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Gridded vertical tropospheric NO2 columns from SCIAMACHY limb/nadir matching

Contact:	Andreas Hilboll <hilboll@iup.physik.uni-bremen.de>
Institution:	Institute of Environmental Physics, University of Bremen
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This document describes the global gridded monthly vertical tropospheric NO2 columns retrieved from the SCIAMACHY instrument using the limb/nadir matching technique, as described in *Hilboll et al. (2013a)*.

Contents

Version history

Version	Date	User	Changes
3.0	2013-06-27	hilboll	initial release

Dataset description

This dataset of tropospheric NO2 columns is in a way an improved extension of the data presented in *Richter et al. (2005)*.

The retrieval of tropospheric slant column densitites (SCDtrop NO2) from SCIAMACHY radiances using the limb/nadir matching approach has been described in *Hilboll et al. (2013a)*. For this version of the tropospheric NO2 column dataset, the limb profiles from the version 3.1 scientific processor were used (*Bauer et al., 2012*).

All measurements are aggregated to monthly averaged 0.125° grids. The conversion to vertical tropospheric column densities has been carried out analogously to *Hilboll et al. (2013b)*:

Tropospheric air mass factors (AMFs) have been calculated with the radiative transfer model SCIATRAN (*Rozanov et al., 2005*). The vertical distribution of tropospheric NO2 has been taken from a climatology of NO2 mixing ratios from the MOZART2 model (*Horowitz et al., 2003*), and surface spectral reflectance from GOME measurements (*Koelemeijer et al., 2003*). Both aspects are explained

in detail in *Nüß (2005)*. The AMFs have then been spatially interpolated to a 0.125° grid. Measurements with a cloud coverage exceeding 20% have been filtered out using the FRESCO+ algorithm (version 6; *Wang et al., 2008*). Additionally, we applied an intensity filter to discard scenes with very large surface reflectivity. This is necessary as the used albedo or surface spectral reflectance climatology (*Koelemeijer et al., 2003*) does not account for short-term changes in reflectivity for example from snow; in addition, the FRESCO+ cloud fractions have large uncertainties over bright surfaces.

Data availability

This dataset can be downloaded at http://www.doas-bremen.de/scia_no2_data_tropos.htm. It is available both in HDF4 and ASCII formats, as annually aggregated `*.zip` files. The filenames are `scia_no2_v30_YYYY_hdf.zip` and `scia_no2_v30_YYYY_ascii.zip`, respectively.

Data format description

The HDF4 files are readable using the GDAL library.

The ASCII files are formatted as follows:

- first a header of varying length with a `*` as first character in each line
- followed by blocks of data for the individual latitude bands from south to north. Each block starts with a line giving the centre latitude (this line again starts with a *) followed by a number of lines with the values for the individual longitudes from west to east.
- the latitude and longitude steps as well as the starting and ending values are given in the header
- all the values have to be multiplied by a scaling factor also given in the header. Please note that this factor changes between years!
- missing values are flagged with a value given in the header

Example
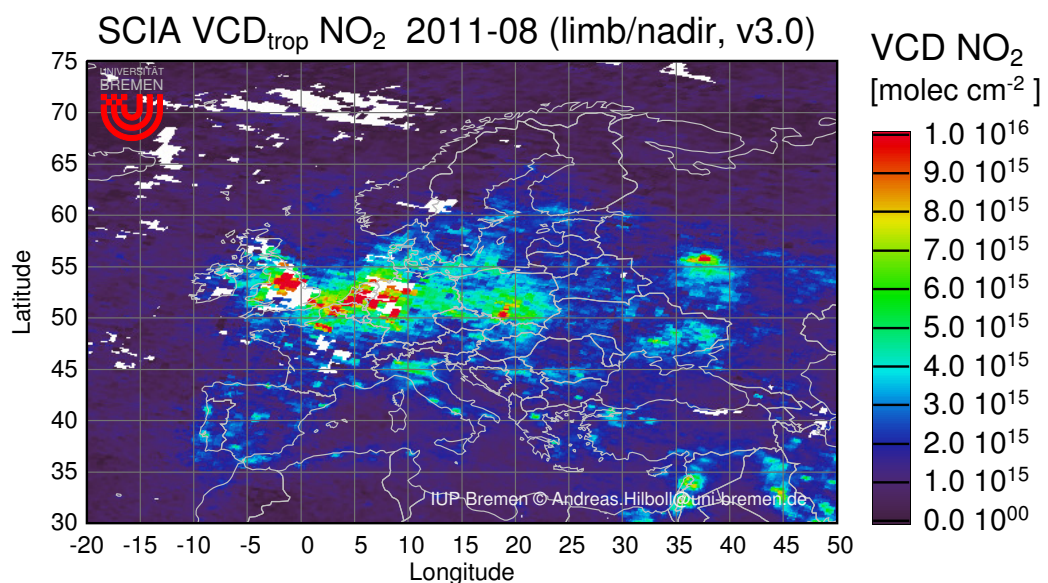
Terms of use

These data are produced at the University of Bremen and are not official ESA data products. We ask people who wish to use our data

- to keep us involved in the project and to discuss relevant findings with us

- not to pass on the data without our approval

- to clearly identify the data source in any presentation using the data by giving reference to *Hilboll et al., 2013a*, and to clearly state the data version

- should the SCIAMACHY data be a substantial part of a publication, we would like to be asked to be co-authors. This is of course a matter that needs to be discussed for each individual case.

Acknowledgements

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