

Review of:

Modelling the climate impact of road transport, maritime shipping and aviation over the period 1860-2100 with an AOGM, Olivié et al.

General comments:

This paper describes one of the first experiments to calculate, using an AOGCM, the climate impact of individual transport sectors, following a middle-of-the-road A1B scenario. The paper would be of great interest to climate modellers and policy makers. The paper is well-written and suitable for publication after addressing some minor points, detailed below.

Specific comments:

1. P19773 – the impact of NO_x on O_3 and CH_4 concentrations occurs on different timescales. This is important when calculating the net effect of NO_x emissions and should be mentioned here.
2. P19773, l22 – It is true that the estimates of contrail and contrail cirrus radiative forcing lie between 10-80 mWm^{-2} , however the most recent ('best') estimates with the most detailed models of contrail cirrus are at the lower end, around 0.031 Wm^{-2} (e.g. Burkhardt and Karcher, 2011). This is worth mentioning.
3. P19776, l18 and P19805, l35. Specify 'ice' supersaturation.
4. P19777, l23. State that the observed trend over the 20th century was 0.8K.
5. Section 2.2 Tables 2, 3 and 4 seem to be referenced before Table 1. The first reference I found to Table 1 was on P19787. Re-order the tables?
6. P19778, l11-13. It would be useful to summarise what the specific emission scenarios are, for each transport sector. i.e. for aviation: what growth rate is assumed and is this globally uniform, do you assume more fuel-efficient aircraft, or different fuel types?
7. P19779, l21. How is the data 'slightly modified' and why is this necessary (why is there a such a gap between the observed and modelled concentration?)? I suggest changing to wording from 'slightly modify' to something more specific.
8. P19780, l15. By 'goes up to around' do you mean 'can be as large as' (does not imply an increase with time)?
9. P198780, l22. Are these the emission periods shown in Figure 2?
10. P19782, l24-26. The sentence is unclear; I think there is a word missing. Suggest: 'also leads to changes'.
11. P19784, l25. State the best estimate from the Burkhardt and Karcher paper.

12. P19786, l16 and Figure 3. In figure 3, is the contribution of aviation to the distribution of BC actually zero (the figure panel is blank), or just smaller than the lowest contour interval used in the figure? A non-zero TOA forcing from aviation BC is quoted in the text.
13. P19787, l26 and Figure 5. I found this figure confusing. The figure caption does not describe all the elements of the figure (what is the solid line, dashed line, and error bars?) and gives too much detailed explanation that belongs in the text. Importantly, I did not understand how the figure represents the effect of using ensemble simulations?
14. P19788, l15. Also, the effect of water vapour emissions from aviation is not considered here.
15. P19789, l21. The impact from aviation is smaller in the SH than the NH due to there being much fewer flights in the SH than the NH and the relatively short lifetime of ozone?
16. P19795, l5-8 and Fig 11. The figure caption is missing a description of the thinner lines (stated in the text as 95% confidence intervals), and that the thick line is the mean over all the ensemble members.
17. P19795, l20. 'From shipping the non-CO2 impact is negative everywhere' – except the SH poles for the period 2011-2030 when it is weakly positive.
18. P19797, l1. This is difficult to see from figure 13, as there are so many different lines on the figure. A solution may be to have separate figure panels for each period, so that the difference between the dashed and solid lines could be clearly seen.
19. Figure 16, left panel. At the moment it is difficult to distinguish the lines from the dots. The clarity of this figure could be improved by making the dots smaller.
20. P19803, l24. It is informative to quote the temperature from transport as a percentage of the total anthropogenic temperature change. E.g. In 2000, the CO2 impact from transport sectors was 0.1K (12.5% of the total anthropogenic temperature change), increasing to 16.7% in 2100.
21. Figures – on some of the multi-panel figure, it may be useful to label individual panels (a), (b) etc to make it easier to refer to them (and for the reader to more easily understand which panel you are referring to!).

Technical comments:

1. P19775, l23. Correct the spelling of 'geographical'.