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## ***Interactive comment on “Seasonal cycle and modal structure of particle number size distribution at Dome C, Antarctica” by E. Järvinen et al.***

### **Anonymous Referee #2**

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The paper “Seasonal cycle and modal structure of particle size distribution at Dome C Antarctica” by Järvinen et. al. presents observations of the aerosol size distributions measured at Antarctic plateau. This is the first long term aerosol size distributions observations from this remote region and the measurements itself is also the main contribution of the presented work. The manuscript is clearly written and structured and analysis of aerosol size distribution measurements is clearly described.

### General comments

Overall there is very little data interpretation and discussion. The contribution of the

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paper to scientific community is reduced to presenting observations. These are beyond any doubt very valuable, but adding more on interpretation will make the paper significantly stronger. For example, I expect that there are available local meteorological data and/or trace gas measurements. Authors can also try to use air mass back trajectories or tools like FLEXPART and study if there is a preferential air mass origin or meteorological conditions for various types of nucleation events reported. On my opinion, in current state presented work is more on level of high quality measurement report, but not a scientific paper.

#### Detail and technical comments

Authors use modal fitting procedure. It is not clearly stated in text, but I assume that each size distribution was fitted. With respect to very low aerosol number concentrations, what was the counting statistics error for individual bins and how that could influence fitting results and growth rate calculations? Purely visually I doubt that authors can present growth rates in nm with one decimal precision.

Besides DMPS, was there also condensation particle counter measuring aerosol number concentration to which the size distribution integral number can be compared?

Chapter 2.2.4 is just repetition from earlier published papers and can be excluded.

Page 6, line 21: How many events were actually excluded?

Page 10, lines 19-21: Neumayer is a coastal station, thus the observed variability might not be due to stronger mixing of the boundary layer (it is not really clear what authors have in mind here), but thanks to stronger influence of the marine air with higher aerosol loading. Check e.g. [Weller et al., 2011]

In summary, the paper contribution is presenting unique data set with unique observations (e.g. wintertime aerosol formation events during polar night), but the lack of interpretation is the major weakness. After the authors will improve that part, I recommend to accept the paper for publication in ACP.

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## References

Weller, R., A. Minikin, D. Wagenbach, and V. Dreiling (2011), Characterization of the inter-annual, seasonal, and diurnal variations of condensation particle concentrations at Neumayer, Antarctica, Atmos. Chem. Phys., 11(24), 13243-13257.

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