

Interactive comment on “The global impact of the transport sectors on atmospheric aerosol in 2030 – Part 2: Aviation” by M. Righi et al.

Anonymous Referee #1

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Review of “The global impact of the transport sectors on atmospheric aerosol in 2030 Part 2: Aviation” By Righi et al.

General: This manuscript describes simulations of the effect of 2030 aviation on climate. The paper depends on other work, but this seems properly referenced and cited. The paper is generally clearly written. It tells mostly a complete story. It should be publishable in ACP subject to minor revisions. Several points need some clarification to put these results in context. Detailed corrections are noted below, but there are some general points I think that need to be addressed.

First, a slightly better discussion of how the aerosol mass and number perturbations are applied to the model. The general reference to the RCPs I do not think fully describes the aviation number concentration perturbations for SO₄, NO₃ and BC. If they do, then

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the numbers should be stated.

Second, I think some further work is necessary to properly characterize the conclusions. Two additional pieces of analysis would be valuable as noted below. (A) I think a figure with a map of radiative forcing from aviation would be valuable. (B) I think some sensitivity runs should be done with single aerosol forcing for NO₃, BC and SO₄. I think these need only be done for one RCP, so only 3 more runs. It would allow a decomposition into the different components, and I think is necessary. (C) Please state numbers for the clear sky and all sky RF. It appears to be mostly all sky (i.e. cloud effects). You might highlight that more, and also show a map or statistics of the cloud forcing changes.

Detailed comments:

Page 34039, L10: how are RCPs included if GHGs fixed and nudged? Just the aerosol emissions? This is clear later, but not initially.

Page 34042, L7: how do these scaled emissions compare to other inventories of aviation emissions in 2030 (ACCRI/AEDT, etc).

Page 34043, L15: how are aviation NO₃ emissions estimated. Do you have mass and number emissions for all aviation aerosols? Please describe in more detail.

Page 34045, L25: but the n Atlantic is pretty heavily polluted and smaller than the pacific, so the explanation here doesn't make a lot of sense. Can you dive into the regional difference in contribution a bit deeper? Is the size of the region the same?

Page 34046, L5: can you break the RF down by species with. A Sensitivity test? Perhaps in just one RCP.

Page 34047, L14: I definitely think you need to. Decompose the different aerosol effects on RF by species.