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Comment

Interactive comment on “Update on emissions and environmental impacts from the international fleet of ships. The contribution from major ship types and ports” by S. B. Dalsøren et al.

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The paper deals with global impacts of ship emissions on atmospheric pollution and eutrophication. Compared to earlier studies, the authors claim to have used an improved emission inventory to achieve more reliable and more detailed results on the environmental impact of ship emissions.

My impression is that they cannot really show that their emission inventory is significantly better than earlier ones or those published by other authors (e.g. Corbett, Eyring, ...). It is only more detailed in terms of considering different ship types. Additionally, their study on the impact of ship emissions in ports suffers from their coarse model res-

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olution of 1.8° (approx. 200 km) (as they mention themselves on page 23). Probably none of the important ports is close to being resolved in the model. Lastly, I cannot see why the investigation of concentration changes by different ship types gives any insight that is not already given by the distribution of the emissions by ship type (Figure 4). The paper would certainly gain a lot more attention if the authors could better explain why their study is of interest for a broader scientific community.

In particular, it would be necessary that they answer these specific questions:

Why should one investigate the effects of the emission of the different ship types separately? Can we expect that container ships will emit less in the future compared to e.g. oil tankers? Should we (can we) replace some ship types by others to reduce the emissions? I cannot see what the purpose of this investigation with numerous coloured figures is.

Why is it useful to combine the COADS and the AMVER data sets? Obviously both do not represent the total fleet but only certain parts of it. However, we can expect that a lot of ships contribute to both data sets. If I understand it correctly these ships are double counted in the combined statistics. It would also be interesting and maybe of use how the COADS and the AMVER statistics compare to the Lloyds data that is used for the operation profiles.

In the emissions modelling section the authors themselves say that they could not get rid of the largest uncertainties which are the operation profiles (days at sea) and the emission factors. So why should their new emissions be significantly improved compared to older versions? Port emissions contribute only 5 % to the total emissions. The uncertainties in the operation profiles are certainly much larger.

What is striking is the large difference in the PM emissions here and by EMEP (more than a factor of 6). It is not clear where these particles are reflected in the results. Is there primary sulfate or nitrate in the emissions and how large is their contribution to the deposition? What does this imply for the uncertainties of the deposition results?

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Concerning the days at sea, I do not understand Figure 2. How do the Norwegian data compare to the assumptions made here? What can we learn for such a comparison except that the operation profiles used here are very uncertain.

I am missing a discussion on the uncertainties connected with the meteorological data that drives transport and deposition. The authors use data from only one year, however weather patterns can be very different from year to year. In my opinion it is not allowed to draw general conclusions about typical deposition patterns or ozone column values out of a one year model run.

Although the model has already been compared to measured data and the literature is cited in the text, it would be nice to be briefly informed about the results. That it has been done doesn't mean that the results were satisfying.

I know that it is not easy to give an informative figure that describes the impact of ship emissions on local pollutant concentrations. However, it is not surprising that ship emissions contribute as much as up to 90 % to the NO₂ concentrations in regions like the southern Atlantic ocean or the Antarctic where no other sources are present. I would have expected an even larger proportion. But this doesn't mean that the total emissions/concentrations are of importance or somehow problematic. It might be nice to give also figures with absolute concentrations.

Additionally, the contribution of the ships to modelled concentrations depends strongly on nearby land emissions. One cannot conclude from a lower shipping contribution to SO₂ and NO₂ concentrations over land that only chemical transformations and stronger deposition is responsible for this (page 21).

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 18323, 2008.

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