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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Features in air ions measured by an Air Ion Spectrometer (AIS) at Dome C" *by* Xuemeng Chen et al.

Anonymous Referee #2

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The article deals with almost a year long air ion measurement in Antartica (Dome C). The manuscript describes the AIS-based measurements including seasonality of concentrations, variability of air ions related to NPF, comparison of different growth rate methods, the influence of cloud/fog formation, and wind induced ion formation. Particle number size distribution and LIDAR measurements were performed as well.

In my opinion, the MS is clearly written and formatted, and it gives unequivocally valuable results on polar regions. The article fits well into the topic of ACP in terms of quality as well. Thus, after considering the following questions and comments as minor revisions, I highly recommend the publication of the manuscript.

Specific comments:

1. Page 3., line 27: remove "totally"

2. Section Introduction: MS deals with polar region, however a brief summary or overview on similarities/differencies with Arctic region would be advantegous.

3. Section Introduction: more specific information on cosmic radiation needed

4. Section 2.1: the description of AIS speaks for itself, but there is no information about diffusion losses what is a relevant question for nanoparticles. How were the sampling lines set up? How long were they? How were the diffusional losses taken into account?

5. Page 9., line 5: The units have to standardized in the paper, and the form of "nm h-1" should be preferred instead of "nm/h".

6. Page 10., equation 7: remove the integration limits 0 and infinite (see Dal Maso et al., 2005)

7. Page 10., line 22: Was the dry condensation sink calculation used? What about RH dependency?

8. Page 11., line 15: Summary on classification of the measurement days would help to better understand the distinction of the days, and thus the description of Table 1. has to be shortened

9. Page 15., 1. paragraph: Repetition from earlier.

10. Page 16. line 4: The interpretation of intervals has to standardized in the paper, e.g. instead of "0.5 – 25", "0.5–25" should be used everywhere.

11. Page 11., line 3: Is there any possible reason why the ion formation rates are comparable to those environments? Any comments regarding to altitudes?

12. Page 39, Fig. 9: Ionising radiation as third variable (colored circles) could be added to the plot. Also, the non-linear relation is evident at least in case of Fig. 9b.

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