Anonymous Referee #2
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[A0] For clarity and visual distinction, the referee comments or questions are listed here in black and are preceded by bracketed, italicized numbers (e.g. ***[1]***). Authors' responses are offset in blue below each referee statement with matching numbers (e.g. ***[A1]***). Page and line numbers refer to online ACPD version.

In this manuscript, Mason and co-authors present an experimental study on the abundance, the nature and the origin of ice nucleating particles (INPs) measured at a coastal site in British Columbia. It was a pleasure to read this article for various reasons: it is clearly structured and well written, the applied methods are well described or cited, the measurements well documented, the data evaluation and interpretation is solid and appropriate, and the conclusions and atmospheric implications are clear and carefully formulated which I prefer versus over interpretation. In summary, this is an excellent manuscript with new and relevant results which in principle can be accepted for publication in ACP as is.

We thank the referee for his/her helpful comments!

Referee comments:
[1] I just have a few minor comments the authors may consider for the final manuscript version. My first comment refers to the mixing state of the different compounds (biological, mineral, soot, etc.) in the aerosol size distribution. This mixing state was not measured in this study, but may have an influence on some of the conclusions, like the contributions of biological particles to the INP abundance concluded from the size distributions as shown in Figure 6. What if the larger particles are just more likely to carry a fluorescent biological particle but the ice nucleation activity is related to some other particle component? The same can happen with soot or other smaller particles that have been collected by larger particles and thus still may contribute to the ice nucleation activity of the apparently larger particles. This possibility or limitation may be mentioned somewhere in the manuscript and also in the conclusion section. This comment also refers to the need of particle mixing state information in future atmospheric INP studies. Would it e.g. be possible in future studies to co-locate the INPs with fluorescent signatures (or other particle compound or property signatures) on the same substrate?

[A1] To address the referee's comments, the following text will be added to the conclusions:

"In this paper we assumed that particles were externally mixed. In future studies it would be useful to include mixing state measurements together with studies similar to those presented here to quantify the extent of external versus internal mixing. In addition, studies that identify INPs followed by chemical composition measurements of these particles by electron microscopy (e.g. Knopf et al., 2014) or fluorescence microscopy would be useful."

[2] I agree to referee 1 that the abstract could be strengthened. I also recommend extending the conclusion section for the most important findings and atmospheric implications.

[A2] See response to Question 1 from Referee 1. In addition, the conclusion section will be extended slightly.

[3] In the abstract line 12 the correlation between INPs at -30ºC and total particles larger than 0.5 µm is mentioned. I think Figure S1 shows INP at -30ºC being equally well correlated with fluorescent and total particles. How can then be concluded for an extra contribution of non-biological particles to INPs? I recommend moving Figure S1 to the main manuscript.

[A3] At a droplet freezing temperature of -30 ºC, fluorescent bioparticles and total particles have the same linear correlation coefficient to INPs ($R = 0.66$). Here we are interested in the trends in R values from previous temperatures as given in Table 1 when discussing possible changes in the composition of INPs. The decrease in R from 0.83 to 0.66 between -25 and -30 ºC for fluorescent bioparticles suggests that the relative contribution of fluorescent bioparticles to the overall INP population is decreasing at temperatures below -25 ºC. On the other hand, an increase in R from 0.49 to 0.66 between -25 and -30 ºC for total particles also suggests that non-biological particles are becoming an increasingly important source of INPs at lower temperatures (given that biological particles are more poorly correlated).

We would prefer to keep Fig. S1 in the supplement since the some of the panels in Fig. S1 are the same as some of the panels in Fig. 5 in the main text. However, if the editor prefers we can move Fig. S1.

[4] The first sentence of the introduction reads as if there is no contribution of heterogeneous ice nucleation in cirrus clouds, which certainly is not the case.

[A4] The first sentence will be rewritten to address the referee's comments.

[5] When discussion the various ice nucleation modes you may also cite Vali et al., Atmos. Chem. Phys. Discuss., 14, 22155-22162, 2014.

[A5] A reference to Vali et al. (now published in ACP) will be added to the revised manuscript.