

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-169

Anonymous Referee #2

Referee comment on "Aviation contrail climate effects in the North Atlantic from 2016 to 2021" by Roger Teoh et al., Atmos. Chem. Phys. Discuss.,
<https://doi.org/10.5194/acp-2022-169-RC2>, 2022

Teoh et al. make use of detailed flight recordings over the North Atlantic ocean in combination with a number of parameterisations to estimate various aspects of the climate effects of contrails in this region. A specific aspect of their study is the estimate of the reductions in air traffic due to the COVID-19 pandemic. The study is of interest to the readers of Atmos. Chem. Phys. It is very diligently conducted and excellently written. I have only a few minor remarks that should be addressed before publication.

Minor remarks

l48 The authors should discuss the IPCC AR6 assessment.

l223 – 225: it is unclear what are local / regional effects and what are global ones. The net cirrus RF given in l224 in my understanding is regional, for the region of interest of the North Atlantic ocean. The contrail climate sensitivity of Kärcher (2018) is a global number. To estimate the cooling effect (0.05 to 0.07 K), was some effort made to extrapolate the RF globally? Or is there a reason to believe the cooling would be confined to the region where the RF occurs? Also I have trouble seeing where the 0.05 K lower bound comes from. Isn't it rather 0.02 K?

I229 Where is this number seen in Table 1?

I262 A bit puzzling logic. The situation appears particularly frequently in summer, much more so than in winter, i.e. at times where a net cooling would be more likely.

I267 How is that possible? Shouldn't there be more incoming sunlight in summer (cf Fig. S14i)?

I282 EF was introduced as an integral measure, why would one now normalize again by contrail length? Why not length and width and go for forcing?

I285 Fig. 3. The legend says "time of day" but really it is UTC, isn't it? There is a large ambiguity on which time (in UTC) is sunrise and which time is sunset, given the breadth in longitude of the Atlantic Ocean. Else it would be useful to indicate the time (spans) of sunrise and sunset that are discussed in the text. As written above, I do not understand the usefulness of EF per length, why not stick to EF, or else omit this panel.

I321 same comment as above on SDR

I336 The half-sentence "below optically thick high-level cirrus" should better start a new sentence with the second argument/condition. But this is not so obvious. If the cirrus are optically thick, why would they not have the same effect in the solar as the optically thick low-level clouds?

I347 It is noteworthy perhaps that the cirrus that are neither strongly cooling nor strongly warming seemingly have a smaller absolute effect in either direction, they occur at smaller nvPM.

I371 Is there an explanation for this result? Is there a reason to believe the HRES resolution is better? Is it appropriate, or would still higher resolution lead to still smaller results?

I381 Is there some problem in the parameterisation that leads to this strong increase in contrail age simply because the input fields have a coarser temporal resolution?

I414 At the end of this uncertainty / sensitivity section, it would have been nice to do an

overall uncertainty quantification by propagating all uncertainties to an overall uncertainty on the assessed RF.

I443 This could be a point where the overall uncertainty is reported.

Typos

I191 "ensemble"

I226 "would have been"

I328 "persist"