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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Black carbon emissions from in-use ships: a California regional assessment" *by* G. M. Buffaloe et al.

**Anonymous Referee #1**

Received and published: 15 November 2013

1. General comments This study provides emission factor of black carbon from in-use ships from ambient measurement. Although this paper seems not include great findings, this kind of data seems to be rare so this study seems to have certain significance. However, this manuscript is not easy to understand (read), and is little bit long. Authors should clearly state the strengths of this study in the Introduction and state the important findings of this study at elsewhere. They should rewrite the whole manuscript to become more clear explanations. I think the construction of the manuscript, figures and tables are OK. There are too many abbreviations such as SSD, LSF, and rBC. Please limit the abbreviations to the general terms or necessary terms. May be about half or less of them are acceptable. After revisions according to the points stated above and below, I think this manuscript is worth publishing in this journal.



2. Specific comments Abstract: It is not easy to understand. The description in the Conclusion is better to be understood. So please reconstruct the Abstract so as to clearly state the main objective and key findings.

Whole manuscript: This manuscript shows the emission factor (EF) only in g/kg-fuel. However, the EF in g/km (per travel distance) may be also (or more) useful for the readers. Also EF in g/km could be more variable with engine type and fuel type and engine load. So I wonder how the results would become when these data is analyzed for the EF in g/km. Please state regarding comments in the manuscript. Of course it is good to show some results of EF in g/km. Authors should clearly describe that EF can be estimated only in g/kg-fuel due to the measurement and estimation protocol at the Introduction or Experimental methods.

2. Experimental Method: Please clearly state the following two points at the beginning of this section: (1) Estimation concept of the EF. How the EF is estimated form ambient measurement? (2) Feature and limitation of the estimation method. Regarding (2), for example, please describe the followings: (a) How the authors can distinguish between the plume from own vessel (R/V Atlantis) and the plume from other vessel? (b) The definition of "plume" (e.g. darkness, concentration, distance from the target vessel). (c) How they can catch or detect plume? (d) What times or what seconds the measurements were conducted in a single plume? How the authors selected or extracted of the effective data from lots of the measured data?

3.1 BC measurement technique comparison, P24687, L14-19: Were the EFs obtained from the four different measurements, though the SP2 values are systematically lower than the other three instruments. It seems reasonable that only three data is used to obtain average EF.

Table S1: Are the data, which the ship speed is zero, for the ships at anchor at harbor? If so, these data may have to be removed from the EF estimation because the engine condition is different from that in running condition and the plume can be strongly

affected by the other sources (ship and onshore sources).

Figs.3&4: Please clearly state the reason of the large variation of EF. Is it mainly from measurement and estimation error or from vessel itself? If the cause is vessel itself, please describe the main cause of the variation.

3. Other comments such as technical corrections P24676, L3, Abstract: Please write “R/V Atlantis” as “research vessel (R/V) Atlantis” because some readers may not understand it is a vessel.

P24676, L14, Abstract: EF of BC is the main result of this study. So it is better to show more detailed data such as the range (minimum to maximum) or regarding values.

P24676, L6, Abstract: Please show the concentration of sulphur in fuel where the ”Relatively Low sulphur” is stated.

P24676, L7-11, Abstract: Two phrases start with “which” are confusing. So please omit those phrases or divide that sentence in two. Or the description in the Conclusion is better to be understood.

P24676, L19-21, Abstract: it is not easy to understand what difference is stated by the words “significant difference”. This sentence may be able to be omitted.

Fig.1 and Table1: Please show in the captions which instrument is shown in y-axis.

Fig. 3: Please explain the meanings of the value in parenthesis in the caption.

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 24675, 2013.