

## ***Interactive comment on* “Shipping emissions in the Iberian Peninsula and its impacts on air quality” by Rafael A. O. Nunes et al.**

### **Anonymous Referee #1**

Received and published: 26 February 2020

Dear Editor,

this MS models shipping emissions across the Iberian Peninsula and their impacts on air quality. The MS is mostly well written and straightforward, and interesting for the scientific community even if certain statements (e.g., the last sentence in the abstract "confirms that shipping emissions can contribute negatively to air quality") are already widely established. I have two main concerns:

1) Model validation: no evidence is reported that the model was validated with observations. Was it validated in any way? How? Even if it cannot be validated with actual shipping contributions due to the different methods used (lines 237-238), the authors could compare their results to total NO<sub>2</sub> or other gaseous pollutant concentrations from reference stations, for example. This kind of comparison would be essential to confirm

their modelling results.

2) Primary vs. secondary aerosol contributions: it is unclear in the manuscript whether the particle concentrations modelled are primary or primary + secondary aerosols from shipping. If secondary aerosols were included, how was this implemented in the model? This is the main limitation of most models targeting shipping emissions (both dispersion and receptor models). Please address this carefully in the Methods section.

Specific comments: - line 25, "its contribution", does this refer to health impacts? The contribution to air quality degradation has been assessed in numerous papers in the literature, including the papers referenced by the authors.

- the English could be reviewed by a native speaker, it is good but some small typos remain.

- line 33, suggestion to reference the EEA report EEA, 2013. The impact of international shipping on European air quality and climate forcing. EEA Technical Report 04/2013. Luxembourg: Publications Office of the European Union, 2013. ISBN 978-92-9213-357-3.

- Please add in the Methods section discussions on model validation and on secondary aerosols (whether they are or not included in the model).

- line 150, what does "ash" refer to, exactly? Please define

- line 155, "ports", the resolution is quite coarse (10x10 km<sup>2</sup>) to represent harbour emissions, or even most coastal urban areas. Please highlight this as a limitation

- line 160, suggest to check and reference the report HEI Special report 22, Impacts of shipping on air pollution emissions, air quality, and health in the Yangtze River Delta and Shanghai, China

- lines 185-188, please add a statistical trend analysis: the differences don't seem

statistically significant, to the naked eye.

- line 191: I don't think the comparison with a paper from 1999 (even if a reference paper) is adequate here: in 20 years the trade and sailing patterns have surely changed largely, therefore this comparison is not representative

- line 203, are these primary or secondary PM10 and PM2.5 concentrations? Or the sum of both?

- line 206, why do concentrations increase gradually towards and over the N of Africa? Are there no O3 sinks (e.g., major cities) in this region? This seems unlikely, probably the emission inventories are not accurate for this region. Please discuss.

- line 217, are these (4.8 microg/me and 6.9 microg/m3) shipping contributions? They seem quite high, especially if only primary aerosols are considered (I'm still unsure of this). Also, are these average values for the entire peninsula? Please compare with shipping contributions from the literature, and also with total (non-ship sourced) PM10, NO2, O3, etc concentrations.

- line 240-241: these contributions seem unlikely as they are reported here. What distance to the coast do these results refer to? Even in coastal areas shipping is seldom the main contributing source, almost always surpassed by traffic contributions (see for Spain the works by Pandolfi et al., Pérez et al, iana et al., Amato et al....). It seems unlikely that shipping accounts for 50% of NO2 ambient concentrations inland. Or are the authors referring to air emissions? If so, this could be possible for major cities such as Barcelona. Please clarify the meaning of these sentences.

- line 249: once again, model validation is needed here.

- lines 265-268 and 283-284: please remove the references to the "port of", as the model's resolution is too coarse to capture this.

- section 3.3, please add model validation and the issue of primary and secondary aerosols, as limitations.

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- line 333, suggestion to add reference to the HEI Special Report

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-1186>, 2020.

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