Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-416-RC2, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impacts on cloud radiative effects induced by coexisting aerosols converted from international shipping and maritime DMS emissions" *by* Qinjian Jin et al.

Anonymous Referee #2

Received and published: 28 July 2018

This paper addresses the well-known and important topic of negative radiative forcing induced by aerosols formed from international shipping emissions. The paper is novel in addressing natural (DMS) emissions and shipping emissions of aerosols and aerosol precursors simultaneously to study their non-additive contributions to cloud formation and cloud radiative effects (CRE). As an interesting add-on, uncertainties due to microphysics modelling are investigated through the use of different aerosol modules and assumptions on mixing states. The paper is well written and the experiments well designed, properly reflecting the current state of science. I don't have any technical comments beyond those already pointed out by Referee #1

Printer-friendly version

Discussion paper

I recommend publication after the following issues have been addressed:

It can be misleading to present the cooling from ISE as balancing GHG warming. E.g. from reading the abstract some may be tempted to conclude that the IMO global sulfur cap from 2020 may contribute to global warming (through reduced CRE), and thus be the wrong way to go. Although global average net radiative forcing may indeed become more positive through this regulation, it should be made clear, at least in the conclusions, that the global sulphur cap is highly beneficial for air quality. The paper already contains relevant references for this (e.g. Corbett et al. 2007, Winebrake et al. 2009). Compensating for GHG warming through aerosol cooling is also problematic because the radiative forcing by aerosols is highly spatially variable. Interestingly in this regard, shipping-induced CRE seems to cause up to 3 W/m2 warming (Figure 4) over Central Europe and areas in China and South America. Finally the cooling contribution, as pointed out by this study, has a large uncertainty (while GHG warming is easier to estimate), and the impact on climate parameters (local temperature, precipitation, etc.) from CRE is even more uncertain than the impact on radiative forcing itself.

Section 2.4 requires some more text as it is important for correct interpretation of the results. For example, what do you mean by diagnostic and prognostic calls in this context? This may well be obvious to insiders of radiation modelling, but what does it imply for the results presented in this paper? Can effects calculated either in the diagnostic or prognostic calls be compared to each other? Also "In this way, the DRE and CRE of ISE can be isolated and evaluated separately" I don't quite understand this sentence.

line 50: is from –> ranges from

line 123: Why referring to Corbett et al., 2007 here? The 0.5% cap wasn't mentioned, and plans for 2020 were not known in 2007.

line 123: although "International Maritime Organization, 2016" looks like a good reference, in the list of references we only learn "IMO sets 2020 date for ships to comply

with low sulfur fuel oil requirement, 2016" which looks like a log rather than a reference. Is there a link to an accessible report or news release instead?

line 168: proposed by IMO –> decided by IMO

line 182: demonstrate –> exhibit or show

line 199: illustrate –> exhibit or show

line 201: analysis –> analyses

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-416, 2018.

Printer-friendly version

Discussion paper