

Interactive comment on “High–Arctic aircraft measurements characterising black carbon vertical variability in spring and summer” by Hannes Schulz et al.

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–Arctic aircraft measurements characterising black carbon vertical variability in spring and summer

We would like to thank the referees for their detailed and constructive comments, which helped us to improve our manuscript.

For easier reading, we attached our comments as PDF, where the referee comments

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are given in black bold, our answers are given below in blue letters. Additionally, we added the changes we made in the revised manuscript in blue bold letters.

Answers of the authors to anonymous Reviewer1

Anonymous Review of Manuscript acp-2018-587 GENERAL REMARKS:

This paper presents vertical distributions of black carbon aerosol from two aircraft campaign in the high arctic during the spring and summer seasons. They look at BC loading, BC fraction of total aerosol, BC mass median diameter and BC/CO and they run back trajectories. The instrumental methods and the writing are fine though the analysis is a rather qualitative and the conclusions basic. The main finding of the paper, as I read it, was that there are seasonal differences in BC sources within and transported to the arctic in the spring and summer that drive marked differences in BC loadings between the two seasons. I don't think that's a particularly surprising finding and the larger motivations, outlined in the introduction, of connecting these observations to deposition rate to the surface and atmospheric heating are not fully realized. Nor is it a paper that can serve to constrain sources of BC to the arctic; as such I am struggling a bit to define what exactly this paper is about or how it might be used by the community.

The authors would like to point out that the referees raised questions concerning the interpretation of the BC/CO ratio as indicator for wet scavenging and encouraged us to verify the subsequent hypothesis and conclusions. Due to the high number of comments on this specific topic, we prefer to provide here a general and common answer to all reviewers. As a consequence of the above-mentioned reasons, Section 3.4 was substantially modified. The discussion now focusses on the importance of transport patterns on the observed BC concentration. Thus, Figure 7 and Figure 8 were modified. The discussion on potential impact of wet scavenging on BC and

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BC/CO ratio is now substantially reduced. However, additional analysis of back trajectories, including encounter with clouds, is now presented in the supplementary material.

Specific comments of Reviewer1

Please find our comments in the supplementary material to this AC!

Please also note the supplement to this comment:

<https://www.atmos-chem-phys-discuss.net/acp-2018-587/acp-2018-587-AC1-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-587>, 2018.