

Interactive comment on “Investigation of gaseous and particulate emissions from various marine vessel types measured on the banks of the Elbe in Northern Germany” by J.-M. Diesch et al.

Anonymous Referee #2

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The paper by Diesch et al. reports on measurements of ambient aerosol and several trace gases on five days in April 2011. These measurements have been carried out on the banks of the lower Elbe close to one of the busiest shipping lanes in Europe. In total 139 ship plumes have been analysed to determine emission factors for the above mentioned quantities depending on vessel classes. In general the paper is an interesting and scientific important piece of work and merits publication in ACP. This is in particular true since only a few studies are available where emission factors of marine vessels have been derived under real conditions. However, like reviewer #1 I have serious concerns about several of the conclusions drawn by the authors due to the very limited data set used. Sections 3.2, 3.3 and 5 should be rephrased, removing

all the statements not supported by the data in a statistical proven way.

Detailed comments:

Section 2: Please give information on which days the mobile lab was where. The measurement site in the south is quite close to Glückstadt. Isn't it possible that local pollution has interfered with ship plumes (in particular for NO_x)?

Time resolution of measurements: The airpointer has to my knowledge not a time resolution much better than one minute. This is in particular the case for NO/NO₂ since it is measuring these trace gases in a two-step procedure. The data output of the system might be faster but this is not the real time resolution of the detector. Also the results shown in Figure 3 are not supporting the statement that most instruments have a time resolution of 12 s or less.

P22278: Could the authors support their statement, that they have measured only fresh emission plumes with their meteorological observations? Two km distance means that a minimum wind speed of 6 m/s in direction of the lab is needed to cover the distance within 5 minutes.

The reference to the instrumental description of Drewnick et al. is missing in the reference list.

Section 2.5: The description of the vessel types is needless since it is never used in the analysis of the data. Instead I would like to have the classification from section 3.3 here.

Sections 3.2 and 3.3: As pointed out above and also shown by reviewer #1 several statements are not supported by the results. E.g. "higher NO/NO₂ ratio was found with increased engine power". Or: "the majority of plumes exhibit a bimodal size distribution". My interpretation would be that this the case only for Type 1 vessels.

Figure 1: For which altitude the trajectories have been calculated. In general, this figure is in my opinion not very helpful. Either one has to zoom in to see the trajectories with

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the sites or the authors just plot wind speed and direction from their own observation, which I clearly prefer.

Figure 2: Panel A of this figure needs a zoom in.

Figure 5: Please use the same scale for SO₂ EFs.

Figure 7: It is almost impossible to get any useful information from the overlapping error bars. It might be improved by shifting the lines a bit within the size bins.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 22269, 2012.

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