

## ***Interactive comment on “Effects of global ship emissions on European air pollution levels” by Jan Eiof Jonson et al.***

### **Anonymous Referee #3**

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This paper describes an interesting study regarding the comparison of global and regional numerical modeling results to evaluate the impact of shipping emissions on air quality over the globe (and in particular over Europe region). The work described is consistent, but there are some open questions and fragilities that should be solved and discussed before publications. The major problems are related to the absence of no model validation is presented or mentioned (model uncertainty should be presented and discussed), quantitative analysis should be always preferable instead of qualitative and it is not clear the added value of this paper comparing to other recent ones (referred in state-of-art) with very similar objectives and modeling (and scenarios) approaches. Below, major and minor revisions requested.

Abstract Line 4: The authors should be consistent when presenting the pollutants

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(name or chemical compound). Please harmonize this along the text. Line 7: The objective/purpose of the study is missing in the abstract! Line 10: Something should be mentioned about the shipping emissions inventory used here (a particularly important input for this study) Lines 18-22: this conclusion is too general and obvious. There are more specific and interesting conclusions at the end of the paper that should be here mentioned.

Introduction Line 26: strange way of starting this Introductory section Line 30: land or maritime emissions? Line 44: reference should be added to support this Line 64-67: it is not clear which is the novelty of this study comparing to others recently published like for example Sofiev et al (2018). The authors should also explained why only focus on PM2.5 and ozone. Also the modeling system could be already mentioned/identified in this part.

Model description Lines 81-84: a reference is missing Line 144: which are higher: emissions per grid cell or total emissions? Line 151-152: please review this sentence Line 158: I do not understand this part "for several of the model runs"...please clarify.

Results (3-5 chapters) Line 218: how did the authors calculate this nitrate contribution? Line 253: Section 5 instead of Sections 5 Lines 271-272: Please review this sentence Line 296: ozone is, in particular, high... Lines 303-306: please quantify these contributions Line 322-323: please clarify/explain why these contributions are negative in these areas Line 328: please review this sentence Line 332: please quantify the ozone reductions mentioned Lines 334-342: the same comment before applies here (quantifications would be important) Line 366: please review this sentence Section 5.1/5.2: the authors identified previously a group of (significant) differences between the global and regional simulations (namely land and shipping emissions, scenarios applications, boundary and initial conditions) but they do not use these differences to explain some of the differences found in results. These differences, in particular, the emission data should be discuss - and in particular why these difference do not invalidate the comparison between the simulations

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Conclusions Line 462: I would suggest to modify the sentence to "Assuming the fulfillment of the legislation, it is expected that this result in substantial..." Lines 481, 487: please review these sentences

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