

[Home](#)[Online Library ACP](#)[Recent Final Revised Papers](#)[Volumes and Issues](#)[Special Issues](#)[Library Search](#)[Title and Author Search](#)[Online Library ACPD](#)[Alerts & RSS Feeds](#)[General Information](#)[Submission](#)[Review](#)[Production](#)[Subscription](#)[Comment on a Paper](#)Impact
Factor
4.865ISI
indexed

ARCHIVED IN



PORTICO

[Volumes and Issues](#) [Contents of Issue 12](#) [Special Issue](#)

Atmos. Chem. Phys., 9, 3947–3956, 2009

www.atmos-chem-phys.net/9/3947/2009/

© Author(s) 2009. This work is distributed under the Creative Commons Attribution 3.0 License.

Equatorial total column of nitrous oxide as measured by IASI on MetOp-A: implications for transport processes

P. Ricaud¹, J.-L. Attié^{1,2}, H. Teyssèdre², L. El Amraoui², V.-H. Peuch², M. Matricardi³, and P. Schluessel⁴¹ Université de Toulouse, Laboratoire d'Aérodynamique, CNRS UMR 5560, Toulouse, France² CNRM-GAME, Météo-France and CNRS URA 1357, Toulouse, France³ ECMWF, Shinfield Park, Reading, Berkshire, RG2 9AX, UK⁴ Department of Programme Development, EUMETSAT, Am Kavalleriesand 31, 64295 Darmstadt, Germany

Abstract. In this paper we use the total columns of nitrous oxide (N₂O) as retrieved from the radiance spectra as measured by the Infrared Atmospheric Sounding Interferometer (IASI) instrument aboard the MetOp-A platform and distributed by the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) during the March– May (MAM) 2008 period. Since the total column of N₂O reflects concentrations in the middle troposphere, cloud-free columnar N₂O measurements are used to assess transport processes in the equatorial band (10° S– 10° N). We compare the measured data set with the outputs produced by the 3-D chemical-transport model MOCAGE during the period MAM 2002– 2004. To reflect MAM 2008 concentrations, MOCAGE results have been scaled by a factor 1.0125 in order to represent the change in concentration of N₂O since 2004. IASI N₂O equatorial measurements show a maximum over Africa ($4.96 \times 10^{-3} \text{ kg m}^{-2}$) and a minimum over South America ($4.86 \times 10^{-3} \text{ kg m}^{-2}$) in reasonable agreement with the outputs from MOCAGE despite the fact that emissions of N₂O are more intense over America than over Africa. The amplitude of the longitudinal variation of total column N₂O along the equatorial band is twice as intense in the measurements (~1.6%) than as in the model calculations (~0.8%), and much greater than the IASI mean random error (0.16– 0.33%). A difference between the two data sets is observed above the Western Pacific (110° E– 150° E) with a marked minimum in IASI compared to MOCAGE. Recent theoretical studies (Ricaud et al., 2007 and 2009) have shown the potentially important effect of the Walker and the Hadley cells on the tropospheric distribution of N₂O in producing a local maximum in N₂O above Africa. Based on equatorial total columns of N₂O retrieved from IASI, our results are consistent with the fact that Africa is a zone of convergence of airmasses coming from different convective regions whilst Western Pacific behaves more like a divergence zone.

[Final Revised Paper](#) (PDF, 2321 KB) [Discussion Paper](#) (ACPD)

Citation: Ricaud, P., Attié, J.-L., Teyssèdre, H., El Amraoui, L., Peuch, V.-H., Matricardi, M., and Schluessel, P.: Equatorial total column of nitrous oxide as measured by IASI on MetOp-A: implications for transport processes,

[Search ACP](#)Library Search Author Search [News](#)

- [New Alert Service available](#)
- [Sister Journals AMT & GMD](#)
- [Financial Support for Authors](#)
- [Journal Impact Factor](#)
- [Public Relations & Background Information](#)

[Recent Papers](#)

01 | ACPD, 22 Jun 2009:
Elevated nitrogen-containing particles observed in Asian dust aerosol samples collected at the marine boundary layer of the Bohai Sea and the Yellow Sea

02 | ACP, 22 Jun 2009:
The relationship between aerosol and cloud drop number concentrations in a global aerosol microphysics model

03 | ACPD, 22 Jun 2009:
Evaluation of the volatility basis-set approach for the simulation of organic aerosol

Atmos. Chem. Phys., 9, 3947-3956,
2009. [Bibtex](#) [EndNote](#) [Reference Manager](#)