

## ***Interactive comment on “Seasonal variations in physical characteristics of aerosol particles at the King Sejong Station, Antarctic Peninsula” by Jaeseok Kim et al.***

### **Anonymous Referee #2**

Received and published: 29 November 2016

This manuscript summarizes measurements of aerosol physical properties (size distributions and number concentrations) as well as CCN concentrations performed at a research station in Antarctica. These data are needed to establish quantitative points of reference for a region that may face dramatic changes as a result of climate change. Because of this, this manuscript fulfills an important role and is suitable for publication in ACP.

I do feel that the authors have missed some opportunities in their presentation of the data to dig a little deeper into their data. I would like for the authors to comment on some of the more obvious issues to me:

(1) Very little is mentioned about the particle size distributions. For example, if new par-

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ticle formation is expected (and there are several references to suggest this in the text), then what do the SMPS data tell us about the nature of the particle formations events. To address this question the data from the size distribution shown in Fig. 8 could show “box-whisker” data that better account for less frequent new particle formation events.

(2) Another missed opportunity is the lack of a thorough analysis of the CCNC data. Other than reporting concentrations at specific supersaturations, the “spectrum” of CCN activity is not really discussed in this paper. Some fitting parameters, namely “C” and “k”, are presented but one of the most widely used parameters, kappa from k-Koehler theory, is not even mentioned.

While I do not demand consideration of these issues as a condition for publication, I do urge the authors to consider how a somewhat minor investment in time might add great value to this publication.

The following are a list of edits and concerns, with the page and line numbers listed:

P2, line 5: lager -> larger

Line 10: This abstract should not assume that the reader understands what C and k refer to. If you want to include these in the abstract you need to explain what they are.

Line 17: improper use of semicolon. Replace with colon

P3, line 9: "unascertained" may be a word (I'm not sure) but many simpler words like “undetermined” or “unknown” are better suited.

Line 10: remove “their”

Line 21: e.g. not i.e. (this is not an exhaustive list of physical properties).

P6, line 1: “decided” should be replaced with “determined”

Line 2: delete the second “only”

Line 7: what model of DMA was used?

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Line 12: “Besides” might be better replaced with “in addition” (this is clearly a style suggestion)

18: “were” should be “was”

P7, line 8: Please review this sentence and correct grammar

P9, Line 1: Please explain why, for this analysis, a supersaturation of 0.4% was chosen

Line 10: is this redundant with the previous sentence in line 5?

Line 19: any evidence of growth from Aitken to nucleation mode?

P10, Line 15: correct spelling of Arctic

P11, Line 5: how well did this model fit the data? There is no mention of this.

Line 17: period (not periods)

P13, Line 6: no comma after “for”

P14, Line 5: all mention of CCN concentrations need to state the SS

Line 10: again, I don't think the reader knows immediately what C and k refer to. If the authors want this section to summarize results I would suggest explaining this to the reader.

Figure notes: Figs 4,8, 10-13: what do the error bars represent? This needs to be in the caption.

Figure 9. Why not normalize to total N?

Fig 13: seems statistically the same to me.

Fig 14: needs to show something about the variability of the size distributions.

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Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-795, 2016.

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