

Interactive  
Comment

## ***Interactive comment on “Future impact of non-land based traffic emissions on atmospheric ozone and OH – an optimistic scenario and a possible mitigation strategy” by Ø. Hodnebrog et al.***

**Anonymous Referee #1**

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This study investigates the impact of non-land based traffic emissions on Ozone, OH and RF, for the B1 and B1 ACARE scenarios (improved NO<sub>x</sub> technology) for 2000, 2025 and 2050. The authors used previously established methods to analyze model results. The paper seems to be lengthy, but could profit from investigating in more detail why for some changes occur (as outlined below).

The paper is well written and the figures are to the most part readable. The paper is well organized. It can be technically improved by pointing the reader more often to the figures and lines in the plot that are referred to in the text.

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This paper is a model study only. However, some important questions should be addressed: How well do models compare to observations? How well do models reproduce chemical species in the year 2000? Is the difference in the RF between the models a result of a different representation of atmospheric species?

The paper should be accepted after these points are addressed (see further specific comments below), which are to the most part minor.

Specific Comments: Abstract: Line 14: what does '(scaled to 100%)' mean? Not clear in this context.

Introduction: Earlier study: Sovde 2007: 10ppbv increase of ozone in the UTLS due to aircraft emissions in 2050. What scenario was used in IPCC terms?

Emissions and simulation setup: Page 16809, line 15: what do you mean with: 'most models update the surface mixing ratios with values from IPCC future simulation'. Are there models that do not change CH<sub>4</sub> surface mixing ratios for future runs?

Line 20: Meteorological data from the year 2003 were used. This year was a strong El Nino year. Do you have a feeling about the variability of your results if using a different year or a 10-year model average for example?

Page 16810: Line 13: 'have been scaled to 100 %' which regard to what?

Model descriptions: Line 22: name the model that was nudge to the meteorological data. Did all the models use 6h meteorological fields? Further, did all models run 2002 for spin-up and 2003 to be analyzed, as noted for TM4? Just describe the common setup in the paragraph ahead and do not repeat this information for the specific models.

Ozone: Page 16814, Line 6: briefly describe the approach of Greve 2010.

Effect on aircraft emissions: Page 16815: Line 3ff: it would be helpful if the reader is pointed to the line the authors refer to in the text, for instance: 'the results indicate an increase in ozone impact from aircraft between 2000 (gray solid line) and 2025 (black

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dotted line).’ and so on. Also explain in the text what the red curves represent, to make it easier for the reader (black minus blue)\*20, if that is what you show.

Figure 5 etc.: please indicate that the red axis on the right, does not correspond to the red lines in particular but to all lines, if that is what you meant.

Line 10: move ‘it depends strongly on the model’ before ‘whether or not’ Line 12: Do you refer to the maximum at 25 degrees S. Also, do you mean increased emissions in the tropics based on Figure 2?

Line 23. Where does this peak in the tropics come from? It seems to exist in 4 of the 6 models (Figure A1). Is this due to transport processes, related to the OH increase in 30N in the upper troposphere? It might help to show and describe the NO<sub>x</sub> distribution with latitude and altitude.

Page 16816: Line 11, add ‘red lines’ to ‘Fig.5’. Line 25: as mentioned before it might help to add NO<sub>x</sub> distribution (altitude vs. latitude) to explain this. Further, how is it that higher background levels of CH<sub>4</sub> result in more ozone production? Explain.

Page 16817: Line 4: Do you observe the impact of changes in road traffic emissions here?

Methane lifetime: Page 16820: Line 17: What is the method described in Hoor 2009?

Page 16821: Line 16: Why speculating about the reason? Do you see a decrease in background NO<sub>x</sub>? Line 20: remove ‘scenarios’ (I think you mean the evolution of emissions, and not the evolution of emission scenarios)

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