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Atmospheric Chemistry and Physics Discussions

Interactive comment on "

Ethane, ethyne and carbon monoxide concentrations in the upper troposphere and lower stratosphere from ACE and GEOS-Chem: a comparison study" *by* G. González Abad et al.

Anonymous Referee #1

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This paper presents the results of the analysis of an extensive set of atmospheric data recorded by the ACE-FTS instrument over a period of more than three years, focused on the title molecules. The data retrieval technique employed is described, with special consideration of the possible errors involved. A comparison between data recorded from balloon and aircraft missions is carried out with the limitation that some of the data were obtained in largely different time periods. The GEOS-Chem model is outlined, and then the most relevant contribution of this paper is addressed, namely the comparison

between ACE observations and GEOS-Chem data analysis. This task is carried out in great detail and validates by itself the publication of this article. Altogether the paper has a great quality and constitutes an interesting scientific and technical contribution.

However, some of the figures lack enough quality, and in some cases the graphs need further explanation to allow complete understanding by a broader scientific community, and not just the very specialized field of researchers. The following points should be addressed to improve the general presentation of the paper:

Figs. 3 and 4. The contribution of the least relevant factors is barely visible. The abscissa scale in the relative errors graphs should be changed up to a maximum of 100 % for C2H6 and less than that for C2H2. Even the absolute errors graphs could be scaled to smaller maximum values for both molecules. There is not much point in showing up to 0.4 ppbv for C2H2 when the highest retrieval does not pass 0.2 ppbv. Besides, it is not quite clear how the effective total error is calculated. Should it not be the sum of all contributions? Please add a comment on this in Section 2.

Figs. 5 and 6 are very faint, or at least they appear very faint in the available version of the manuscript. It should be easy to redraw them using thicker sets for lines, letters and numbers.

Total budget values for ethane and ethyne are given in Tg C units in Section 4. This is perhaps obvious for the specialized readers, but not to everyone.

Fig. 8 is very clear and shows seasonal CO concentration variations and hemispherical asymmetry. However, the figures of 17 % and 15 % quoted for low estimations in Southern hemisphere and Northern hemisphere respectively, are mentioned (lines 307 and 313 of the manuscript) but they do not seem to match the results depicted on the right hand panels of Fig. 8. It would seem that the model overestimates Southern hemisphere results in many cases, unless I am misinterpreting the graphs. This calls again for further explanation.

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Figs. 12 to 14 are very good, as are Tables 2 to 4. There is a comment in the Conclusions abut agreement being good, which is true, and mean bias values being smaller than 40 % for all three molecules in all regions, which does not seem to conform to some values in Table 4 for C2H2, especially in North America and Antarctic.

In summary, the paper is very good, but it can easily be improved with a small effort from the authors.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 13099, 2011.