

Interactive comment on “Technical Note: Impact of nonlinearity on changing the a prioriof trace gas profiles estimates from the Tropospheric Emission Spectrometer (TES)” by S. S. Kulawik et al.

S. S. Kulawik et al.

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Below contains the review from Anonymous Referee #3. Where a response is needed, a response statement is given with a description of the action taken. Thanks to the reviewer for the helpful suggestions on this paper.

The paper by Kulawik et al. represents an interesting and innovative contribution to the scientific literature on atmospheric remote sensing. Prior to publication in ACP, however, the paper should be thoroughly checked and corrected/improved with regard to typos and bulky formulations. Examples from the abstract: - "We examines ..." - "We find that ... is shown to ..."

Response: The document was searched for the above wording. The following modifi-

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cations were made:

In abstract, wording is changed from: "We examines the robustness of this assumption when exchanging the prior by comparing..." To: "The robustness of this assumption is tested by comparing..."

In abstract, wording is changed from: "We find that linearly converting..." To: "Linearly converting..."

In section 3.1.4, wording is changed from "We find that retrievals with a 10% increase..." To: "Retrievals with a 10% increase"

Beyond that, I agree with most suggestions outlined in the preceding referee comment, but I think that for ACP the paper qualifies as a technical note rather than a research article. It provides new and relevant methodological information for trace gas retrievals but no new insights into atmospheric processes and properties (see abstract and conclusions).

Response: This paper is a validation of the previously implicit assumption of moderate non-linearity of TES atmospheric satellite data, which is essential for exchanging the prior (the method of validation of this paper) as well as assimilation and comparisons of TES data with other instruments, models, and sondes. The conclusion that moderate linearity is valid for TES retrievals is a validation of the above uses of TES data, similar in scope and conclusions of other validation papers, e.g. validation of TES ozone. Validation papers are routinely published without the "Technical note" designation, and we would ask the Editor to consider the removal of "Technical note" from the title, as suggested by Thomas von Clarmann (the other referee).

Moreover, the references to articles that are "accepted" or "in press" should be updated.

Response: The references were checked and updated as follows:

Citation updates:

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Updated citation for (Bowman et al., 2007) paper to (Bowman et al., 2008).

Update citation Osterman et al., 2007 to Osterman et al., 2006 or Osterman et al., 2008 in different locations.

Eldering paper has been accepted; changed citation to (Eldering et al., 2008)

Updated citation in paper from (Richards et al., 2007) to (Richards et al., 2008).

Removed citation to Tremblay, 2007 (submitted). This paper was rejected.

Reference updates:

Added new reference (in response to reviewer 1): Backus, G. and Gilbert, F.: Uniqueness in Inversion of Inaccurate Gross Earth Data, Philosophical Transactions of the Royal Society of London Series a-Mathematical and Physical Sciences, 266 (1173), 123-&, 1970.

Update to accepted to ACPD:

Bowman, K. W., Jones, D. B. A., Logan, J. A., Worden, H., Boersma, F., Chang, R., Kulawik, S. S., Osterman, G. and Worden, J.: Impact of surface emissions to the zonal variability of tropical tropospheric ozone and carbon monoxide for november 2004, Atmos. Chem. Phys. Discuss., 8 (1), 1505-1548, 2008.

Eldering paper has been accepted - moved/updated to regular reference list.

Moved Jones paper before Kulawik paper (to make alphabetical).

Added DOI for Logan, 2008 and all other accepted papers.

Updated Nassar, 2007 reference and added Richards, 2008 reference. These references were munged together. These are the separated references:

Nassar, R., Logan, J. A., Worden, H. M., Megretskaia, I. A., Bowman, K. W., Osterman, G. B., Thompson, A. M., Tarasick, D. W., Austin, S., Claude, H., Dubey, M. K., Hocking, W. K., Johnson, B. J., Joseph, E., Merrill, J., Morris, G. A., Newchurch, M.,

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8, S2612–S2615, 2008

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Oltmans, S. J., Posny, F., Schmidlin, F. J., Vömel, H., Whiteman, D. N. and Witte, J. C.: Validation of Tropospheric Emission Spectrometer (TES) Nadir Ozone Profiles Using Ozone-sonde Measurements, *Journal of Geophysical Research-Atmospheres*, doi:10.1029/2007JD008819, 2008, in press.

Richards, N. A. D., Osterman, G. B., Browell, E. V., Hair, J. W., Avery, M. and Li, Q.: Validation of Tropospheric Emission Spectrometer (TES) Ozone Profiles with Aircraft Observations During INTEX-B, *Journal of Geophysical Research-Atmospheres*, doi:10.1029/2007JD008815, 2008, in press.

Add references:

Osterman, G. B., S. S. Kulawik, H. M. Worden, N. A. D. Richards, B. M. Fisher, A. Eldering, M. W. Shephard, L. Froidevaux, G. Labow, M. Luo, R. L. Herman, K. W. Bowman, and A. M. Thompson (2008), Validation of Tropospheric Emission Spectrometer (TES) measurements of the total, stratospheric, and tropospheric column abundance of ozone, *J. Geophys. Res.*, 113, D15S16, doi:10.1029/2007JD008801 7 May 2008

Removed reference to Tremblay, 2007 (submitted). This paper was rejected.

There was a double listing of Worden, H.M. (2007). Removed one listing.

Thanks to the reviewer for the helpful suggestions and comments on this paper.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 8, 1261, 2008.

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