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Atmospheric Measurement Techniques
Discussions

Interactive comment on "A technique for quantifying heterogeneous ice nucleation in microlitre supercooled water droplets" *by* T. F. Whale et al.

Anonymous Referee #2

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I support publication in AMT. Though the idea behind the open microliter-sized droplet freezing technique, which is named as μL-NIPI in this work, is not totally new, the authors put a considerable amount of effort into minimizing artifacts (frost formation, droplet evaporation and droplet communication) and quantitatively characterizing this droplet assay, which would be useful for investigating the freezing efficiency of high temperature INPs above about -20 °C. Further, the portable (and simple) design of μL-NIPI is beneficial to the immediate analysis of the collected samples in the field. This is especially important to minimize the sampling bias of biological particles that have been known as efficient INPs at high temperatures.

The manuscript is well structured and carefully written, and I am convinced that the μL-NIPI system enables to perform IN measurements under more controlled conditions (e.g., known mass of particles in droplets of mm diameter) such that it can complement the investigable temperatures and capabilities of other types of IN instruments as summarized in P 9511 L 7-16.

I have some minor suggestions/comments:

P 9510 L 21: Cloud droplets

P 9511 L27: clouds-sized

P 9512 L 6-8: What exactly do the authors mean by 'more than covering the range of relevance for the atmosphere'? Perhaps the authors mean 'beyond the range of atmospherically relevant dust aerosol concentrations'? Please clarify. In addition, the motivation of the μL-NIPI development may be better stated in L 17, followed by 'This therefore allows. . .". The authors may consider rephrasing these sentences.

P 9514 L 3: -20 and -100 °C

P 9514 L 8: before using

P 9518 L 2: show that this

P 9519 L 13: What is the minimum wt%, which μL-NIPI can reliably handle? For example, for K-feldspar in Fig. 7, do the K-feldspar data points extend to the higher ns values than 10ˆ3 cmˆ-2 if K-feldspar <0.01 wt% is employed? If so, I assume the data points overlap with ones from pL-NIPI up to -20 °C?

P 9520 L 6-14: The authors may consider mentioning the study done by Wex et al. (2015). I am not expecting any quantitative comparisons, but Wex et al. is rather comprehensive so worth mentioning as an example of the previous Snomax IN studies.

P 9520 L 17: setup (as first given in P 9514)

P 9520 L 24: pL

P 9521 L 4-6: Figure 7 supports uniform distribution of particles in individual droplets (P 9514 L 10-12) & mass-independent specific surface area. How about some variables in solution preparation and their effect on IN properties? Some discussions are given in P 9514 L 10-12, but how about the length of time employed for the suspension preparation? For instance, can the longer suspension preparation alter surface (e.g., specific surface area) and IN properties over time when compared to the shorter one?

P 9521 L 26: cloud droplet sizes

P 9522 L 1-2: atmospheric relevance of what? Ts?

P 9522 L 2: cloud-sized

P 9531 Fig. 2 legend: et al.,

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 9509, 2014.