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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Do supersonic aircraft avoid contrails?" *by* A. Stenke et al.

A. Stenke et al.

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We thank the reviewer for the comments on our paper which helped us to improve the quality of the manuscript. The reviewer raised some minor comments which we addressed as follows:

In the general comments the reviewer states that the paper lacks of a wider context, e.g., concerning air industry issues.

Concerning the feasibility of a future supersonic fleet, current market forecasts see a 60% chance of any launch of a supersonic business jet program in the next 8 years, and an 85% chance by 2020. Furthermore, different European projects like HISAC (www.hisacproject.com) or LAPCAT (www.esa.int/techresources/lapcat) deal with the development of supersonic aircraft. Airbus spent a lot of effort and money in market

forecasts and in creating the SCENIC air traffic inventories. That might be an indication that air industry sees a profitable market for a future supersonic aircraft. We added a short paragraph on this issue in the introduction of our paper.

The air traffic inventories used in the present study have been provided by Airbus within the SCENIC project. We tried to provide all information about the air traffic inventories in our paper which are necessary to understand the results of our study. In many cases there is no more information available. For example, we do not have any further information about the traffic demand than the given numbers of revenue passenger kilometres. Airbus used internal as well as external (e.g. Boeing, NASA) market forecasts in their evaluation which seems to be in good agreement with other industrial forecasts. Compared to other forecasts, it represents a medium demand in the long-term. There will be a companion paper be Rogers et al. (in the manuscript cited as Marizy et al.) with more detailed information about the SCENIC scenarios. In the revised version of our paper we tried to give as much additional information about the air traffic scenarios as possible (see also below).

Specific comments:

- *Relative climate impact of sub- and supersonic fleets:* We did not discuss the relative climate impact of a subsonic and a supersonic fleet in detail, since the present study concentrates on contrails. A comprehensive discussion of the results from the SCENIC project including the climate impact of NOx, CO_2 and water vapour emissions is given in Grewe et al. (2007). Furthermore, a direct intercomparison of the climate impact of a subsonic and supersonic aircraft is given in Grewe and Stenke, ACPD, 7, 12185-12229, 2007. We agree with the reviewer that the differences in radiative forcing contributions between subsonic and supersonic air traffic are very important, and extended this discussion a little

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bit in the introduction as well as in the conclusions.

- *Contrail cirrus:* We agree with the reviewer that the aviation impact on cirrus clouds is an import issue. Therefore, we added a short discussion on contrail cirrus in the introduction including the results of the TRADEOFF project.

- *Table 3*: Since the radiative forcing of CO_2 is not considered in our paper, we removed the fuel consumption from table 3 in order to avoid any misunderstandings. Furthermore, we now explicitly mention in the table caption that the RF values apply to linear contrails only.

- *Differences in air traffic inventories*: As mentioned above we have only little information about the underlying market forecasts or how the flight routes have been calculated. We only have information about the 3-dimensional distribution of fuel consumption, flown distance, NOx-emissions etc. as well as overall parameters like RPK or the mean EI(NOx). We used these global parameters to explain the differences between the SCENIC scenarios and the NASA inventory as far as possible (Sect. 3.1). For example, mean EI(NOx) is 10.85 g(NOx)/kg(fuel) in the SCENIC subsonic scenario and 15.2 g(NOx)/kg(fuel) in the NASA inventory which indicates different aircraft technology. Furthermore, the SCENIC dataset shows the maximum fuel consumption between 11 and 12 km, the NASA dataset between 10 and 11 km.

- *Constant RPK:* The assumption that the number of revenue passenger km is constant has been made in order to provide comparability of the different scenarios. Whether the air traffic demand will increase in the case of a mixed fleet or not, does not only depend on the reduction in journey time but also on other parameters like ticket price. However, this discussion is very speculative.

- *Figure size:* Concerning the size of our figures we put the lower panel of Fig. 4 in a separate figure. Furthermore, we will take care that the figures are large

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enough in the final print version.

Finally, we considered all technical comments of the reviewer. The paper Marizy et al. (now cited as Rogers et al.) is still cited as a footnote and will be added to the reference list as soon as it is published in ACPD. We hope that this will be the case within a short time.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 12927, 2007.