

Interactive comment on “Characteristics of immersion freezing nuclei at the south pole station in Antarctica” by K. Ardon-Dryer et al.

Anonymous Referee #1

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The present work shows measurements of Immersion Freezing Nuclei (FN) number concentration as function of temperature at the South Pole station during late summer (late January and early February) 2009. A total of 12 filter samples were analyzed using the FRIDGE-TAU instrument. Most of the filter samples were sampled at the roof top of the station while three filter samples were sampled using a balloon at different heights. Measurements were correlated to different meteorological parameters as well as back trajectories.

The presented work is done on a high scientific standard.

I recommend to publish the work in ACP after minor revisions.

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General comments:

I am aware that fieldwork at the south pole station is not an easy task. But the number of 12 samples makes general statements difficult, even if these particle samples are distributed in 1459 individual droplets. For the reader the question remains, why there are no more than three filter samples on the balloon platform and why the time period/sample number is so limited. Especially the balloon results are questionable because of the small data basis (one per case). As a result the authors limit their findings consequently to a “suggestion”.

Specific comments

- The cooperation with Paul Lawson “suggests” that the FN measurements are part of a bigger campaign. Please give some hints how your measurements are incorporated.
- (P97 l 2) please motivate EQ. 1
- (P95 l 7pp Method of analysis) Please add the sample characteristic / schematics of your filter sampler with special emphasis on the upper cut off. Later in the text (P99 5-10) the authors state that it is unlikely that some ice particles have been sampled (due to orientation of the inlet). Sampling ice crystals might also be an explanation for the observed strong correlation of FN to wind speed (due to saltation) – and also the “height” dependency - like the authors state on Page 99 line 7) (see also next item)
- The mixed-layer at Antarctic Plateau station was estimated using SODAR measurements to be 200-300 m during high and late summer (Argentini et al.: Boundary-Layer Meteorology Volume 115, Number 3, 409-422, DOI: 10.1007/s10546-003-3780-2)

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10.1007/s10546-004-5643-6). The “mixed-layer” for large ice crystals will be much less... please comment.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 91, 2011.