

***Interactive comment on “Arctic aerosol life cycle: linking aerosol size distributions observed between 2000 and 2010 with air mass transport and precipitation at Zeppelin station, Ny-Ålesund, Svalbard” by P. Tunved et al.***

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First of all the authors thank referee #2 for the assistance and time invested in improving the quality of this manuscript. The main concerns raised by referee #2 were related to the language used in the MS. We have listened to this criticism and have had the manuscript proof-read by a native speaking colleague. Legends and captions have also been edited where necessary.

Refere #2 also had a number of minor comments, for which we outline our response in

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detail below.

## Detailed comments

Section 2.1.1: The effect of missing data for years 2004 and winter 2008-2009 is highlighted. End of section 2.1 now reads:

“Also note that the missing data periods during 2004 and 2008-2009 as a consequence render average size distributions calculated for these year less representative.”

At end of section 2.1.1 we also added:

“Also note that the missing data periods during 2004 and 2008-2009 cause these years to be not fully representative.”

P.29976, l. 24: The authors agree and we provide an order of magnitude estimate of “short”. Sentence now reads:

“Nevertheless, this mode represents aerosol population in smallest observed sizes, which potentially originate from new particle formation that occurred rather recently (an assumption based on the fact that lifetime of the smallest observed particles is short, i.e. in the order of a couple of hours up to a day for a particle with  $D_p=10-20\text{nm}$ .)”

P.29977, l. 21: We added “Bates et al., 2000” to support the statement.

P.29977, l. 26: We agree that the use of “uni-modal” in this context may be confusing when talking about aerosols. We rephrase according to:

“Although the seasonal variation of the integral number concentration seems follow a pattern with maximum concentration of integral number during the summer months, . . .”

P.29978, l.15-16: We agree and reformulate according to:

“Instead, this transition is likely strongly linked to increased wet removal (e.g. Garrett et al., 2011) together with increased photochemical activity due to increased solar radiation. Wet removal and change of source areas reduce the condensation sink

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which allow for new particle formation to occur.”

Figures and tables:

Regarding position of table 2: We agree with the referee. Table 2 has been moved to Appendix A and Table is now labeled A1.

Figure 10 has been changed according to suggestions of the referee.

Figure 11: It is unclear to the authors what disagreement the referee is referring to.

Figure 12-13: The authors agree with the referee and the figures have now been split into 2x3 subplots labeled 12a-b and 13 a-b. The authors also took the liberty to improve the resolution of the plots by increasing the number of grids from 30x30 to 60x60, which according to us greatly improved the appearance of figures 12-13.

Figure 15: Very true indeed. Figure has been changed accordingly.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 29967, 2012.

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