Referee #1

Comments:

1. Figure 1: Perhaps add photographs of the sites, so the reader gets an impression of the surroundings in which the samples were collected.

Thank you very much for this suggestion. We agree that it would be very nice to show photographs of the different sampling sites, unfortunately, no photographs were taken during the sampling campaign, so we have decided to not include photographs.

2. Section 3.2 discusses differences between SML and SBW in terms of INPs. Lines 276-279 state: "In addition, our study revealed enhanced INP-10 concentrations in the SML compared to the corresponding SBW samples (Fig. 3b). This finding aligns with observations by Wilson et al. (2015) and Hartmann et al. (2021), whereas Irish et al. (2017) observed no significant upconcentration of INPs in the SML." Yet, a closer look at Figure 3b reveals that one third of the samples does not show an upconcentration. So, better qualify the cited statement.

We have modified Fig. 3b showing the T_{50} temperatures instead of the INP_{10} values. In this representation the enhanced concentration of INPs in the SML becomes clearer. Further, we have added the fraction frozen curves for the undiluted samples of both fjords as well as a box plot showing a significant difference between the T_{50} temperatures in the SML and the SBW to the Supplementary.

Changes in the text:

Line 282: “While freezing was initiated above -7 °C in all investigated SBW samples (Fig. S1), the concentration of INPs active at -10 °C (INP_{-10}) covered a wide range from $1.3 \cdot 10^4$ INPs per L to 6.1×10^6 INPs per L (Fig. 3a). Typically, biological INPs are responsible for ice nucleation at temperatures higher than -15 °C (Murray et al., 2012), implying that the elevated onset freezing temperatures observed in our samples are attributable to INPs originating from biological sources. In addition, our study revealed higher T_{50} temperatures (temperature where 50% of the droplets were frozen) in the SML compared to the corresponding SBW samples (Fig. 3b, Fig. S2) showing that the highly active INPs are primarily found in the SML, which may affect their emissions into the atmosphere through wave breaking and bubble bursting (Ickes et al., 2020; Wilson et al., 2015).”

Corrected Fig. 3:

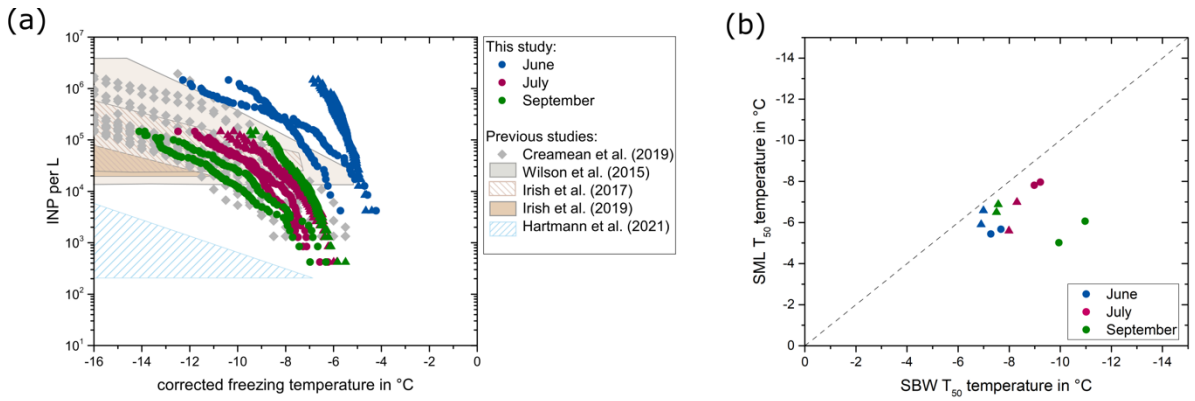

Figure 3: (a) Number of INPs per L seawater for the bulk water samples collected in the Kobbefjord (circles) and Godthåbsfjord (triangles). The INP data in June is derived from a 10-fold dilution due to the high activity. The boxes represent the data ranges reported by previous studies and the grey data points represent the data reported by Creamean et al. (2019). (b) Comparison of the T50 temperatures in the SBW in relation to the SML for Kobbefjord (circles) and Godthåbsfjord (triangles). The dashed line represents the 1:1 fraction.

Figures added to Supplementary:

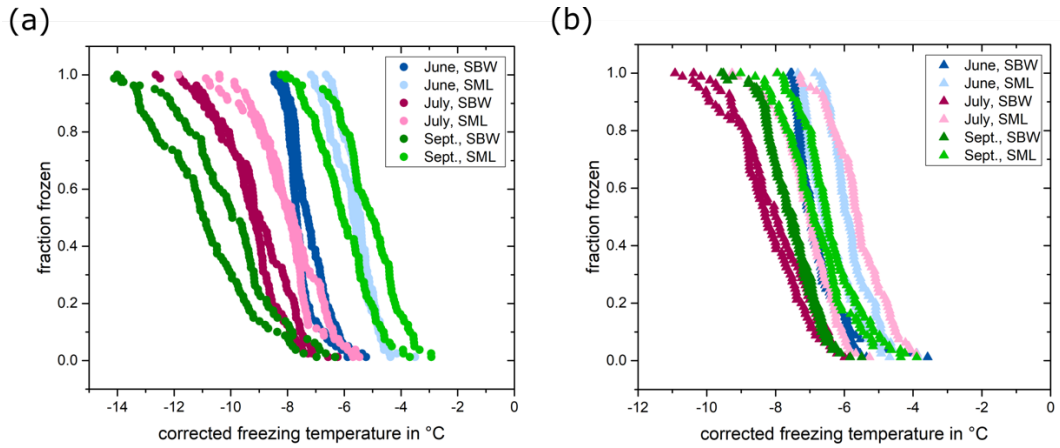

Figure S1: Fraction frozen curves for the undiluted samples for the Kobbefjord (a) and the Godthåbsford (b). All samples are analyzed in duplicates.

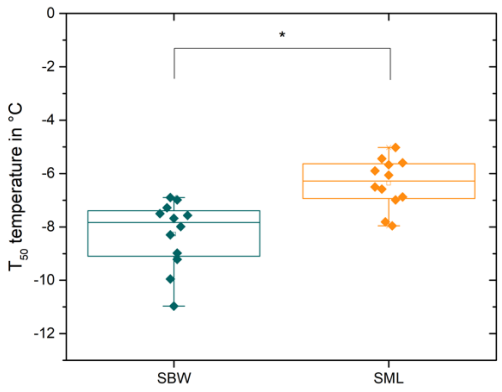

Figure S2: T50 temperatures for the SBW samples in comparison to the SML samples shown as box plot with 25th and 75th percentiles. T50 temperatures are significantly higher in the SML ($p < 0.05$).

3. Can you extrapolate the trendlines in Figure 7b to get a rough estimate of what INP concentration might be in pure meteoric water (fMW = 1.0)? This number would allow for a more quantitative comparisons with INP concentration in other freshwaters discussed in lines 480-487

Thank you for this comment. It is an interesting idea to extrapolate the fraction of meteoric water. We have modified Fig. 7b accordingly and added the concentration of INPs for fMW=1.0 in Line 537-542:

"The fact that the study region is impacted by terrestrial runoff and glacial melt water as well as the strong correlation between the fraction of meteoric water and the INP_{-10} concentration, supports the conclusion that terrestrial runoff is a major source of marine INPs in the investigated region. An extrapolation of the trendline in Fig. 7b leads to an estimated concentration of $7.8 \cdot 10^6$ INPs per L active at -10 °C in pure meteoric water ($f_{MW}=1$) which is in good agreement with the average concentration of $1.0 \cdot 10^7$ INPs per L active at -10 °C reported for freshwater samples from streams in eastern Greenland by Jensen et al. (2024)."

Jensen, L. Z., Simonsen, J. K., Pastor, A., Pearce, C., Nørnberg, P., Lund-Hansen, L. C., Finster, K., and Šantl-Temkiv, T.: Linking Biogenic High-Temperature Ice Nucleating Particles in Arctic soils and Streams to Their Microbial Producers, Aerosol Research Discuss., 2024, 1-29, 10.5194/ar-2024-18, 2024.

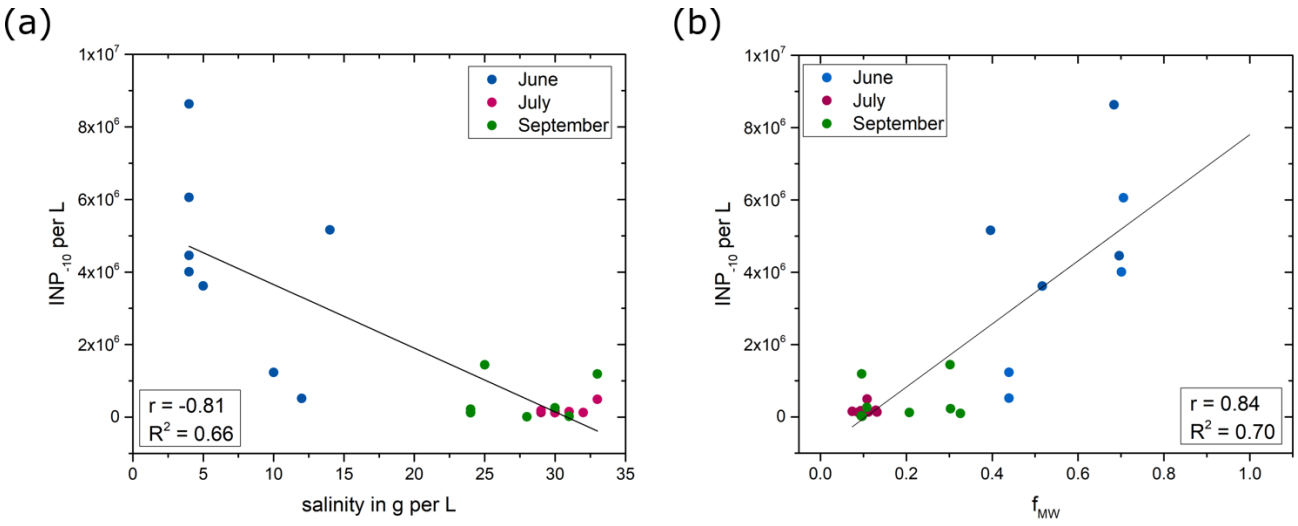

Figure 7: The INP_{-10} concentration as a function of (a) salinity and (b) freshwater fractions from meteoric water. The lines represent linear regressions of all data points shown in the graphs. Both correlations are significant ($p < 0.001$).