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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A strategy for climate evaluation of aircraft technology: an efficient climate impact assessment tool – AirClim" *by* V. Grewe and A. Stenke

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Answer to referee 2

The referee had 4 major concerns:

1. An uncertainty analysis is missing, which impacts the relevance of the conclusions.
2. Only littel comparison to other approaches (Wit et al.,)
3. paper and figures seems to be disorganized
4. Enough done for verification?

Reply:

1. We totally agree that an uncertainty estimate should have been given in the first place (and has been originally planned to be included). We included such an analysis only with respect to the investigation of supersonic options. In the revised version, we include uncertainty ranges in Figures 10 and 12 (11 and 13 in revised version). Additionally, we add an analysis on the uncertaitenties to the discussion on the importance of NO_x versus CO_2 emissions.

   The efficacy of aircraft induced ozone is expected to be larger than for tropospheric ozone (Ponater et al., compared to e.g. Fig 2.19), since aircraft ozone is mainly located in the tropopause region and ozone in the lower stratosphere has larger efficacy compared to tropospheric ozone (e.g. Joshi et al., 2003).

2. Basically, the approach differs to other approaches in how RFs are calculated. The conversion of RF into dT is as in many other publications. In order to intercompare these approaches we have discussed the methodologies based on tables 5 and 6, which we now enlarged to better understand the differences.

   Generally, we agree that for future emissions a backward-looking metric is not the best approach. RF is a backward looking metric. However the difference RF(background aircraft scenario + perturbation scenario) - RF(background aircraft scenario) removes the historical contribution and concentrates on future emissions. The same applies for the consideration of temperature changes.

3. We are aware that the paper includes a complex modelling set-up, including chemical effects, cloud effects, radiation and climate impacts. To give approach more structure we presented the procedure in Figure 1 and organized the paper according to that Figure. Section 2 includes the methodology, 2.2 the red part (precalculated data) 2.3 the yellow part emissions data, 2.4 AirClim model (blue part), the way how both parts are combined. Section 2.2 is really the new part of

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the model and has to be discused in more detail. This is done in Section 3. A validation is given in Section 4 and results in Section 5. There are some parts, which re-organized to be fully consistent with this structure. - The RF results for subsonic air traffic are now shifted to the verification section - The results on the regional sensitivity of emissions on global mean temperature is shifed from Section 3 to Section 5. Since they do not describe the input data, although of similar shape. Indeed, some Figures were not in the right order. Changed.

4. A more detailed verification of the results with respect to the subsonic air trafic is added. The individual contributions and the reasons for the descrepancies are more discussed in detail.

Specific comments. done

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 12185, 2007.