

Atmos. Chem. Phys. Discuss., referee comment RC2
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Review of manuscript acp-2021-306

Anonymous Referee #2

Referee comment on "The impact of nitrogen and sulfur emissions from shipping on the exceedance of critical loads in the Baltic Sea region" by Sara Jutterström et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-306-RC2>, 2021

GENERAL REMARKS

The study investigates the impact of emissions from shipping on the acidification and eutrophication of soils and lakes in the Baltic Sea region. Exceedances of critical loads of ecosystems by the deposition of sulphur and nitrogen compounds from shipping are calculated for years 2012 and 2040, applying different emission control scenarios. The key finding of the study is that in year 2040 sulphur emissions from shipping have no further impact on the acidification of ecosystems if the rules of Sulphur Emission Control Areas (SECA) are applied. In contrast, nitrogen emissions from shipping still contribute to eutrophication, even if the rules of Nitrogen Emission Control Areas (NECA) are in force.

The paper is very well written and structured, and the number and quality of figures is adequate. The number of tables is very large and the authors may consider moving some to supplementary material to increase readability. The study fits well into the scope of the journal and makes a significant contribution to the Special Issue on Shipping and the Environment. The manuscript will be suitable for publication once few issues as discussed in the following have been considered.

SPECIFIC COMMENT

The manuscript investigates the exceedances of critical loads of sulphur and nitrogen depositions. The authors use the expression "exceedance of critical loads" but refer to exceeded areas. I suggest using here the coherent wording "exceedance area". Then, the link between the two parameters is more evident.

In the Introduction, the authors discuss the decrease in emissions of S and N species (line 44 – 49) and they present quantitative numbers for the achieved reduction. However, the reference year should be clearly defined. In the current version, the reference period is not clear.

MINOR ISSUES

- Line 34: Suggested re-phrasing: “takes predominantly place in the gas phase” instead of “takes ... part in ...”.
- Line 45: Please clarify whether you mean “have decreased by 91% ...” or “have decreased to 91% ...”.
- Line 80: Do you refer to the fuel sulphur content by mass or by volume? Please specify.
- Line 190: Parentheses are missing for the reference Posch et al. (2015).
- Line 210: The Results Chapter is Chapter 3, not 2.
- Section 2.2 and Figure 3: It is not readily obvious from the description of the shipping scenarios whether EEDI – Shipping is based on BAU with NECA implemented, or not. One clarifying sentence is appreciated, although this informant can be found in Table 2. Clarification would also help to better understand Fig. 4 and the other figures later in the manuscript which show results from the EEDI scenario.
- Table 2: Is there a reason, why the first three columns contain values with one digit, while the last three columns contain two-digit values? Consistent presentation is suggested.