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Interactive comment on “A comprehensive inventory of ship traffic exhaust emissions in the European sea areas in 2011” by J.-P. Jalkanen et al.

Anonymous Referee #1

Received and published: 27 April 2015

This is a well-written, straightforward paper that I recommend for publication after a number of issues have been clarified, added or improved. The topic of shipping emissions is highly relevant and the use of AIS data results in an enormous increase of resolution of the emissions data which will improve our air quality modelling capabilities substantially. I recommend this paper for publication after the below comments have been treated satisfactorily.

Specific Comments

line14-15; p7471. In this discussion it should be noted that the most trafficked river

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in Europe is the Rhine which ends in Rotterdam; the biggest European port. AIS for non-recreational inland shipping has been subsidized in the Netherlands (and by now is compulsory). This explains a much higher share of small vessels in the Netherlands compared to other countries with much less important inland shipping routes.

The contents of Table 3 should be discussed in a bit more detail, especially the very high % of auxiliary engines (AE) (= 100%- ME%) should be explained and /or commented on: There seem to be many ships where AE% is > 40% and sometimes higher than 50% - which makes one wonder what the main engine really is if it is only used for 30-50% of the time. It seems that in several cases the ME could be used for tasks that the AE performs when in port? So how do you know they use only the AE?

I5-10 p7473 - discussion on uncertainty here seems related to the above comment on Table 2.

p 7474 - bottom of page: There appears a bit of inconsistency in the reasoning here - while the argument now is that the current 2011 estimate is in line with Vinken et al. for 2006 - a bit earlier in the paper it was argued that it made sense that NO_x emissions were lower due to the economic crisis of 2008-2009. Vinken et al. is before, this paper is after. Please give some interpretation / comment on this.

In section 3.4 the EDGAR inventory is missing - would be good to include this next to EMEP as it is one of the most widely used inventories.

I8 and further p7475: The SO₂ emissions are directly related to the S content of the fuel - so the conclusion can only be that the EMEP inventory has about 2 x the S content.- which seems unlikely - At the same time it seems unlikely that this factor 2 can be entirely covered by the in-port emissions which may use lower S fuels (or if so please calculate and explain) - so a bit more discussion is needed here - for example what is the role of the high % of AE in this study (see Table 3) - can that help to partly explain the gap?

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I 10-11 7476 - please recalculate both to CO₂ or both to tons of fuel - not 1 as fuel and 1 as CO₂ - this is for the reader very inconvenient.

I 18 p 7477 - The authors mention correctly the importance of the high resolution for AQ and health studies. However, to support this point the reviewer would also like to know about accessibility of the data for other scientists. Are they available upon request? or in other ways?. it is fine to say that this data will improve air quality and health studies but that is only true if the data are available for use.

I12 and further p7478. This paragraph is not conclusion but belongs in the introduction or possibly somewhere in the discussion section.

Last but not least in the Conclusions something more should be said about the large discrepancy in SO_x emissions for the MEd Sea between this work and EMEP / IIASA . Now it is only mentioned. But as said earlier SO_x emissions are simply and directly controlled by the S content of the fuel. So the fuels assumed to be burned in these studies are very different - how likely is that and how can it be explained or - if it can't be explained what kind of data or research is needed to solve this?

further minor comments.

line 16 p 7461 "Furthermore, important emission sources, like harbours have been often neglected from regional emission studies." This statement needs to be either better specified or removed. Harbours contain many different sources; International shipping, inland shipping, refineries, handling of goods, mobile machinery for unloading etc etc. . There will be no national or regional inventory with zero emissions in ports. (they might be incomplete though)

line 6, p7466 - The sulphur content of the fuel has been modelled explicitly for each vessel... This needs some clarification. There are regulations by Sea (e.g. SECA) and the avg fuel S content in shipping is known but I don't see how you can model the fuel S content by ship. There will be ships with lower than avg fuel S and some

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with higher S content than avg but how to know which is true for an individual ship w/o actual sampling and measurement?

I2 7473 habe = have - In general it would be good to ask someone to check for missing cases of the word "the" or "a" - this happens occasionally in the text but it takes me too much time to identify page and line numbers to list them.

The legend of Table 1 refers to Annex II for details but no Annex is present or given.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 7459, 2015.

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