



Interactive comment on “Validation of three different scientific ozone products retrieved from IASI spectra using ozonesondes” by G. Dufour et al.

Anonymous Referee #1

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General Comments: The paper is a description of the error characteristics and vertical resolution of three different ozone retrieval approaches that use IASI radiances to estimate ozone profiles. The paper is appropriate for AMT but needs some revisions to the language as well as a better description of the error sources, mainly that the geophysical parameters that also affect the measured radiance such as temperature, water, and surface properties. If the authors can add in a description of these radiatively interfering error sources then I would recommend publication. As a referee, while I am remaining anonymous, I am identifying myself as a member of the Aura TES science team as some of my comments relate to our understanding of the possible sources of

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error in the TES ozone profile estimates.

Following is a list of specific comments.

Page 54268:

Line 1: This sentence is vague, what does sophisticated mathematical and numerical methods mean? State instead the method, e.g., “Ozone concentrations from satellite measurements are typically inferred from measured radiances using a non-linear least squares approach that involves minimizing a cost function depending on the radiance and a forward model of the geophysical parameters (including ozone concentrations) that affect the radiance. If a profile of ozone is estimate from the radiance then the problem is ill-posed and the cost function is then augmented by an additional term that describes the a priori statistics of the atmosphere.

Line 8: Reference Boxe et al., 2010 ACP “Validation of TES. . .”

Line 9: you say variations AND variability.. only need to say this once.

Line 12: remove (temporal and spatial variations). . . or alternatively explain what you mean.

Line 26: What does mature mean? I think you mean well characterized, that is, the expected and actual errors agree and the biases are quantified using validation measurements. Please explain or remove this sentence.

Page 5432: Line 25 The discussion on even and odd pixels is highly confusing to someone not familiar with the IASI instrument.

Page 5433:How are the cloud properties retrieved if the cloud fraction is 25%? Also, remove sentence about Nehalem quad-core cpu. . . It is not informative.

Page 5435: Line 40 Add Reference: Kulawik, S.S.; Osterman, G.; Jones, D.B.A.; Bowman, K.W., Calculation of Altitude-Dependent Tikhonov Constraints for TES Nadir Retrievals, IEEE Trans. Geosci. Remote Sensing, 44, 1334- 1342, May 2006.

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Also I believe Tilman Steck wrote a paper on the use of Tikhonov constraints for estimating ozone.

Page 5444. Note that TES ozone retrievals are also biased high in the UTLS region (H. Worden et al., 2007; Nassar et al., and Boxe et al., 2010). While we thought that the cold-space calibration could be the reason, we found that the TES calibration error could not explain the ozone bias. Our current explanation is that the upper tropospheric bias is also due to spectroscopy.

Pages 5445-5446 Tables 6:8 These tables are rather confusing. The error profiles shown in Figure 3 pretty much show the same content. What I would like to see is a comparison of the actual random error (RMS of IASI-Smoothed Sonde) versus the calculated random error (measurement plus interfering species, temperature emissivity, clouds etc). This information is all in the various tables but is spread out in a manner that is inconvenient to the reader. Can you put on the top row the different products and in the left column the different partial columns and then put actual and calculated errors in each entry of the table? Alternatively, just show the errors as a function of altitude as in Figure 3 and the correlations in a table. Finally, as noted in general comments, are the interference errors included in the random error?

Page 5450: The discussion of the “S-shape” is highly confusing. For one, is figure 13 just the retrieval itself or a comparison of the retrieval to a sonde? It is not clear from either the discussion or the Figure caption. Is the claim that the “S-Shape” is a retrieval artifact of some kind? This would be confusing because one might expect a “natural” S-Shape in the true tropical ozone distribution due to convective lofting of ozone poor air into the UTLS region and due to lightning in the middle troposphere (Jourdain et al., Worden et al., Liu et al., Li et al. papers on TES website). Please clarify in both the discussion and in the figure caption.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 5425, 2011.

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