

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2020-1274

Anonymous Referee #1

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Referee comment on "Projections of shipping emissions and the related impact on air pollution and human health in the Nordic region" by Camilla Geels et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1274-RC1>, 2021

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Dear Editor,

this MS presents projections of future shipping emissions in different scenarios, as well as their expected impacts on human health. It is very well written and straightforward, with clearly structured objectives. The research topic is relevant and of interest for the scientific community. I may recommend publication, with some suggestions which may help place the authors' results further in context:

- Abstract, "But the question is if this is enough to mitigate the future increase in shipping activities." Please rephrase - the fact that pollutant emissions are decreased in ECAs has no relation with mitigating the increase of shipping activities in the future.

- line 27, section 3.4 and conclusions (line 661): to place these numbers (e.g., 850 premature deaths) in context for the reader, please translate them into premature deaths/100000 inhabitants, as done by Fann et al. (2019) and Viana et al. (2020). This would help comparing with other studies and understanding the magnitude of the health impacts reported.

Fann, N., Coffman, E., Hajat, A., Kim, S.-Y., 2019. Change in fine particle-related premature deaths among US population subgroups between 1980 and 2010. *Air Qual. Atmos. Heal.* 12, 673–682. <https://doi.org/10.1007/s11869-019-00686-9>;

Viana, M., Rizza, V., Tobías, A., Carr, E., Corbett, J., Sofiev, M., Karanasiou, A., Buonanno, G., & Fann, N. (2020). Estimated health impacts from maritime transport in the Mediterranean region and benefits from the use of cleaner fuels. *Environment International*, 138, 105670.

- line 75 (and/or in section 2.1.3): please comment on the likelihood of each of the scenarios proposed.

- line 88, "For the Nordic area, we focus mainly on total PM2.5, while for the Arctic we focus on the deposition of nitrogen and black carbon", please justify these choices. Given the health relevance of BC, why was this parameter not included in the analysis for the Nordic area?

- line 89: please clarify the "EVA" acronym.

- Sections 2.3 and 2.4: please add at least some quantitative analysis of the performance of the CTMs in the main text, i.e., what is their uncertainty when compared to surface observations? It is good that the details are presented in the Supplement, but a short comment on model validation in the main text would help the reader (e.g., line 242 ", it displays high correlation (insert quantitative data here) with observations while PM concentrations are somewhat underestimated").

- line 256, are the terms "acute deaths" and "chronic deaths" the best terms here? Death is usually pretty chronic... maybe "premature deaths due to chronic/acute exposures"?

- line 303, please explain "For SO<sub>2</sub> and BC, the major reason for the emission reductions outside SECA from 2015 to 2050 is the shift from HFO with a Sulphur content of 2.45% in 2015 to HFO with 0.5% Sulphur from 2020 onwards and the consequently reduced emission factors": is the lower S content expected to result in improved combustion efficiency, and therefore lower BC emission factors? Or what is the reason for the decrease in BC?

- line 377 "The total number of premature deaths in the Nordic region in 2015" and Figure 7: please clarify, does this refer to all-cause mortality? Or cause-specific (shipping)? The comparison in Fig 8 suggests it is all-cause.

- Fig 8: the scale of the Y axis limits the understanding of the actual differences between models. Please find a different type of chart to report this comparison, or discuss the actual numbers in the text.

- Fig 10: image quality should be improved. Please add Y axis labels.

- Fig 12: image quality should be improved. Please add Y axis lable.

- The section on limitations is very valuable.