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Interactive comment on "Single-particle characterization of ice-nucleating particles and ice particle residuals sampled by three different techniques" *by* A. Worringen et al.

Anonymous Referee #4

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This paper focuses on chemical characterization of ice-nucleating particles and the results from different sampling techniques are compared. The scientific results are interesting and the comparison of different techniques is necessary. The results from this paper are an important contribution to the fields of ice nucleation and aerosol chemistry; however, I can only recommend this paper for publication after major revisions. The paper was confusing as written and is missing several pieces of information that are essential to interpreting the results.

General Comments:

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1) The introduction and experimental sections are poorly organized and have some pieces of information twice, while other key pieces of information are missing. Please revise and make more clear and concise, while also giving more details about the various techniques.

2) Information is missing about the various techniques. For instance, transmission efficiency of the pCVI is not included. A paper is cited as in prep that might have this information in it; however, I cannot interpret these results without seeing that paper. Additionally, the reference for the ice selective inlet is a personal communication. If there is no reference that gives detailed information about the technique/inlet, then substantial data needs to be given in this paper regarding its performance including transmission efficiencies.

3) More information is needed regarding the LA-MS technique. Representative mass spectra should be given of different particle types. How were the mass spectra classified? By hand? With a clustering algorithm? Does Table 2 refer to only SEM classifications or LA-MS too? Please state this in the caption.

4) Operating temperatures and supersaturations in the FINCH are necessary to interpret the chemical results. These must given every time the FINCH data is presented. How did the FINCH temperatures compare to the ambient temperature in the clouds? This is also a crucial piece of information when comparing the different techniques.

5) Size distributions of particles from the 3 different techniques are briefly discussed, but there is no mention of how these correspond to the transmission efficiencies for the different techniques. The ISI sees a larger mode, while the others do not. Is this because the ISI is the only inlet that transmits large sizes effectively? Please discuss this more.

6) There are a lot of bar graphs and it would be clearer if the instrument or technique used was displayed at the top of each graph. This would allow for easier identification of what the graph is showing, especially for Figures 9 and 10.

7) Table 3 is confusing because the percentages add up to over 100%. It would be clearer, if you included mixed particle types separately. This would also add more information about mixing state.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 23027, 2014.

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