

Interactive comment on “Size-resolved cloud condensation nuclei concentration measurements in the Arctic: two case studies from the summer of 2008” by J. Zábori et al.

Anonymous Referee #3

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General comments

The paper "Size-resolved cloud condensation nuclei concentration measurements in the Arctic: two case studies from the summer of 2008" by Zábori et al. presents size resolved CCN concentrations presenting two case studies in the Arctic. The paper presents new size resolved CCN data from the Arctic and the dataset is unique even though it is only for two cases. The scientific methods used are valid and well explained. The previous work has been widely recognized. The previous work is partly presented in such large extent that it overshadows the work done in this paper. The new scientific information provided by this paper is limited but the results are worth to be reported due

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to the importance and lack of the measurements in the Arctic. See the more detailed in the comments below.

- The literature overview in the introduction and the sections later when discussing about the results is representing the major part of the paper. I would emphasize more on the CCN results of this study, and maybe prepare a Table with all the other studies and the results of this paper.

- Related to the comment above, the introduction is quite long and heavy to read. It would benefit from not presenting all the values from each single study (at this point the reader does not know their relevance to this study). I would extend the last paragraph of the introduction with relevant info and references from the literature review paragraphs and move the single values from different studies in a comparison Table or present them later when discussing about the results.

Specific comments

Methods

- Section 2.2: Please provide information on the inlet/sampling system for the CCN, DMPS & CPCs. Are there notable losses?

- Page 5087, lines 16-19: Add the resulting time resolution for the size resolved CCN cycle. 10 min per cycle?

Results and discussion

- It would be very informative and interesting to know also the temperature during the cases.

- Page 5090, lines 15-19: New particle formation has been observed throughout the day, thus most frequently around noon. Having only one case here I would not state your results are in big contrast with previous results of Tunved or others. On the other hand you observe particles of 15nm at midnight, which means the actual NPF at 1nm

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has occurred many hours earlier on the previous day, probably in the afternoon (the growth does not seem to be very fast). Re-think this statement.

- Page 5091, lines 23-29: Similar comment to the one above. The case value is 40% higher than the average but still well inside the 75 percentile, so it is quite a normal value. Maybe comparison to data from 2008-2010 would be better if the cut-off size is considered to make the difference.

- Page 5092, line 3-5, & Fig.7: Are the bad data for 22 Aug also removed from Figure 7? It seems in the Figure that only 21 Aug has some data missing.

- Page 5093-5094, lines 29-2: Also here the case value is well inside the 75 percentile, so it is an exceptional value.

- Page 5099, lines 13-29: Please add a sentence (at the end) to connect this paragraph to this study. The paragraph info is used in later chapters but at the moment it feels bit loose.

- Page 5101, lines 15-18: The particles $>400\text{nm}$ in the filters will make a major part of the total mass and probably is the main reason for the possible discrepancies.

Summary and conclusions

- The section is more of a summary at the moment. Few compact sentences of the main results, their importance and prospects for future work would be good.

Tables

- Table 3: This table is very small and is not needed. The values are stated in the text. They could be added also in Table 1 if wanted.

Figures

- Interpretation of Figures 2 and 7 would benefit from plotting also the mean size distributions for the periods: before-during-after.

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- Maybe the trajectories for each case could be compiled in same Figure as done with the lidar plots (see Figs 6 & 11).

- Figure 14: Is the y-axis particle concentration, N? By summing up the CN channels the Ntot would be only around 20-30 cm-3 for the June case and just bit more for the August case. Or is this just me misunderstanding the plot?

Technical corrections

- Page 5096, line 25, 28, 29: Concentration values “XXX particles cm-3”, delete “particles” to be consistent throughout the paper.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 15, 5079, 2015.

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