

Interactive comment on “Climate impact of supersonic air traffic: an approach to optimize a potential future supersonic fleet – results from the EU-project SCENIC” by V. Grewe et al.

Anonymous Referee #2

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General Comments

I thought that this was an interesting paper, looking at the theoretical impact of replacing a subsonic fleet with supersonic aircraft. In particular, it not only examined the impact of changes in NO_x emissions on ozone, but looked at a whole suite of impacts: water vapour, ozone, contrails, and aerosols and the associated combined climate response. Although I felt this was a very positive thing, it did mean that the paper was attempting to cover a great deal and at times, lost its focus. I would like to see more focus and clarity in some sections. Should these comments be addressed, I recommend publication.

The emission scenarios used were generated on the basis of market potential, technical capabilities, time savings and thus, were potentially more realistic than other estimates. These emissions scenarios underpin the simulations that were carried out and the scientific conclusions of the paper and yet, the reader is continually being referred to 'personal communication' for further information. I would like to see more information/detail/clarification on the characteristics of the emissions and some of the reasoning behind the numbers in Table 1. As an example, why does scenario P4 result in an increase in the number of aircraft?

The conclusions of this paper are largely drawn from examining differences as a result of changes to emissions. There seems to be no consideration of the statistical significance of the differences found and I would like the authors to comment on the extent to which differences in the annual mean equilibrium response of water vapour and ozone to emission changes are statistically significant.

There was some discussion about the use of various metrics and the limitations of RF. As a result, the authors chose to use near-surface temperature change as a metric for climate change. However, in the abstract, the authors still use RF! I would like some addition outlining the temperature change and that temperature change placed in context by comparison with the expected temperature change due to CO₂ from anthropogenic surface sources.

The authors state that the model results differ significantly in terms of the response to a replacement of subsonic aircraft by supersonic aircraft. Can the authors comment on the impact these difference have on their results and conclusions? Specifically, in calculating the multi-model mean response, can they weight each model response according to their confidence in each model's transport?

Specific Comments

Abstract: Misspelling of Mach Section1 Introduction: 'is capable to simulate' - change to 'is capable of simulating' Section 3.3 Radiative forcing : 'The change of radiative

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forcing' - change to 'the change in radiative forcing' Section 3.4 Climate change: I would prefer the use of 'effective RF' rather than normalised for consistency. Section 4.3 Ozone: All models indicate ... This statement is confusing. Section 4.3 Ozone: 'To some extend' - change to 'To some extent' Table 4: The sign of the mean loss does not match individual model losses Figure 7: The quality of this figure should be improved to match that of the other figures. Can you alter the legend to confirm that this figure is showing differences in RF from S4?

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 6143, 2007.

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