

Interactive
Comment

Interactive comment on “Analysis of global and regional CO burdens measured from space between 2000 and 2009 and validated by ground-based solar tracking spectrometers” by L. N. Yurganov et al.

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Analysis of global and regional CO burdens measured from space between 2000 and 2009 and validated by ground-based solar tracking spectrometers L Yurganov, W McMillan, E Grechko, and A Dzhola (acp-2009-640) Authors' response to the Reviewers

“The manuscript by Yurganov et al compares MOPITT and AIRS products for retrieved CO total column with ground-based FTIRs at seven globally-distributed stations. The

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paper attempts to "provide a consistent long-term record of global CO observations since 3 March 2000" by identifying and removing relative biases between MOPITT and AIRS. This is a worthy goal, however the manuscript seems to have two significant limitations which will limit its relevance to potential readers. First, the authors decided to compare the most recent AIRS product ('V5') with an outdated MOPITT product ('V3'). Second, the manuscript includes very little consideration of the potentially different averaging kernels for the two satellite instruments. Such differences could contribute significantly to differences in the AIRS and MOPITT products".

We are grateful to both reviewers for their sound remarks. The criticism of reviewer #2(cited above) is definitely justified, but, in our opinion, both of the highlighted disadvantages should not prevent the publication of our results.

1). The version 4 (V4) MOPITT product became available when our analysis was nearly complete. Thus, we decided to submit the analysis with MOPITT V3 data and acknowledge the newer MOPITT V4 in our manuscript (page 13). We believe our comparison of AIRS V5 to MOPITT V3 total columns is justified by the numerous previous publications using these datasets whose results can benefit from our analysis. For example, our analysis suggests the results of Witte et al. (2009) should be re-evaluated in light of the instrumental drift in the MOPITT V3 data they used and the global changes in CO columns we report during the last half of 2008 (see the discussion in our manuscript on page 15). The instrumental drift present in MOPITT V3 is a relevant issue for many papers published using that dataset. Generally, the issue of temporal stability of satellite data is raised only in two recent publications (Yurganov et al., 2008, Emmons et al., 2009). Future validation of MOPITT V4 will allow us to decide if this new version is better than V3. Another example paper that still uses MOPITT V3 is : de Laat, A.T.J., A.M.S. Gloudemans, I. Aben, and H. Schrijver (2009), Global evaluation of SCIAMACHY and MOPITT carbon monoxide column differences for 2004-2005.,*J. Geophys. Res.*, doi:10.1029/2009JD012698, in press. (accepted 16 November 2009) 2) A comprehensive comparison of the vertical sensitivities of

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MOPITT and AIRS is possible only when the “true” CO vertical profiles are available. Unfortunately, the available CO vertical profiles are somewhat sparse and very limited in their latitudinal coverage, especially in the Southern Hemisphere. Our analysis is based on the archived NDACC measurements of CO total column (TC). Although retrievals of CO profiles from high resolution solar spectra is possible, the results are less reliable than that for TC and the profiles are not archived, yet. Moreover, using several ground-based interferometers would require a careful unification of the profile retrieval algorithms. This task requires a special laborious investigation. The submitted manuscript focuses on the comparison between the final products of three archived data sets: NDACC, MOPITT and AIRS. The ground-based instruments are subjected to regular intercomparisons and we assume that their almost flat vertical sensitivity supplies a good CO TC ground truth. Then, we compare the two satellite data sets to this ground truth and make conclusions about their validity. Any differences can be attributed to different reasons, including differences between the two satellite instruments’ vertical sensitivities. However, as just discussed, further investigation of this topic requires knowledge of the true CO profile.

Some clarification of these issues deserves inclusion in the paper. This will be provided for the final version together with other improvements after on-line discussion.

We also thank Merritt Deeter (NCAR) who noted personally that the MOPITT V3 product does report results over the Arctic. Unfortunately no matching days have been found for the Ny-Alesund Observatory, Spitsbergen. We will correct the corresponding text in the final version.

The remarks of the Reviewer #1 are as follow: Figures 1a/1b captions. Add that the deviations from the ground truth are shown (like is mentioned in many other figures). Added. Figure 10. The values of the y-axis between the second and third panel overlap. This should be changed. Changed. Typo’s Page 3, lines 15-16. Change to "... correlation between the independent ..." Corrected. Page 7, line 15. Double punctuation mark. Corrected. Page 7, line 27. Change to "AIRS and MOPITT CO biases

demonstrate ..." Corrected. Page 9, line 24. Change to "... to yield the CO burden ..." Corrected. Page 10, line 31. Change to "... and corrected them using the comparison ..." Corrected. Page 11, line 1. Replace "referenced" with "relative" Corrected. Page 11, line 5. Change to "Recall that this is ..." Corrected. Page 14, line 1. Change to "... Section 2.2, the AIRS bias ..." Corrected. Page 14, line 29. Change to "However, it is far more preferable ..." Corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24875, 2009.

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