OMI YEARLY TROPOSPHERIC NO_2 PRODUCT DESCRIPTION

1. Identification

1.1. Product description

1.1.1. Abstract

Global tropospheric NO_2 columns are retrieved from satellite observations. They are based on slant column NO_2 retrievals with the DOAS technique, and the KNMI combined modeling/retrieval/assimilation approach. Per year the average of all daily values is calculated.

1.1.2. Purpose

The dataset has been developed to monitor air pollution from anthropogenic and natural sources.

1.1.3. Application

Nitrogen oxides play a central role in tropospheric chemistry, and there are several reasons why an improved knowledge of the global tropospheric distribution of NOx (NO+NO2) is important:

- NOx and volatile organic compounds are emitted in large quantities due to human activities such as traffic and industry. In the summer months this mixture produces photochemical smog.
- The chemical budget of ozone in the troposphere is largely determined by the concentration of NOx. The knowledge of the ozone distribution and its budgets is strongly limited by a severe lack of observations of NO and NO2 in the troposphere.
- The variability of NOx concentrations in the lower troposphere in industrialised areas and near biomass burning sites is very large. The few available point observations of NOx, on the ground or from aircraft measurements, are therefore difficult to translate to regional scale concentrations.
- The residence time of NOx in the lower troposphere is short. Therefore observations of boundary layer NOx contain important information on the emissions of nitric oxide, and the trends in these emissions.
- The free troposphere is also of great importance for the ozone budget, and for CH4 and CO oxidation processes. Again these budgets are uncertain due to a limited knowledge of NOx. The degree of NOx transfer from the boundary layer is difficult to model, and NOx emissions from lightning are very uncertain.

1.2. Time period of content

1.2.1. Time period of content

2005 - 2008

1.2.2. Currentness reference
Yearly average

1.3. Status

1.3.1. Progress
Complete and validated.

1.3.2. Maintenance and update frequency
Continuous

1.4. Spatial Domain

1.4.1. Bounding coordinates
Global coverage: Longitude [-180,180], latitude [-90.,90.]

1.5. Keywords

1.5.1. Theme
Atmosphere, air quality.

1.5.2. Place
Global.

1.5.3. Stratum
Troposphere.

1.5.4. Temporal
2005-2008

1.6. Access constraints
None.

1.7. Use constraints
None.

1.8. Point of contact
Ronald van der A, (email avander “at” knmi.nl)

1.9 Citation

1.9.1. Originator
KNMI.

1.9.2. Publication date
October 2011.

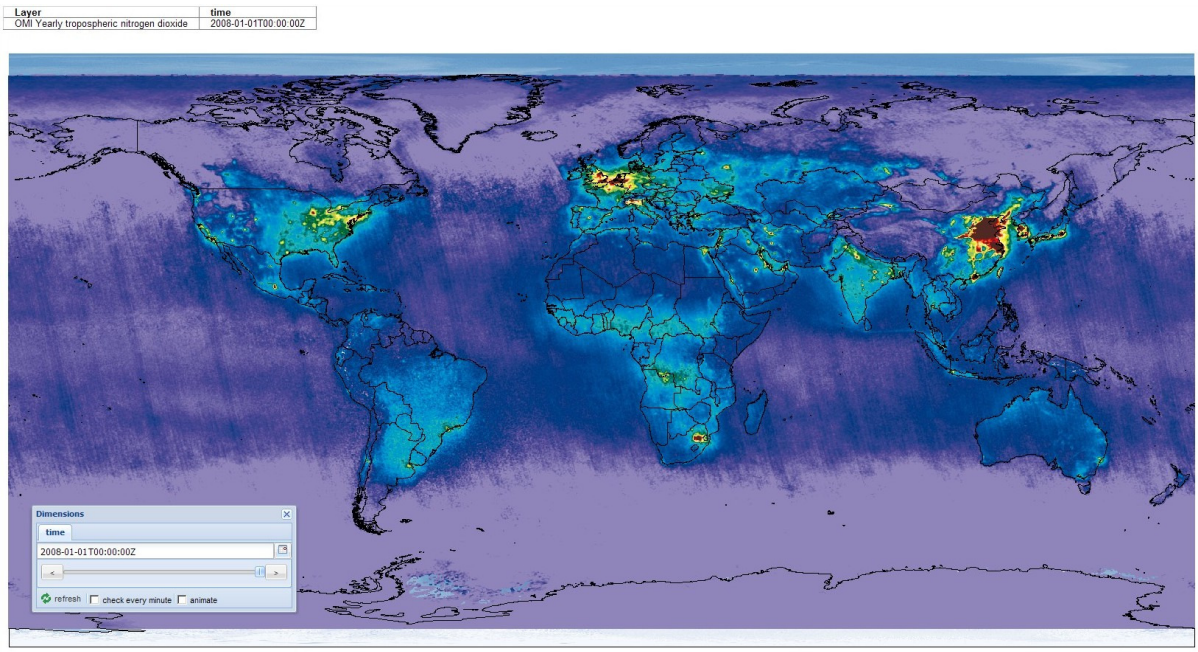
1.9.3. Title

Tropospheric NO_2 from OMI

1.9.4. Edition

Collection 3.

1.10 Preview



1.11. Data set credit

K. F. Boersma, R. J. Dirksen, J. P. Veefkind, H. J. Eskes, and R. J. van der A.

1.12. Cross reference

GOME, OMI and GOME-2 tropospheric NO_2 data (http://www.temis.nl/).

1.13. Literature

Boersma, K.F., H.J. Eskes, J.P. Veefkind, E.J. Brinksma, R.J. van der A, M. Sneep, G.H.J. van den Oord, P.F. Levelt, P. Stammes, J.F. Gleason and E.J. Bucsela, Near-real time retrieval of tropospheric NO2 from OMI, Atm. Chem. Phys., 2013-2128, sref:1680-7324/acp/2007-7-2103, 2007

2. Data Quality

2.1 Lineage

2.1.1. Source information

NO_2 slant columns from KNMI.

2.1.2. Processing steps

2.1.2.1. Processing description

Satellite instruments use spectroscopy to retrieve atmospheric trace gas concentrations in the atmosphere. By comparing the measured spectrum of the backscattered light from the Earth's atmosphere with a reference spectrum, the column density of nitrogen dioxide along the light path can be determined. The NO_2 stratospheric column is deduced from a chemistry-transport model assimilation run of the NO_2 column data. Subsequently, the assimilated stratospheric column is subtracted from the retrieved total column, resulting in a tropospheric column. These columns are averaged over the year,

2.1.2.2. Algorithms used

Tropospheric NO_2 retrieval algorithm.

2.1.2.3. Ancillary data

Meteorological data (wind, temperature, surface pressure) by ECMWF.

2.1.2.4. Processing date

July 2011.

2.1.2.5. Data validation

20-40 %.x

3. Spatial Data Organization

3.1. Indirect Spatial Reference

Map covers the world.

3.2. Direct Spatial Reference Method

Raster data in a regular longitude latitude grid on a 0.125 degree resolution

3.3. Point and vector object information

N/A

3.4. Raster object information

3.4.1. Row count

1440

3.4.2. Column count

2880

3.4.3. Vertical count

1

4. Spatial Reference

4.1. Coordinate System

4.1.1. Geographic coordinate units
degrees.

4.1.2. Map projection
latitude_longitude.

4.1.3. Datum
WGS84

4.1.4. EPSG Code
EPSG:4326

4.1.5. PROJ4 parameters
+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs

5. Product Description Reference Information

5.1. Product Description Date
12 October 2011

5.2. Product Description Review Date
31 October 2011.

5.3. Product Description Contact
Ronald van der A, (email avander “at” knmi.nl)