

Product specification document for the retrieval of SCIAMACHY vertical tropospheric NO₂ columns

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1. Product Description

NO₂ columns are retrieved as described in the algorithm description document. In summary, slant columns of NO₂ are determined by direct spectral fitting of backscattered solar radiance. The stratosphere is removed by assuming that the monthly mean columns over the central Pacific are primarily stratospheric. A simulation from the chemical transport model GEOS-Chem (www.geos-chem.org) corrects for the small amounts of tropospheric NO₂ over the Pacific. The resulting tropospheric columns are converted into vertical columns by applying an air mass factor formulation which uses simulated vertical NO₂ profiles for GEOS-Chem, scattering weights calculated from the Linearized Discrete Ordinate Radiative Transfer (Lidort) Model [Spurr, 2002], and cloud information derived from the Fast Retrieval Scheme for Cloud Observables (FRESCO+) [Wang et al., 2008]. Surface reflectivities are from Kleipool et al. [2008].

2. Product Format

Product is available in both ASCII and HDF format

Level 2 Product

The file is named as follows:

AMF-orb#####_####-YYYYMMDD-hhmmssA.ext

#-orbit number

Y- year

M-month

D-day

h- UTC-hour

m- UTC-minute

s-UTC-second

ext- file extension (v5 for ASCII, he5 for hdf, wscat for scattering weights)

Available information includes scattering weights (both in LIDORT and GEOS-Chem resolution), pixel, scan, slant column, error, fractional radiance of clouds, latitude and longitude centre and corner points, AMF, vertical tropospheric NO₂ columns, timestamp, stratospheric slant columns, and both solar and viewing zenith angles. The ASCII format is ordered as following:

pixel, scan, slant column, error, fractional radiance from clouds, latitude A, longitude A, latitude B, longitude B, latitude C, longitude C, latitude D, longitude D, latitude centre, longitude centre, AMF, tropospheric vertical column, scan, UTC sec

Level 3 Product

Monthly means of level 2 data are re-gridded into either a 0.4° latitude × 0.4° longitude or a 2° latitude × 2.5° longitude grid. Available information includes latitude and longitude centre points, amf, error, slant column, and vertical tropospheric columns. Filenames appear as follows:

SCIAMACHYRMY.vert.ext

R- resolution (.4 or 2)

M- Month

Y- Year

ext- extension (dat for ASCII and he5 for hdf)

3. Software Release History

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4. Implementation Details

-see tropospheric NO₂ algorithm description document

5. List of Known Issues

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6. Data Quality Assessment

- See tropospheric NO₂ algorithm description document

References

Kleipool, Q. L., M. R. Dobber, J. F. de Haan, and P. F. Levelt (2008), Earth surface reflectance climatology from 3 years of OMI data, *Journal of Geophysical Research-Atmospheres*, 113(D18), doi: 10.1029/2008JD010290 ER.

Spurr, R.J.D. (2002), Simultaneous derivation of intensities and weighting functions in a general pseudo-spherical discrete ordinate radiative transfer treatment, *J. Quant. Spectrosc. Radiat. Transfer*, 75, 129-175.

Wang, P., P. Stammes, R. van der A, G. Pinardi, M. van Roozendaal (2008) FRESCO+: an improved O₂-A band cloud retrieval algorithm for tropospheric trace gas retrievals, *ACP*, 8, 6565-6576