

Dear Editor,

Thank you very much collecting and forwarding the second round of reviews of our manuscript. We acknowledge that only one minor issue was remaining and we provide accordingly a reply below.

We hope this reply will satisfy the requirement while we are at your disposal.

With best regards,

Kevin Ohneiser et al.

Review Round 2:

- Reviewer remark:

“The heat fraction can be calculated by picking a temperature where you have all of the data. It's never limited to warmer than -10°C . Some of the cold Bise data at HPB and Eri will be high and comparable to the warm Bise, even if they have a different shape. The log scale makes the differences between spectra appear larger, which is why calculation is a solid option.”

- Reply:

What the reviewer writes is correct. But we explicitly only talked about those INP that are ice active at $> -10^{\circ}\text{C}$. So this new comment does not apply to what we were talking about. We restructured the leading sentence on this topic to make this even clearer (new text is in bold):

*“Concerning heat-labile biological INPs **that are ice active above -10°C** , we observe elevated INP concentrations ~~above -10°C~~ in all unheated samples during the warm Bise situation, regardless of sampling location.”*

To comply with the reviewers comment, we also added a new paragraph, at the end of the abovementioned paragraph, starting in line 284:

*“**The loss of INPs upon heating above -10°C was most pronounced. But when looking at Fig. 5, it can be seen that INP concentrations were also lowered at temperatures below -10°C at all three stations and for all cases. This shows the presence of proteinaceous, biological INPs across the whole temperature range for which data for heated samples was obtained. In the temperature range below -10°C , the relation between the fraction of heat-labile INPs and sampling location and time followed a different trend than above -10°C : The smallest loss occurred for Eri during the cold Bise case while HPB was in free troposphere, with a decrease in INP concentrations by roughly 30-40%. Higher losses were observed for all other cases at all three stations.**”*

For consistency, we also slightly updated the last sentence of the addressed paragraph, which now reads (Line 291f):

In summary, the presence of these potentially biological INPs is noteworthy so early in the year, particularly for INPS active above -10°C as they already were present in early January at MEL and HPB when it was in the free troposphere.