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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comparison between summertime and wintertime Arctic Ocean primary marine aerosol properties" *by* J. Zábori et al.

Anonymous Referee #1

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The authors of this paper have measured the total particle number concentration and distribution of primary marine aerosols (PMA) generated from water from the Arctic Ocean during one winter and one summer for varying temperature ranges. Due to the rapid changing Arctic climate, this is an important matter to investigate. The authors admit that the temperature dependency of the PMA concentrations and distributions cannot be directly extended to a heating Arctic Ocean, due to the potential biological and chemical changes that were not investigated in this paper. The paper is well written and well structured and the figures are very illustrative. The differences between winter and summer experiments are discussed well and there has been given thought to the potential errors within the different experimental setups (e.g. in water flow rates).

Questions to the authors/clarifications for the paper:

*) Zábori et al., ACP, 12, 10405-10421, 2012 paper (when talking about the winter experiments) claims that most of the variation in particle number concentration originate from the sea water temperature changes and not from a depletion of organic substances from the sea water. Is this the same case for the summer experiments?

*) Figure 4+5: why is there this sudden peak at ∼120 nm during winter, but not during summer?

*) Why is there so great difference in the measurement time (P31161 L26-27 and P31162 L5-6)?

The section on 'Future implications'/Figure 9:

This section (and figure) would need some improvements: the figure could be more illustrative and clear, e.g. by adding colours. In the text, add the expected Arctic Ocean temperature increase and discuss the feedbacks with respect to that. It would improve the figure, if also DMS and marine VOCs were included and discussed. Likewise, salinity changes due to decreased sea ice and glacial extent should be included and discussed as well. Discuss the figure with respect to the future expected winter vs the summer situation. In the paper you show that the temperature increase shifts the PMA size distribution which will affect the CCN prediction, which should also be addressed here. P31170 L16-20 "Assuming a change of Tw in the lower water temperature range (below 6 C), the net resulting change in PMA production due to the two factors (increasing Tw and increasing source area) is currently not know (since they have opposite signs on the PMA production) and should be studied in the future, for example with the help of modelling tools". It would strengthen your figure to make a back-of-the-envelope calculation on this (use your results from your paper, expected future sea ice extent and water temperature).

Minor comments:

ACP is a European journal, why British English should be used (e.g. use 'vapour', not

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'vapor').

P31154 L2-6: there is a grammatical error here somewhere.

P31154 L18: should write what 'Dp' is when using it for the first time.

P31154 L25: add a 'a' before 'Dp'.

P31155 L10: add 'and' before 'change'.

P31158 L 22: add 'the' before 'summer'.

P31158 L 27: add 'the' before 'summer' and before 'winter'.

There should be more references to the Zábori et al., ACP, 12, 10405-10421, 2012 paper in the methodology, since it is the same experiment.

Figure 1 and 2 are already presented in Zábori et al., ACP, 12, 10405-10421, 2012 and you should therefore refer to this paper when presenting the figures.

P31170 L15: there is a grammatical error here somewhere.

P31161 L 22: no need to mention that Tw is water temperature, again.

P31164 L19&21: write 'a Dp of 100 um' instead of 'Dp 100 um'.

P31173 L18: error in reference title (missing ', 1997-2010')

P31173 L23: error in reference author (Putaud, J.-P.)

P31173 L24: error in reference journal (I think the proper is J. Geophys. Res.-Atmos)

P31174 L3-4: error in reference authors (Facchini, M. C., Nilsson, E. D., O'Dowd, C. D.)

P31174 L17-20: error in reference authors (Hegseth, E. N., Kovacs, K. M., Weslawski, J. M., Gabrielsen, G. W., Leakey, R. J. G., Lønne, O. J., Wängberg, S.-Å., Voronkov, A. Y., Kovaltchouk, N. A.)

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P31176 L3: error in reference author (Beszczynska-Møller, A.)

P31176 L8: error in reference author (Tremblay, J.-É.)

P31177 Table 1: Maybe add water surface temperature.

P31178 Figure text for Fig 1b line 3: add the name of the glacier if such exists.

P31184 There is no need to have 4 bars here to show the temperature. One should be enough.

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