

Review of the manuscript by Riess et al. "Improved monitoring of shipping NO₂ with TROPOMI: decreasing NO_x emissions in European seas during the COVID-19 pandemic"

The manuscript presents an analysis of ship emissions over European seas based on TROPOMI NO₂ observations. The authors also analyse the effects of COVID-19 restrictions on shipping and the relative decrease in emissions. The manuscript has sufficient elements of novelties as it provides a deeper analysis of the capabilities of TROPOMI NO₂ observations for ship emission monitoring, after a first paper dedicated to the detection of individual plumes by Georgoulas et al. (2020). I recommend publication after addressing the following comments:

1. You mention the NO₂ profiles used in NO₂ retrieval from TM5 at 1x1degrees: Can you comment on the possible uncertainty related to such coarse resolution and on their accuracy over sea in particular?
2. Did you assess how the FRESCO+wide perform over ice/snow surfaces? Can you comment on that?
3. How do your simpler emission estimates from AIS compare to the estimates from STEAM model? And why don't you use STEAM emissions for the analysis of changes? Not available for 2020? Also, you use this CAMS-STEAM emission data in Fig. 1 and 2, maybe you should introduce this dataset a little bit earlier.
4. L340-... This statement is not supported, are you implicitly referring to your figure 10c? if yes, please make that connection.
5. Can you address and discuss a bit more the uncertainties on these monthly β values at such coarse resolution when you use it here for the emission change estimates? Also, how could monthly β values change between 2006 and 2020 due to meteorology or other factors?

Technical comments:

L128-L129 "in order to distinguish between bright reflecting layers at the Earth's surface from reflecting surfaces in the lower atmosphere.": remove "between" or replace "from" with "and"

L359-360 you just said this in the previous paragraph, maybe rephrase here