

Figure S1. Principal Coordinates Analysis (PCoA) plot of bacterial genetic profiles based on the generalized UniFrac distance $d^{(0.5)}$ matrix. Different colors mark samples from different transects (lines): on the slope and the base of Fugleberget (A, B), the wetland plain area (C), and close to the sea shore of Hansvika (D), where snow samples were collected.

Table S1. The dominant bacterial classes in the coastal snowpacks.

Phylum; Class	Total number of reads	% content
<i>Bacillota; Bacilli</i>	163,333	39.65
<i>Cyanobacteriota; Cyanobacteriia</i>	63,307	15.37
<i>Pseudomonadota; Alphaproteobacteria</i>	62,427	15.16
<i>Pseudomonadota; Gammaproteobacteria</i>	35,780	8.69
<i>Bacteroidota; Bacteroidia</i>	28,186	6.84
<i>Actinomycetota; Actinobacteria</i>	25,216	6.12
<i>Acidobacteriota; Acidobacteriae</i>	11,358	2.76
<i>Bacillota; Clostridia</i>	8,531	2.07
<i>Deinococcota; Deinococci</i>	2,389	0.58
<i>Actinomycetota; Thermoleophilia</i>	2,178	0.53
Other	9,197	2.23
Total	411,902	100

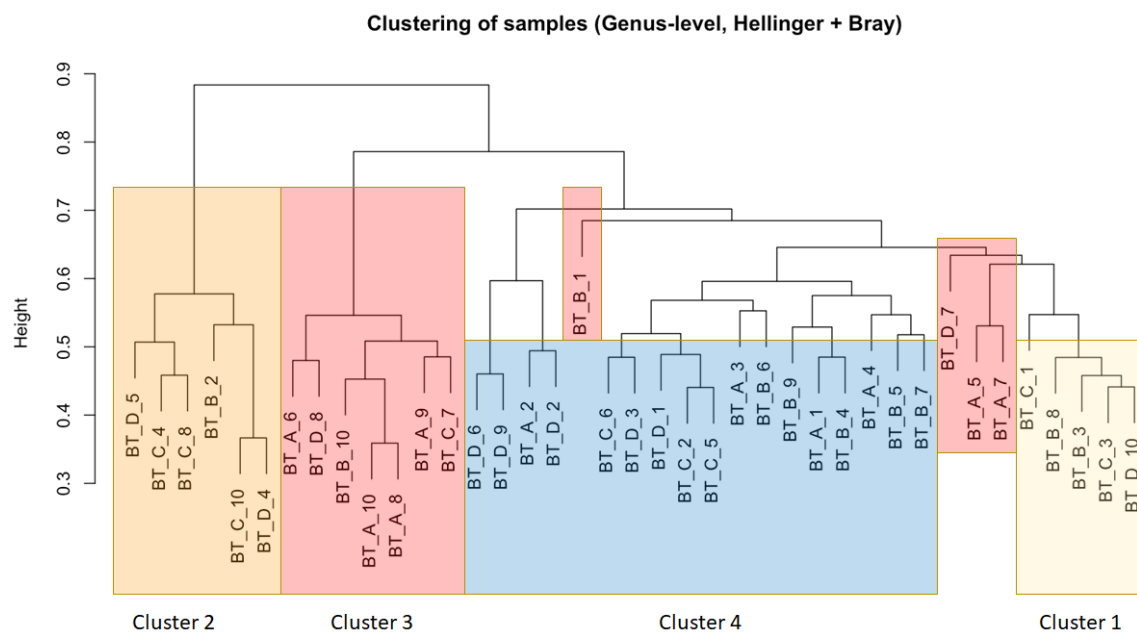


Figure S2. Hierarchical clustering of samples based on genus-level bacterial community composition. The ASV abundance table was Hellinger-transformed and Bray–Curtis dissimilarities were calculated. Clustering was performed using hierarchical agglomeration, and clusters were defined at the indicated height threshold, resulting in four major clusters. Colored backgrounds denote cluster membership (gold – Cluster 1, orange – Cluster 2, red – Cluster 3, blue – Cluster 4). Sample labels correspond to individual snow profile samples from biological transects - lines A–D.

S1. Variability in alpha diversity among clusters

Richness metrics (total number of ASVs, Faith's phylogenetic diversity PD) and diversity indices (Shannon entropy H' and Simpson's index SI) were used to evaluate the changes in the alpha diversity of snow clusters (Fig. S3). The cluster factor was significant ($P < 0.001$) for each index. The richness metric values differed significantly across snow clusters, with the highest in Cluster 1 and the lowest in Cluster 2. As for diversity indices, the highest Shannon and Simpson index values were measured for Cluster 1, and these values were significantly different compared to other snow clusters. In contrast to richness indices, the lowest values were detected in Cluster 3. Additionally, no significant differences in Simpson index values were observed between Clusters 2 and 4.

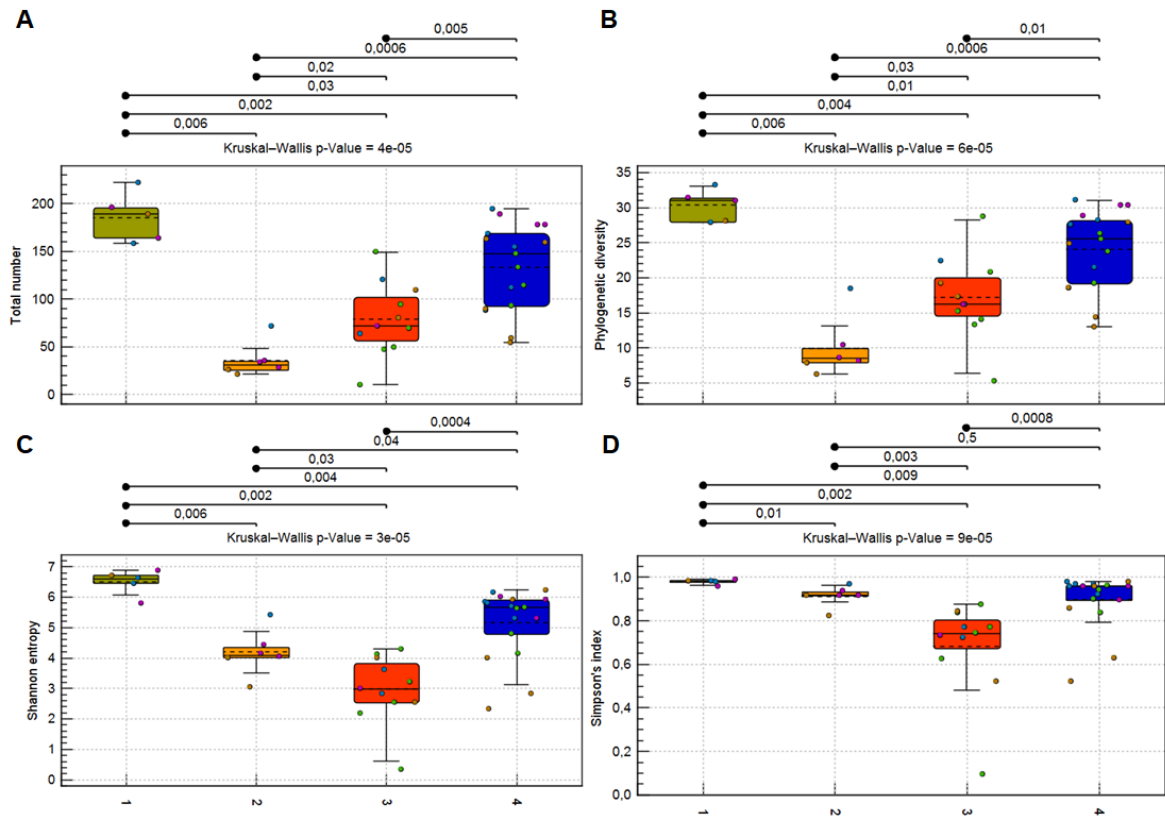


Figure S3. Comparison of alpha diversity indices between snow clusters: A: total number of ASVs; B: phylogenetic diversity; C: Shannon entropy; D: Simpson's index. Legend: dashed line presents mean value; continuous line – median value; box borders define 25th percentile.

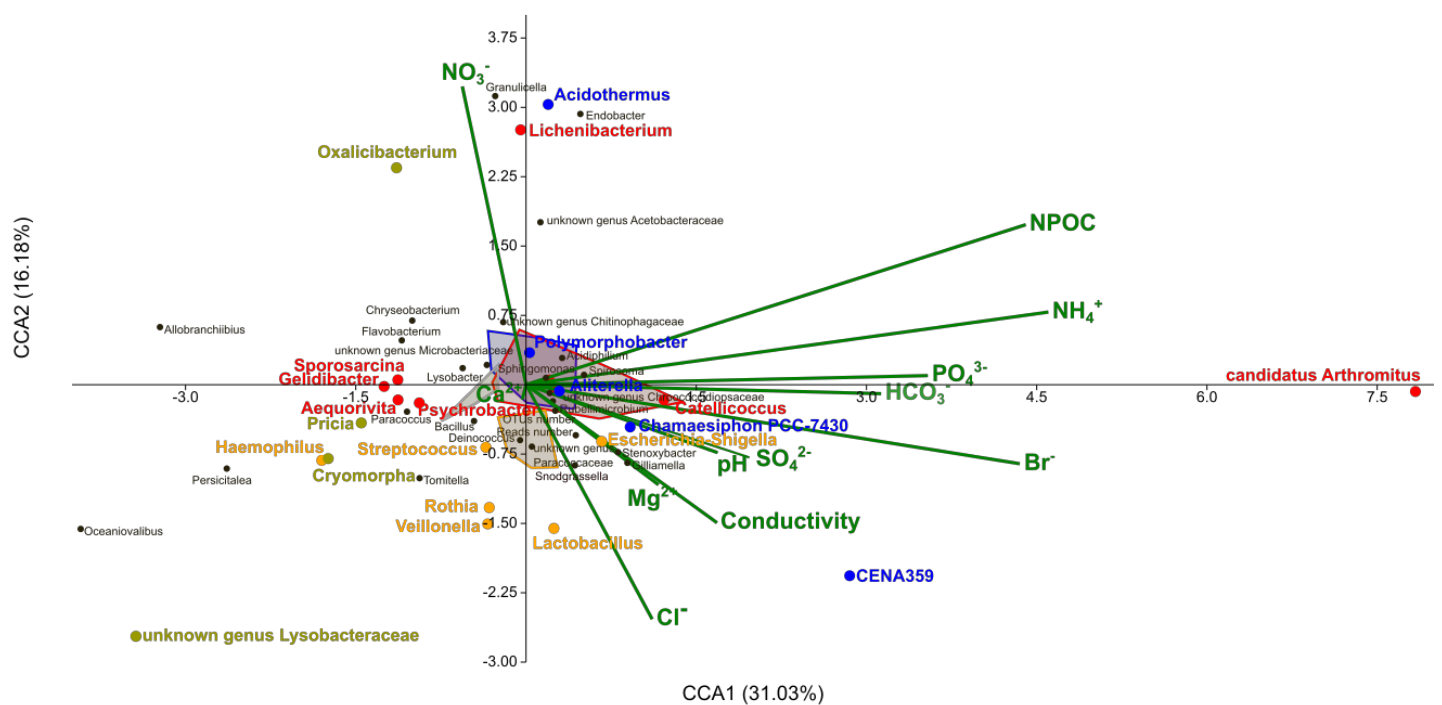


Figure S5. Canonical correspondence analysis (CCA) of bacterial profiles at the genus level in snow clusters. Triplot of relative abundance of different genera (top 46 genera >1% of total read content, total ASV reads, and ASV number) and 12 environmental snow attributes across four snow clusters. Bold green lines represent the physicochemical parameters; the line length indicates which physicochemical parameters impact genus distribution the most. Four snow clusters are marked by gold (Cluster 1), orange (Cluster 2), red (Cluster 3) and blue (Cluster 4) colors. The marker genera for each snow cluster, which are mentioned in the text, are marked by cluster color, and others are shown as black dots and names.

Table S2. Spearman correlation matrix of environmental variables.

	pH	Conductivity	NPOC	Total N	Inorganic N	N-NH ₄ ⁺	NH ₄ ⁺	NO ₃ ⁻	N-NO ₃ ⁻	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	HCO ₃ ⁻	F ⁻	Cl ⁻	Br ⁻	PO ₄ ³⁻
pH	-																	
Conductivity	-0.05	-																
NPOC	0.33	0.17	-															
Total N	0.33	0.25	0.87	-														
Inorganic N	0.38	0.28	0.78	0.85	-													
N-NH ₄ ⁺	0.50	0.23	0.74	0.79	0.96	-												
NH ₄ ⁺	0.50	0.23	0.74	0.79	0.96	1.00	-											
NO ₃ ⁻	-0.25	0.44	0.50	0.54	0.52	0.32	0.32	-										
N-NO ₃ ⁻	-0.25	0.44	0.50	0.54	0.52	0.32	0.32	1.00	-									
Na ⁺	-0.15	0.95	0.09	0.13	0.16	0.12	0.12	0.36	0.36	-								
K ⁺	0.16	0.82	0.43	0.49	0.50	0.48	0.48	0.46	0.46	0.78	-							
Ca ²⁺	-0.02	0.85	0.35	0.38	0.40	0.35	0.35	0.55	0.55	0.84	0.79	-						
Mg ²⁺	-0.10	0.91	0.20	0.24	0.26	0.22	0.22	0.47	0.47	0.91	0.89	0.90	-					
HCO ₃ ⁻	0.88	-0.18	0.35	0.40	0.40	0.54	0.54	-0.27	-0.27	-0.27	0.13	-0.14	-0.17	-				
F ⁻	0.36	0.08	0.34	0.32	0.33	0.34	0.34	0.18	0.18	-0.01	0.35	0.24	0.20	0.34	-			
Cl ⁻	-0.16	0.96	0.09	0.12	0.14	0.10	0.10	0.38	0.38	0.99	0.77	0.83	0.91	-0.29	-0.06	-		
Br ⁻	0.20	0.72	0.40	0.40	0.51	0.51	0.51	0.28	0.28	0.70	0.78	0.69	0.75	0.17	0.34	0.68	-	
PO ₄ ³⁻	0.52	0.29	0.50	0.50	0.52	0.53	0.53	0.28	0.28	0.15	0.53	0.30	0.35	0.53	0.65	0.12	0.57	-
SO ₄ ²⁻	-0.15	0.94	0.25	0.30	0.31	0.23	0.23	0.59	0.59	0.90	0.86	0.87	0.94	-0.23	0.16	0.91	0.70	0.37

Spearman's rank correlation coefficients (ρ) between environmental variables. Statistically significant correlations ($p < 0.05$, Bonferroni corrected) are given in boldface.