

Interactive comment on “Constraining the ship contribution to the aerosol of the Central Mediterranean” by S. Becagli et al.

Anonymous Referee #1

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Dear Editor,

this manuscript presents an assessment of shipping contributions to PM10 aerosols in two locations in the Mediterranean Sea. It presents a very interesting integrated approach combining different tools such as analysis of the chemical composition of PM10, tracer analysis, back-trajectories and ship inventories and databases. Whereas certain of these tools are not novel and suffer from limitations (e.g., tracer methods), the combination of all of them provides very interesting results. Over all, the paper is of interest to the scientific community and merits publication after revision. Specific comments are provided below:

- lines 110-113 would fit better in the Methods section
- line 276: very good, it is very important that the authors highlight this kind of limitation

C1

- line 292: "smaller" should be "lower". In general, the English is correct but a review by a native speaker would be helpful.

- Figure 2: the nitrate contribution at LMP is surprisingly high, considering the thermal instability of this species. Can this be due to an artefact or high uncertainty of the measurements?

- line 340: also, EC concentrations are much higher in CGR, supporting this interpretation (the dominance of anthropogenic sources of carbonaceous aerosols in CGR)

- Figure 4 is interesting but not so useful, it could be removed if the authors encounter space limitations

- line 402: about the representativeness of this kind of ratios: it should be stated that this ratio may have a large variability due to varying fuel composition and engine operating conditions

- line 424: LCR=1-5, how specific are these values for the specific refinery in the Moreno et al study? Can they really be extrapolated to other refineries? What can the uncertainty be for other refineries? Please discuss

- line 430: 24% of samples with LCR>1 and 8% >2, this is a very high contribution (32%), can the contribution from refineries be so high at LMP? From where? Or is this an example of the limitation mentioned above, the uncertainty of these LCR values when applied to other study areas? Please discuss

- Figure 6: again, the authors show only one point per type of dust, what is the uncertainty? The authors' results seem very conclusive with regard to their own samples, but it would still be useful to see the potential variability in the other (refinery, UCC) types of dust. If no other data is available for this kind of sources, please mention as a limitation

- line 575: it is also possible that this is due to the larger aerosol dilution during transport towards LMP?

C2

- line 666: "two times higher than...", isn't this strongly dependent on fuel and engine operating conditions?
- line 702: "component" should be "components"
- line 703: the term "rough estimate" is more adequate than the "unambiguous identification" used in other parts of the text
- line 722: "50%", again, this is very variable depending on engine conditions, meteorology (oxidation rate of SO₂...), etc. Therefore this 20% difference can be expected
- line 741: the higher % contributions obtained should not be considered a negative result, due to the potentially large variability of these contributions. It is correct to compare the order of magnitude with the previous literature, but the precision of the authors' method (and of other currently available methods) is not sufficient for them to carry out a detailed comparison of the results obtained. The results presented are quite positive, in my opinion.
- line 781: should "as expected", be added at the start of the sentence?

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