOME ozone profile retrieval.

Observations at the Suriname Meteorological Service (MDS) in Parmaribo, 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

Research and applications

- Validation of ozonesonde and satellite observations
- Radiative transfer model studies
- Calibration of UV-index forecasts

Ozonesondes:

- Profiles of ozone, temperature, humidity and wind, weekly balloon releases since September 1999.
- Data deposited at SHADOZ (Southern Hemisphere Additional Ozone Sondes) and NDSC databases

Research and applications:

- Atmospheric transport, dynamics and chemistry in the Tropics
- Stratosphere/troposphere and interhemispheric exchange
- Validation of satellite observations (GOME and SCIAMACHY)

- Development of GOME total ozone and ozone profile retrieval.
- Algorithm development for global UV index forecasts based on GOME total ozone

Retrieval, analyses and validation of satellite observations:

- GOME total ozone, ozone profile, and NO_2 column retrieval, since 1997.
- SCIAMACHY profile retrieval, from 2002.
- GOME UV Index forecasts, from 2001
- SCIAMACHY validation, preparation and carry out, since 1997.

Preparation of future satellite missions:

- Participate in designing future ESA atmospheric chemistry missions: TROC, Geo TROPE, and ACECHEM.
- Scientific lead for the Dutch-Finnish Ozone Monitoring Instrument (OMI) on board EOS AURA (PI-institute)
- Preparation for GOME-2 (Ozone SAF)

Modelling:

Chemistry-transport modeling:

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

Dynamics:

- Stratosphere/troposphere coupling (also for 2 x CO_2).
- Inter-hemispheric exchange
- Effects of gravity waves on STE and vortex permeability
- AO: Arctic Oscillation

Validation:

- Aircraft measurements of composition, e.g. Caribic project
- Ozone soundings in De Bilt and Paramaribo

Assimilation of ground-based and satellite observations:

- EU project GOA: data assimilation of GOME ozone and GOME NO_2.
- GOME total ozone and ozone profile assimilation in 3-D chemistry transport model (ESA Data User Programme). Near real-time ozone fields and ozone + global UV Index forecasts are continuously generated and can be obtained at the web-site: http\\:www.knmi.nl/neonet/atmo_chem./gome/fd
- Preparations for the assimilation of SCIAMACHY products: ozone, methane, aerosols, NO_2, and others
- Participation in ENVISAT validation

Contribution to Assessment reports:

- European Research in the Stratosphere 1996-2000
- IPCC Assessment – Third Assessment Report (TAR)
- WMO/UNEP Ozone Assessment Report 2002

National Institute for Public Health and the Environment (RIVM)

Operation of a stratospheric lidar for ozone, temperature and aerosol profiling at NDSC Primary Station Lauder, New Zealand:

- Ozone profiles 8 - 45 km
- Temperature profiles 8 - 65 km
- Aerosol backscatter coefficient profiles 8 - 30 km

- Between 50 -100 measurement nights per year
- Time series starts December 1994, NDSC database.

Operation of a tropospheric lidar for ozone and aerosol profiling at TOR station Bilthoven, the Netherlands:
- Ozone profiles 1 - 8 km
- Aerosol backscatter coefficient profiles 1 - 8 km
- Between 50 -100 days per year with observations
- Time series starts December 1994, TOR database.

UV-monitoring with high spectral resolution in Bilthoven, the Netherlands:
- Year-round UV monitoring with high spectral resolution
- UV-maps of Europe using satellite and groundbased measurements, including cloud effects
- Extensive validation activities of these maps by comparing satellite fields with groundbased observations
- Setting up of a European UV database (SUVDAMA project)

Participation in satellite validation programs:
- GOME ozone profiles (active member of ESA validation working group)
- ENVISAT validation program: Sciamachy, Gomos and Mipas.
- EOS Aura/OMI

Contribution to assessment reports:
- UNEP/WMO Scientific assessment of Ozone Depletion
- European Environmental Agency assessment reports

Institute for Marine and Atmospheric Research, Utrecht University (IMAU)

Observations by aircraft (twinjet), in collaboration with European groups:
Ozone and precursors:
- Ozone, hydrogen peroxide
- NO_y gases, CO, hydrocarbons
- Aldehydes, ketones, organic acids, alcohols
- Actinic fluxes

Air mass tracers:
- Methane, nitrous oxide
- Water vapor, CFC's
- Carbon dioxide

Aerosols:
- Small particles and ion-molecule clusters
- Aerosol size distributions
- Aerosol chemical composition

Research topics:
- Oxidation processes in upper troposphere/lower stratosphere
- Stratosphere-troposphere exchange
- Ozone chemistry in the tropical troposphere
- Aerosol microphysical processes

Atmospheric chemistry and climate modelling:
Chemistry transport modelling:
- Tropospheric ozone budget
- Oxidation efficiency of the atmosphere
- Ozone chemistry in the lower stratosphere
- Heterogeneous processes
- Biosphere-atmosphere interactions

Chemistry climate modelling:

- Stratosphere-troposphere exchange
- Aerosol dynamics and composition
- Ozone, methane and aerosol radiative forcing and responses

Model validation:

- Aircraft measurements
- Balloon ozone soundings
- Satellite observations (e.g., GOME, HALOE)

Contribution to assessment reports:

- WCRP – model intercomparisons
- WMO/UNEP Ozone Assessment 2002
- European Assessment on the Impact of Aircraft on the Atmosphere

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