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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Size-resolved measurements of ice nucleating particles at six locations in North America and one in Europe" *by* R. H. Mason et al.

Anonymous Referee #2

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The paper by Mason et al. presents size-resolved impactor measurements of sub- and super-micron particles collected at seven locations in Canada, the U.S., and France. The samples were analyzed determining the particles' immersion-mode freezing properties, that is, ice nucleating particle (INP) number concentrations as a function of size and temperature.

The main conclusion from the study is that a large fraction of the ice active particles is > 1 μm in diameter. This is particularly important to know for the interpretation of INP concentrations determined with other established on-line measuring instruments, such as the continuous-flow diffusion chambers, which typically miss the super-micron

particles in their analysis due to the specific inlet system.

The paper is very well structured, describes the applied methods and discusses the results very nicely. Therefore I can fully recommend the paper for final publication in ACP. I have only very little suggestions for improvement and a few minor questions all listed chronologically in the following:

P. 20523, L.7: Here it would be helpful to add one short sentence on the applied measurement principle, the MOUDI-DFT.

P. 20525, L. 24-29: I would delete this paragraph at this place because it tells already main results, which not necessarily are part of the introduction section.

P. 20530: The aerosol particle number size concentration usually varies significantly over the size range of 0.1 to 10 μm. Consequently, I guess the surface coverage must be very different for the individual impactor stages, i.e., small number of particles on upper stages and large number on lower stages. How does that affect the droplet freezing experiments? I could imagine that it is difficult to analyze samples with too high particle load because the growing droplets may run into each other very easily. On the other hand, if there are only few particles on the surface the result might not be statistically significant. How did you handle different surface coverages?

P. 20531 and 20532: I wonder if rounding INP concentrations to two significant digits should be enough, e.g., 3.8 L-1 instead of 3.77 L-1, since I believe your measurements are not more precise than that. Also standard deviations together with the mean values would be interesting to know.

P. 20533, L. 25-27: How realistic is the assumption? Did the number size distributions (if available) also show uniformly distributed aerosol particles over this size range?

Fig. 3: Why did you not show any error bars for the Labrador Sea results?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 20521, 2015.