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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Intercomparison methods for satellite measurements of atmospheric composition: application to tropospheric ozone from TES and OMI" *by* L. Zhang et al.

Anonymous Referee #1

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Intercomparison methods for satellite measurements of atmospheric composition: application to tropospheric ozone from TES and OMI L. Zhang1, D. J. Jacob1,2, X. Liu3,4,5, J. A. Logan2, K. Chance4, A. Eldering6, and B. R. Bojkov7 1Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA 02138, USA 2School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138, USA 3Goddard Earth Sciences and Technology Center, University of Maryland, Baltimore County, Baltimore, Maryland, USA 4Harvard-Smithsonian Center for Astrophysics, Cambridge, MA 02138, USA 5NASA Goddard Space Flight Center, Greenbelt,

Maryland, USA 6Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109, USA 1417 Anonymous Referee Comments and Suggestions 1. This study uses an in situ, CTM, and averaging kernel smoothing method to validate and intercompare satellite satellite retrievals of TES and OMI ozone. This paper is well-written and quantitatively reports three useful techniques for the validation and global intercomparison of atmospheric trace gases. A recommend publishing this paper in a timely fashion. My comments and suggestions are shown below. 2. In the Abstract, page 1419, line 12 – Applying a full year (2006) of TES and OMI data to GEOS-Chem produces a mean positive biases of 5.3 ppbv for TES and 2.8 ppbv for OMI at 500 hPa relative to in situ data from ozonesones. What is the root cause of these biases produced from GEOS-Chem? 3. In relation to the last sentence in the Abstract, page 1419, line 20 – I suggest clarifying what 'the combination of possible factors' are that contribute to GEOS-Chem underestimating tropospheric ozone in the tropics. 4. Page 1421, line 21 – I suggest putting the word 'or' before the phrase 'averaging kernels,' contained in parentheses. 5. Page 1421, line 24 – sentence should read → "This was recently applied. . ." 6. Page 1422, line 12 – please state what 'different information' is provided using the three methods for validation and intercomparison. 7. Page 1422, line 17 'on board' should be 'onboard'. 8. Page 1433, line 6 – What is meant exactly by the statement → "We have adjusted the TES and OMI data for the mean positive biases of 5.3 and 2.8 ppbv, respectively as revealed by the ozonesonde comparisons"? 9. It appears that several factors may contribute to GEOS-Chem underestimations of ozone (page 1433, line 12). Yet, given the range of uncertainty for those factors that are not well-parameterized by GEOS-Chem (i.e., at present), is it possible to quantify which process(es) may contribute the most at specified regions around the globe to this underestimation of ozone by GEOS-Chem? 10. Page 1434, line 1 → What additional parameterization may be needed to better simulate stratospheric-tropospheric exchange of ozone in GEOS-Chem?

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