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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aircraft pollution: a futuristic view" *by* O. A. Søvde et al.

Anonymous Referee #1

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1 General comments:

Using a chemical transport model (CTM), this paper investigates the effects of the aircraft pollution on the ozone layer with respect to 2050 aircraft emission scenarios. The results suggest that the aircraft emissions including NOx, aerosols, and water vapour could impact on ozone production and depletion at various aspects. It is apparent that NOx and H_2O emissions from supersonic aircraft tend to decrease total ozone while subsonic aircraft contribute an increase in total ozone. I think this is interesting and important scientific question. However, the paper is not well written. Most figures are not well described and hard to follow with corresponding text. Figure captions, in particular, are vague and not clearly presented. The paper needs major revisions before it is accepted for final publication.

2 Specific comments:

1. Page 2536, line 7: The model was initialised from a previous 2050 study. Give a reference for this study or give more details.

2. Page 2536, line 18-20: For meteorological conditions, did the model run with repeated 2000 meteorological fields or change year by year? Are the subsequent analysis based on multi-year average or the last year of the model simulation? what is the effect of interannual variability on the model results?

3. Page 2536, line 21: What does it mean by 1 x 1 horizontal resolution and 305 m vertical resolution? What is the model vertical resolution in the UTLS region?

4. Page 2536, line 27: Although CO_2 is has a long lifetime, its cooling effect in the stratosphere has a significant impact on chemical processes. As a CTM, the feedbacks between thermal and chemical processes are not considered. This will have an important effect on the ozone changes due to aircraft emissions. These issues should be addressed before making conclusions.

5. Page 2538, line 14-16: The text is not consistent with the Fig. 2. What is the unit and contour intervals in Fig. 2?, we can not see any 1.1 and 1.9 ppbv values in the figure. The similar problems appear in other figures.

6. Page 2538: Comparing Fig. 1 with Fig. 3, we can see that NOy distribution is quite different from that of H_2O. The authors pointed out that NOy and H_2O values in the Southern hemisphere are due to transport processes. Can we explain why the same transport processes can cause a different distribution between NOy and H_2O?

7. Page 2538, line 9-10: explain how those percentage values are calculated. Also, what does Fig. 5 plot for? Is it simply a plot for two years data, or a plot for

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separate variables? What is the unit of the plotting variable? The authors should not leave a reader to guess what they are plotting for.

8. Page 2538, line 21: The sentence is completely out of sight since the there is no any level/altitude information in Fig. 4.

9. Page 2540, line 14: the simulated change in column ozone ranging from -1.56 DU t0 1.65 DU, To what an extent these changes are significant? The significance of the ozone changes due to different aircraft emissions should be tested wherever possible.

10. Page 2540, line 14: Since Fig. 6 shows the total ozone column differences, why there is an axis of altitude (total column ozone is a function of latitude and longitude)? Also there are no negative values in Fig. 6, but authors stated that differences ranging from -1.56 DU to 1.65 DU.

11. Page 2540, line 16-25: Fig. 8 shows the aircraft aerosol surface area density, but it is actually the ozone changes seen from the plot. What on earth it is?

12. Fig. 9 is completely not understandable! The figure caption seems to be for another figure.

13. What does Figure 10 shows, is it ozone mixing ratios or total ozone column differences?

14. What does Figure 13 shows, is it ozone mixing ratios or total ozone column differences?

15. Figs 10-12, are the plots are for two year of data? which two years of data are displayed?

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2531, 2007.