Supporting information:

Linking Biogenic High-Temperature Ice Nucleating Particles in Arctic soils and Streams to Their Microbial Producers

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Supplementary Table 1 show the amount of soil used for DNA extraction for each sample and if the sample was excluded from the study due to DNA extraction inefficiency. Note that samples which had too little DNA after extraction were excluded from the DNA analysis.

Stream	Replicate	Soil (g)	Comments
Kærelv C	1	0.22	
Kærelv C	2	0.25	
Kærelv A	1	0.28	

Kærelv A	2	0.28	
West 5	1	0.22	
West 5	2	0.26	
West 4	1	0.26	
West 4	2	0.28	
Aucella	1	0.16	Excluded
Aucella	2	0.15	Excluded
Tørvedammen	1	0.25	
Tørvedammen	2	0.24	
West 1	1	0.25	
West 1	2	0.26	
West 3	1	0.29	
West 3	2	0.27	
West 2	1	0.29	
West 2	2	0.28	
Grænseelv	1	0.25	
Grænseelv	2	0.29	
Zackenberg River	1	0.15	
Zackenberg River	2	0.04	Excluded

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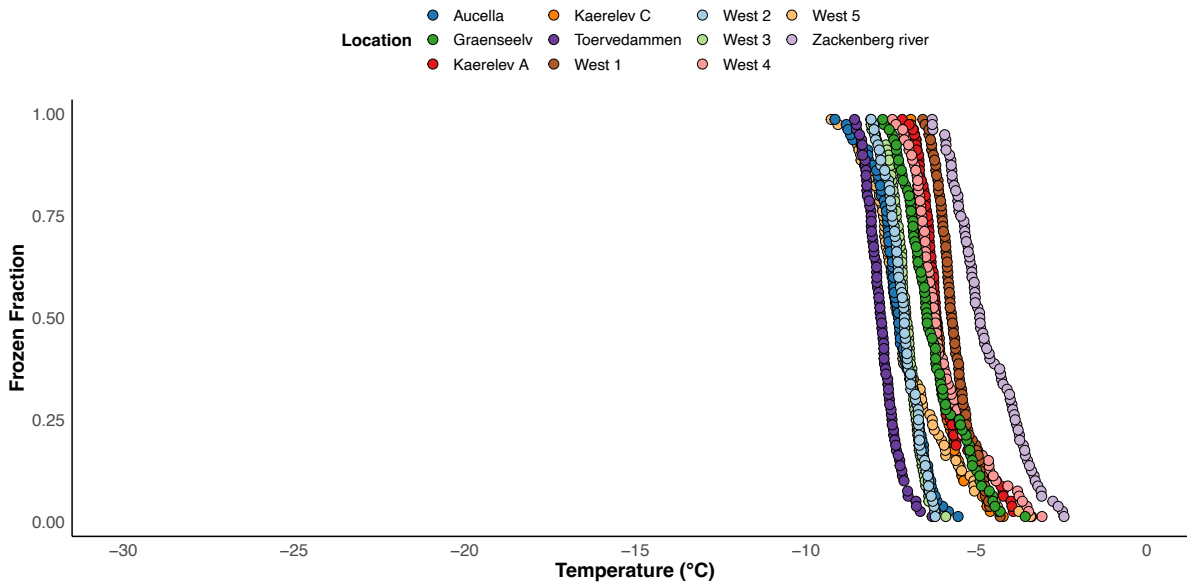
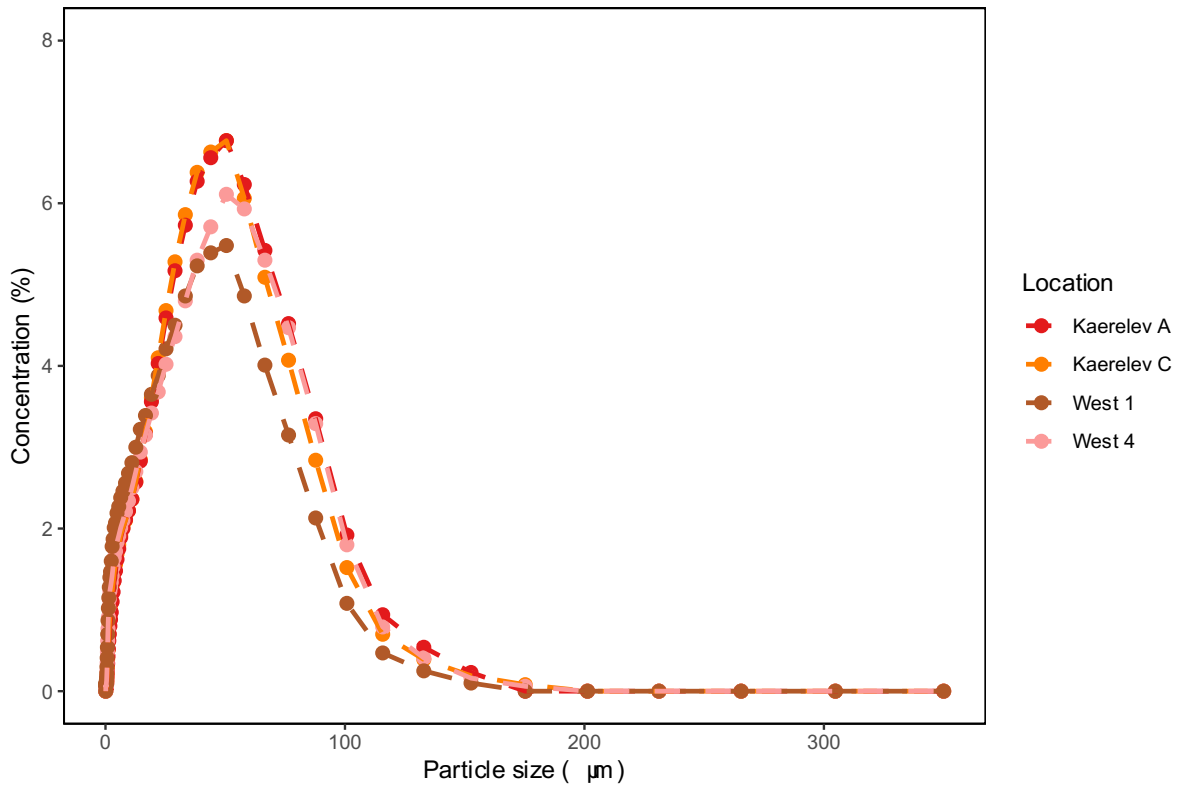
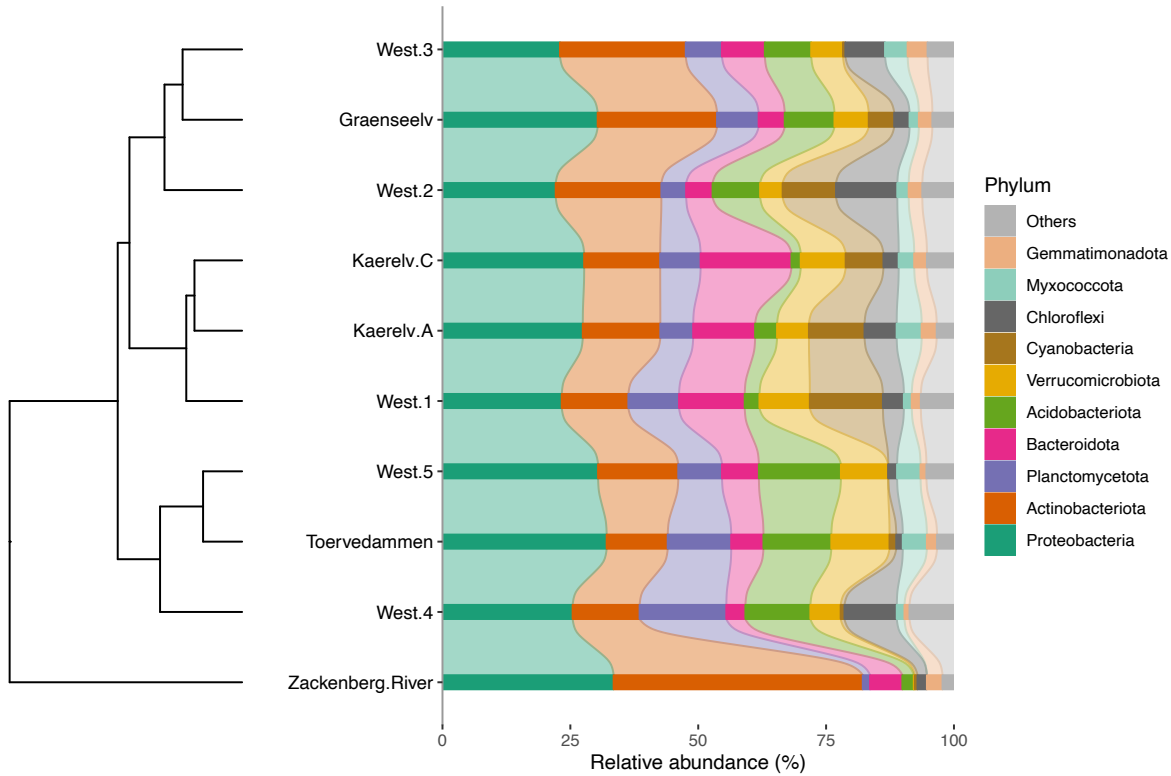
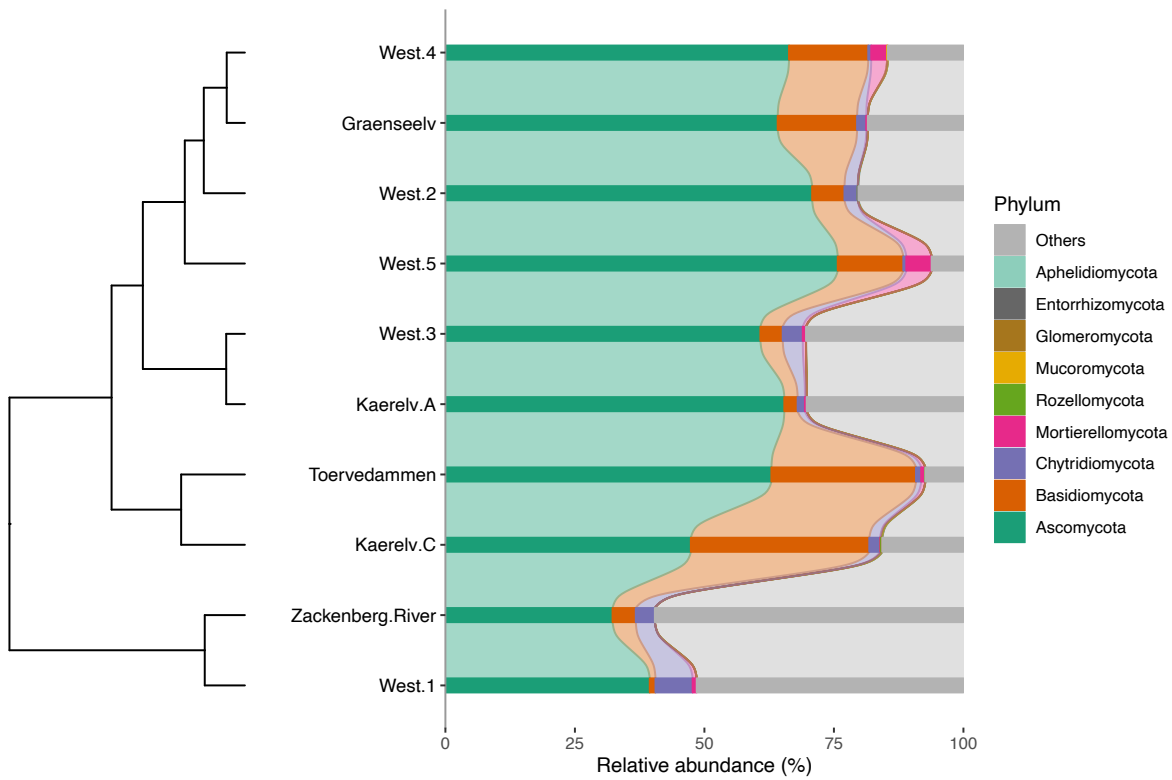
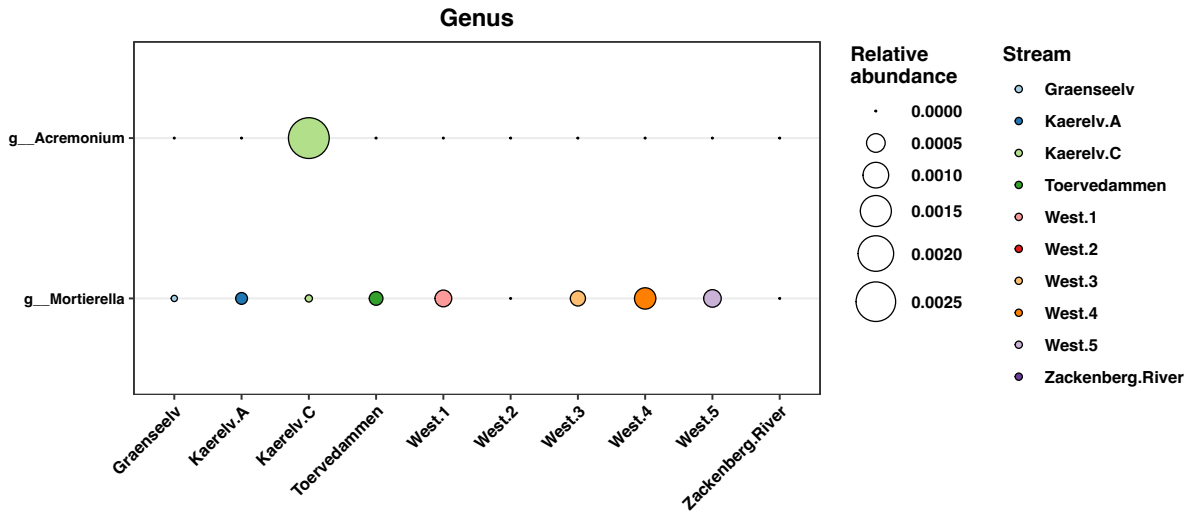
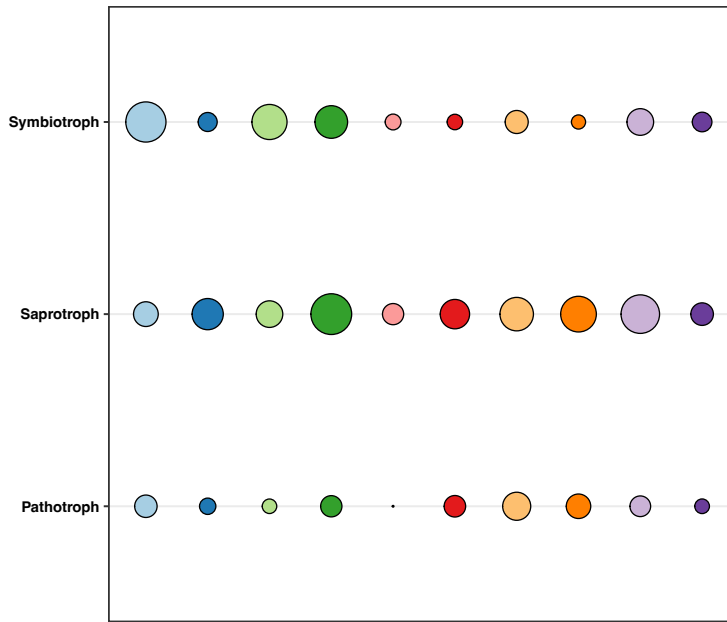
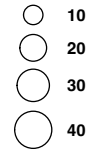
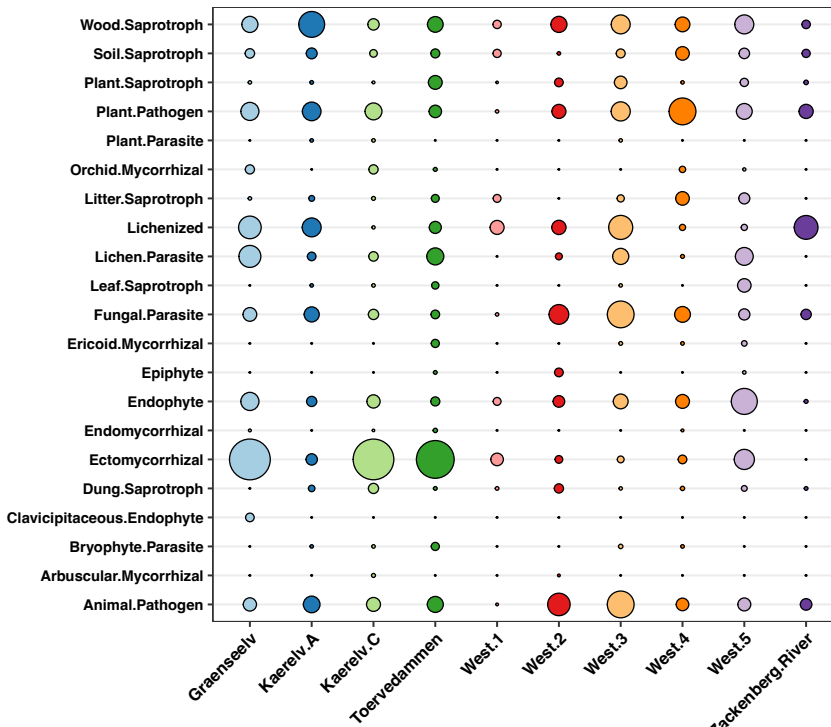

Supplementary Figure 1 Freezing activity for soil samples from eleven different locations in Northeast Greenland given as
30   the fraction of frozen droplets as a function of temperature

Supplementary Figure 2 show soil particle size distribution for the 4 samples with a peak mode between 0 and 100 μm. Clay particles are considered as < 2 μm, Silt 2-63 μm, while Sand > 63 μm. Note the only 4 samples are depicted here, since

35   too little sample was available for the rest of location to perform the analysis.

40   **Supplementary Figure 3** Shows the mean relative abundance of the top 11 highest abundant bacterial phyla present in the soil samples from the 11 different location. Additionally the samples has been clustered based on the euclidean distance matrix.

45 **Supplementary Figure 4** Shows the mean relative abundance of the top 10 highest abundant fungal phyla present in the soil samples from the 11 different location. Additionally the samples has been clustered based on the euclidean distance matrix.

50 **Supplementary Figure 5** shows the mean relative abundance of known fungal INA genera at all 11 locations.

Trophic mode

Guild

Supplementary Figure 6 provides an overview of the mean relative abundance of predicted fungal trophic modes and
 guilds across all 11 sampled locations. The predictions were generated using FUNguild, a tool commonly employed for
assessing fungal functional roles in environmental samples. In this context, trophic modes refer to the nutritional strategies
adopted by fungi, such as saprotrophy, pathotrophy, or symbiotrophy. Additionally, guilds categorize fungi based on shared
ecological functions.

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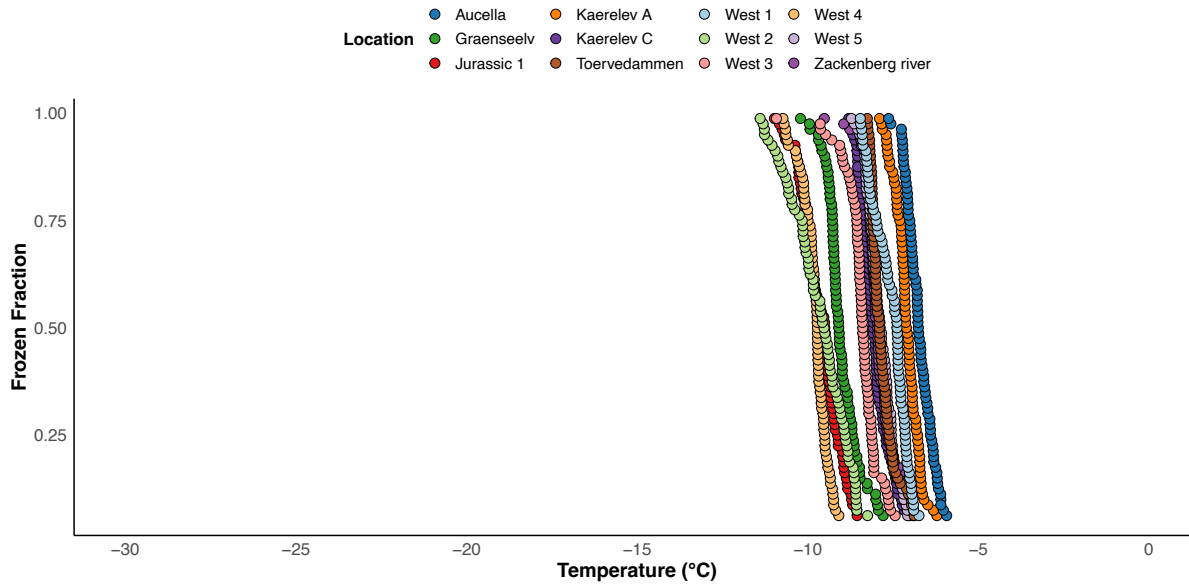
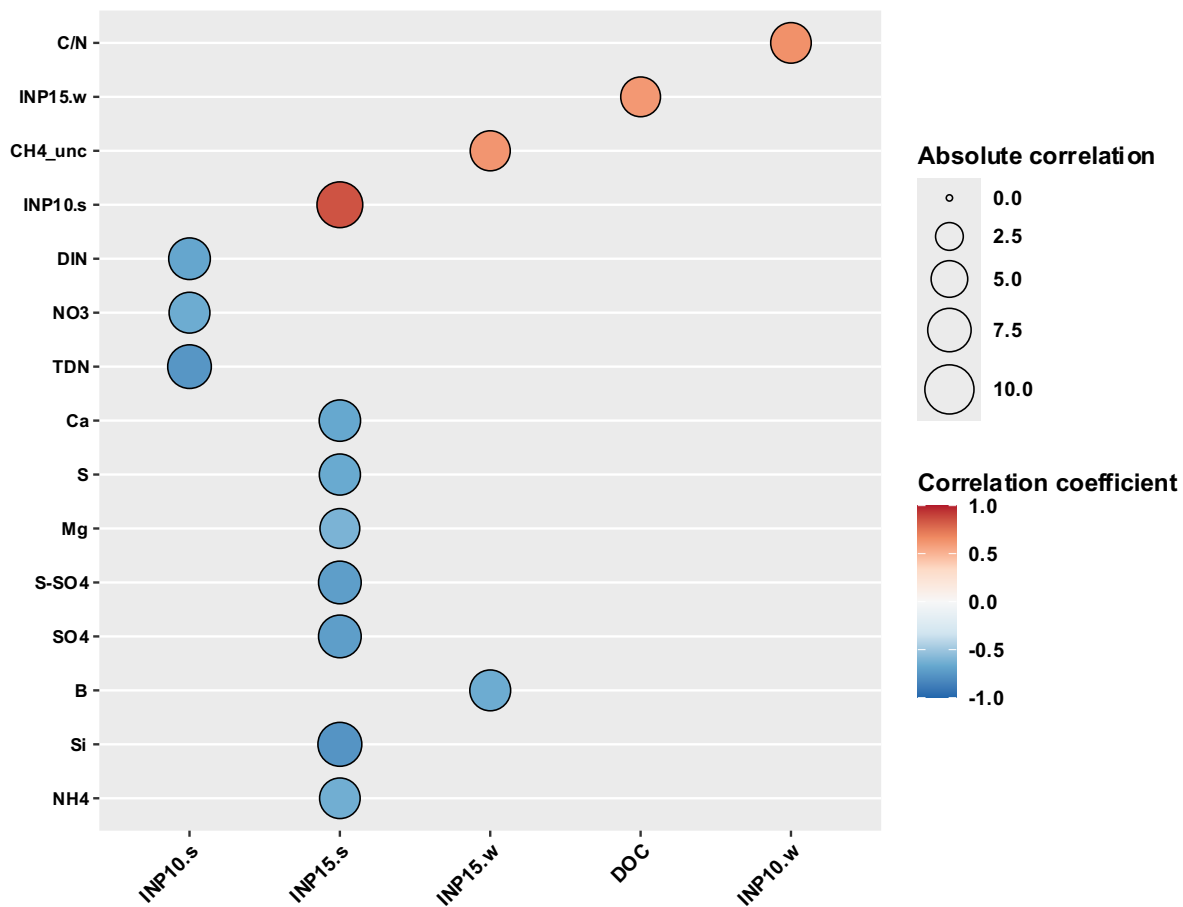

Supplementary Figure 7 Freezing activity for freshwater samples from twelve different locations in Northeast Greenland
given as fraction of frozen droplets as a function of temperature.

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Supplementary Figure 8 show significant Spearman's rank correlations ($p < 0.05$) between ice nucleating particle concentrations in soil and streams with biogeochemical parameters. The size of the bubbles represents the strength of the absolute correlation, while the color indicates whether the correlation is positive (red) or negative (blue).

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