

Interactive comment on “Emissions factors for gaseous and particulate pollutants from offshore diesel engine vessels in China” by F. Zhang et al.

Anonymous Referee #2

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The paper presents emissions factors measured on 3 ships operating in Chinese seas. The measurements as such were thoroughly done and the data could contribute to the knowledge of emission factors from ships operating in China. However, the presentation of the measurements does not really give a possibility to put these measurements in some wider context as the comparisons are done in an inconsistent way.

The introduction provides a rather scattered picture of findings on shipping emissions and effects and does not either provide a review of state of the art or set a scene for the new measurements to be presented. The description of policies regulating the shipping emissions, important driver for fuels and technologies used by the shipping industry, is weak and incorrect (see comment nr. 2 below). The only Chinese regulations mentioned are a GB/T 17 411–1998 bunker standard, being less stringent than the

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ISO 8217–2010 without explaining what the difference actually is, and the recent fuel S limit for berthing ships in port of Hong Kong. Since the focus is emissions in China it would be interesting to read how the legislation differs from the global IMO legislation, if there is some motivation that the tested ships use diesel fuel and not residual fuel, among other. To put the measured EF into wider context, what part of the fleet, ship operations or fuel consumed is using diesel fuel?

Comments:

23509, l. 14-18 ... low engine power vessel, ... higher engine power vessel - this is a bit confusing description of the vessels, especially as also medium-speed and high-speed engines and different engine loads are used to describe the experiments. It looks like there are two smaller and one larger vessels, maybe this, or using the vessel abbreviations would make the text easier.

p.23512, l. 15 an on: IMO legislation in ECAs is not decided by EU environmental ministers, the same rules apply for the North Sea & English Channel and for the Baltic sea through all years, not only 2004-2010.

p. 23 514: Operating modes – the normal is to express operating modes as % of max engine load and not ship speed which is affected by external conditions as currents, wind-speed e.c.t. The comparison with other data is difficult when using vessel speed when most of the other published factors are based on engine load.

p. 23 516, Formula 2: The flue gas emission rate $R(\text{FG})$ is essential for the calculation, how was it obtained? Has the correction for CO_2 in the engine inlet air been implemented in the carbon balance equation? In formula 3 – What is meant with ‘background subtracted’?

p. 23517 Part 3 – what is reason of presentation and comparison of concentrations in exhaust? These vary largely among the different engines and operation conditions and do not allow any general comparison.

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p. 23519 l. 1-3 CO₂ emissions – ship HH had actually rather bad and not ‘high’ combustion efficiency with 2-7.5% C emitted as other but CO₂. p. 23521 – OC depends very much on dilution of the exhaust analysed and OC analysed on PM sampled without dilution can not be directly compared with OC analysed on samples from diluted exhaust

p. 23522 – Section 3.3 – How were the emission factors for different operation modes averaged? There are standardized methods for averaging, were these applied?

p. 23523 l. 3-4 – How were the Tier-1 limit emissions calculated in g/kg-fuel? The specific fuel consumption needed for the calculation need to be shown. This is also the case for the power-based emission factors

Table 3. Fuel-based emission factors – The table is mostly missing information about fuels used by the vessels and their sulphur content which is essential for EFs both for SO₂ and for PM.

p. 23524 – section 3.5 – Since the Tier is based on power-based EF it would be good to look at these as well, these EFs are usually stable. The variability of the fuel-based EFs is related to the power-based ones through inverse specific fuel consumption which can have similar shape as seen on fig. 4

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 23507, 2015.