

## ***Interactive comment on “Modeling the present and future impact of aviation on climate: an AOGCM approach with online coupled chemistry” by P. Huszar et al.***

**Anonymous Referee #1**

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Although I agree that responding to all comments of the first reviewer would make the paper much stronger I keep my recommendation reached earlier, i.e. "publishable after major revisions".

The step of addressing the issue of aviation impact with a coupled chemistry-climate model is an important one, even though (given the strong simplifications) it is small. Addressing the following weaknesses appropriately would give better confidence that it is a small step into the \*right\* direction:

The chemistry is very simplified and is integrated only in a specific height range. Is this to save CPU time? This has to be explained in more detail. The distributions

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of chemical species in this model configuration should be compared systematically to observational data before the scheme can be used.

There is very little significance to the results. I assume the reason why 90% level was chosen is because at 95% one would have given almost no significant results. If so, more ensemble members or emission scaling should be used.

Below are some more specific comments, most of them minor, but some of them also asking for additional explanation and a restructuring of the results section.

3818 line 11: 'time horizon'

3818 line 17: not clear what 'more unique' means in this context

3819 line 5: 1960s

3821 line 23: move 'only' to after 'If', i.e. 'If only the...'

3822 line 15: 'CIC was'

3825 line 1: you mean 'walltime'?

3827 line 9: better write '...evolution of the contrails. However, as the radiative...'

3827 line 26: '...and down to the...'

3828 line 7: 'used' or 'use' (but not 'uses')

3832 line 18: 'leaded' → 'led'

3833 line 17: why does the CO<sub>2</sub> enhancement due to aviation lead to a decrease in surface temperature? It says later on that this might be due to 'some complex feedback mechanism', but can anything more specific be said? It's a bit surprising and it's not only the Arctic.

3833 line 20: 'Arctics' → 'Arctic'

3835 line 20: remove either 'also' or 'as well'

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3836 line 18: it would be better to show changes in chemical constituents before their impacts, i.e. move section 3.4 before the sections where their climate impacts are discussed.

3837 line 8: why does NO<sub>x</sub> go down in the near future due to aircraft NO<sub>x</sub> emissions?

3838 line 20: '..in contrast to..'

3838 line 21: 'These prescribed..'

3838 line 22: how can you say 'probably too large'? Maybe, rather your ozone formation is too small?

3839 line 2: either 'mechanism that leads' or 'mechanisms that lead' 3839 line 8: 'are' → 'is'

Table 1: what is the difference between 'DEFchem' and 'noAVIATION'?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 3817, 2013.