

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-591

Anonymous Referee #1

Referee comment on "A full year of aerosol size distribution data from the central Arctic under an extreme positive Arctic Oscillation: insights from the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC) expedition" by Matthew Boyer et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-591-RC1>, 2022

This paper reports the aerosol size distribution and BC concentration measured during the unique MOSAIC experiment in the central Arctic. Most part of the paper is devoted to the size distribution. Most of the findings confirm the knowledge obtained up to now from the land stations distributed around the Arctic, but that interannual variability could bring to results appreciably different from year to year (and that the MOSAIC year has been quite peculiar).

The article is well written and I have only a couple of comments, as well as few minor annotations.

The authors use the stability of the atmosphere as an argument to justify the advection and the deposition of aerosols, but they don't show any measurements of this parameter taken during the cruise. It would be possible to provide some evaluation for it?

When comparing MOSAIC measurements with long-term observation taken at land stations, PNC from Tiksi, Villum and Zeppelin look very different (higher) than those measured onboard Polarster, in particular for particles with $d < 100$ nm. In my opinion this is not sufficiently highlighted in the text. Same for Figure 11 for the 1 year comparison.

Specific comments:

L197 I would suggest to move the link to PSAP Gruevbadet data in the "Data availability" section, together with all the others.

L205-209 You cite Beck et al. 2022 three times in few rows. Maybe you can re-phrase in order to do it once or twice.

L295 Description of panel (b) is missing

L305 I don't see the meaning of showing the hourly averages in S4, considering the fact that they are done over 1 year period and in 1 year you have so different environmental conditions. This is partly acknowledge by the authors in the text.

Figure 10 It is difficult to distinguish the different colors (e.g. Utqiagvik from Gruvabadet). In which order are reported the different stations in the figure? In my opinion is not the same as in the legend.