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Supplementary methods

Terminal-restriction fragment (T-RF) relative abundances (in this instance normalized as ‰ integer values to satisfy formatting requirements) were plotted using the radfit function of the Vegan package (Oksanen et al. 2012) in the R 2.15.0 statistical environment (R Development Core Team 2012) to model broken-stick, pre-emption, log-normal, Zipf and Mandelbrot-Zipf relative abundance distributions against the T-RF relative abundance distributions. The fit of the zero-sum model to T-RF relative abundances was conducted using TeTame 2.1 (Jabot et al. 2008). The fit of all models to the T-RF data was evaluated using Akaike's Information Criterion (AIC; Akaike 1974) where the best-fitting model is accorded the lowest score. In the instance of zero-sum models, the output of TeTame 2.1 is provided as minimum log-likelihood values, requiring transformation to yield maximum likelihood values for calculation of AIC (Feinstein & Blackwood 2012).

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Supplementary Table S1. Akaike Information Criterion (AIC) values for model evaluation of terminal-restriction fragment (T-RF) abundance distribution; the lowest value, i.e., the best AIC score, for each sample is in boldface. The number of T-RFs per sample is indicated.

Sample type	Sample	T-RFs	Null	Preemption	Lognormal	Zipf	Mandelbrot-Zipf	Zero-Sum
Cryoconite	MLC1	13	195.66	128.17	98.25	**85.52**	87.25	294.92
Cryoconite	MLC2	12	243.44	173.50	151.33	**108.02**	109.45	259.35
Cryoconite	MLC3	10	219.50	149.49	113.90	**74.64**	76.04	238.29
Cryoconite	MLC4	32	262.23	254.57	200.83	197.05	**194.28**	414.95
Cryoconite	MLC5	13	165.75	129.57	120.17	108.40	**97.63**	307.94
Cryoconite	MLC6	21	248.51	165.82	136.74	123.48	**121.24**	293.07
Cryoconite	MLC8	7	132.14	81.96	86.83	102.60	**74.45**	161.80
Cryoconite	MLC9	15	200.14	185.40	137.31	**103.64**	105.64	336.73
Cryoconite	MLC10	15	250.82	225.23	175.71	**120.58**	122.58	333.19
Cryoconite	VBC1	30	344.25	305.08	219.69	**168.41**	170.41	445.20
Cryoconite	VBC2	23	246.26	197.10	194.45	192.78	**160.42**	329.75
Cryoconite	VBC3	18	180.53	128.35	136.93	147.56	**114.15**	424.30
Cryoconite	VBC4	36	263.55	227.69	229.63	252.67	**194.17**	463.46
Cryoconite	VBC5	20	229.97	203.15	158.32	128.54	**127.17**	295.16
Cryoconite	VBC6	21	238.95	251.03	163.38	120.16	122.16	313.03
Cryoconite	ABC1	10	208.02	141.49	105.01	82.77	84.77	242.13
Cryoconite	ABC2	11	164.56	96.35	86.05	84.06	**76.71**	262.49
Cryoconite	ABC3	9	250.72	102.13	79.79	94.65	**74.28**	211.47
Cryoconite	ABC4	53	395.84	385.98	315.72	298.85	**258.19**	626.71
Cryoconite	ABC5	62	387.31	377.56	312.62	304.04	**286.30**	745.65
Cryoconite	ABC6	18	216.14	127.17	135.91	158.69	**119.23**	271.45
Cryoconite	ABC7	18	213.36	122.74	131.74	154.08	**114.25**	272.73
Cryoconite	ABC8	17	168.61	147.60	139.01	138.73	**113.53**	255.74
Cryoconite	ABC9	18	212.21	188.12	170.53	152.78	**132.30**	284.67
Cryoconite	ABC10	13	134.97	102.79	110.89	132.33	**97.61**	314.47
Soil	ETT1	6	79.24	67.18	67.62	60.30	**54.80**	150.17
Soil	ETT2	5	119.55	103.18	120.15	127.10	**102.57**	134.59
Soil	ETT3	28	396.16	226.80	180.68	**158.35**	160.04	432.90
Soil	ETT4	10	212.15	139.65	104.03	**81.20**	83.20	271.44
Soil	ETT5	3	100.06	74.36	**38.09**	52.08	40.09	66.15
Soil	SVT1	6	119.59	92.03	105.11	135.41	**87.48**	151.54
Soil	SVT2	5	74.22	66.84	62.58	**51.69**	51.78	119.99
Soil	SVT3	14	1535.77	833.76	400.86	**258.06**	260.06	350.28
Soil	SVT5	5	177.17	112.53	77.03	**58.90**	60.90	121.35
Soil	ABM1	44	322.99	333.76	243.52	217.44	**215.92**	567.43
Soil	ABM2	34	352.99	202.30	189.93	202.36	**179.64**	464.71
Soil	ABM3	26	359.46	190.64	**153.04**	153.22	153.64	395.26
Soil	ABM5	25	381.16	192.10	153.36	**142.51**	142.69	406.87
Soil	VBM1	19	344.29	359.70	223.87	**130.58**	132.58	487.26
Soil	VBM2	23	328.71	206.56	160.29	**131.53**	133.53	384.74
Soil	VBM3	19	322.53	233.11	175.22	**121.64**	123.64	491.59
Soil	VBM4	22	318.18	147.92	140.20	**166.27**	**130.35**	358.95
Soil	VBM5	24	355.58	165.84	143.87	163.29	**142.89**	380.19
Soil	MLM1	46	354.27	336.15	260.65	231.96	**231.35**	626.24
Soil	MLM2	23	268.24	194.70	159.24	137.75	**137.09**	362.78
Soil	MLM3	23	404.26	216.72	165.52	**139.94**	141.94	361.88
Soil	MLM4	20	340.95	261.47	188.97	**133.23**	135.23	509.50
Soil	MLM5	11	183.94	129.00	107.72	**86.85**	87.32	294.08

Supplementary Table S2. Permutational analysis of variance (PERMANOVA) of bacterial 16S presence–absence terminal-restriction fragment length polymorphism (T-RFLP) profiles; *p*(perm) values of less than 0.01 have been highlighted in bold to indicate highly significant differences between sample groups upon pairwise PERMANOVA.

	Pairwise PERMANOVA *p*(perm) values)						
	ML[a] cryoconite	VB[b] cryoconite	AB[c] cryoconite	ET [d] tundra	SV[d] tundra	AB moraine	VB moraine
ML cryoconite							
VB cryoconite	**0.0008**						
AB cryoconite	**0.0001**	**0.0102**					
ET tundra	**0.0005**	**0.0019**	**0.0008**				
SV tundra	**0.0016**	**0.0051**	**0.0011**	0.6423			
AB moraine	**0.0016**	**0.0054**	**0.0009**	0.0171	0.028		
VB moraine	**0.0003**	**0.0013**	**0.0006**	0.0141	0.0251	0.0569	
ML moraine	**0.0012**	**0.0024**	**0.0004**	0.0312	0.0379	0.7912	0.235

[a]Midtre Lovénbreen

[b]Vestre Brøggerbreen

[c]Austre Brøggerbreen

[d]See Fig. 1 for location of the two tundra sites.