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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ship plumes in the Baltic Sea Sulphur Emission Control Area: Chemical characterization and contribution to coastal aerosol concentrations" *by* Stina Ausmeel et al.

Anonymous Referee #2

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The paper aims to characterize and evaluate the contribution of ship plume to coastal aerosol by size distribution and SP-AMS measurements in a coastal site located in a recently classified sulphur emission controlled area (SECA). Besides, results on a simulated ageing of ship plume by an oxidation flow reaction are reported.

The paper present a large data set, but conclusions are not compelling. Here below some specific comments and suggestions to improve the discussion and especially to better constrain the conclusions.

The evaluated impact on of ship plume is really low, by reading the manuscript I do not understand what are the authors conclusions, is this due to the application of SECA

rules? Or to other meteorological effect? This aspect is fundamental to give guideline to environmental policies. Please authors improve the discussion on this aspect.

The result of the scarce increases of secondary aerosol obtained in the OFR measurements is not fully supported. I think that a comparison with data from other sites could help the discussion (e.g. Contini et al., 2011 and especially Perez et al., 2016 for the evaluation of secondary aerosol). Besides, the statement that background particles are already aged is not correct in my opinion, as the author state the time required to air masses from ship plume to the sampling site is 90 min in the measuring condition, this time is not sufficient for the ageing of aerosol, nether in summer. I think that information on the height of planetary boundary layer are fundamental to understand secondary aerosol formation processes and especially the real contribution of ship aerosol to background aerosol budget. By considering this aspect, conclusions can change substantially. I strongly suggest adding a discussion on the effect of PBL height on the contribution of both primary and secondary ship aerosol respect to background.

The paper can be published on ACP only if a deep discussion on the above reported points is added. Besides, few minor comments are reported here below.

Minor comments.

A map with the sampling site and surrounding areas with the urbanization level can be useful to interpret the data set.

Section 3.1 Plume identification and general characteristic seems more a methodology to recognize ship plume than results, I suggest moving this part in the Materials and methods section.

Lines 339-340. The sentence is not completely correct, it is true that nitrate arises from oxidation of NOx, but ammonium arises from neutralization of ammonia on both HNO3 and H2SO4, the latter is preferred over ammonium nitrate formation due to the lower

vapor pressure of sulfuric acid than nitric acid (Hauglustaine et al., 2014).

References

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