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Soil microbial biomass, activity and community composition along altitudinal gradients in the High Arctic (Billefjorden, Svalbard)

Petr Kotas et al.

Correspondence to: Petr Kotas (kotyno@prf.jcu.cz)

Figure S1

Time series of soil temperatures at –5 cm from sampling sites located along Tr1 in the period June 2012 – May 2013.

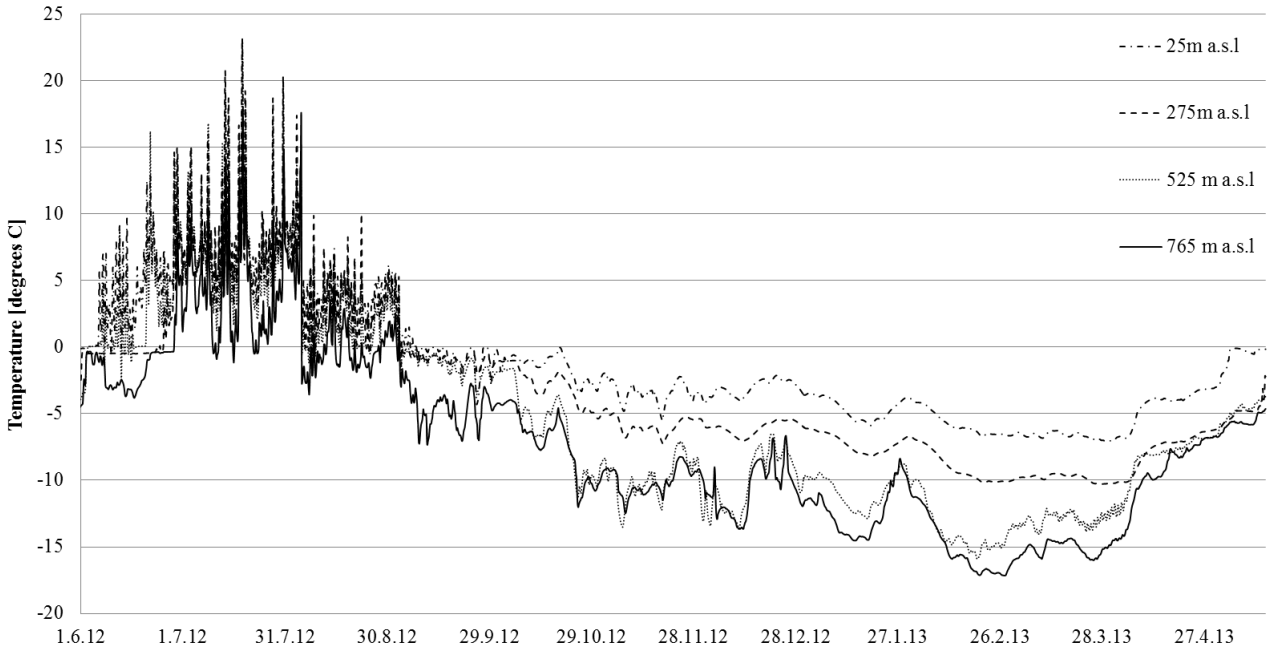

Figure S2

Time series of daily means of soil temperatures at -5 cm **(a)** and of air temperatures at 2 m **(b)** from AWS_{25} (25m a.s.l.) and AWS_{455} (455m a.s.l.) meteorological stations from May 2012 to September 2013.

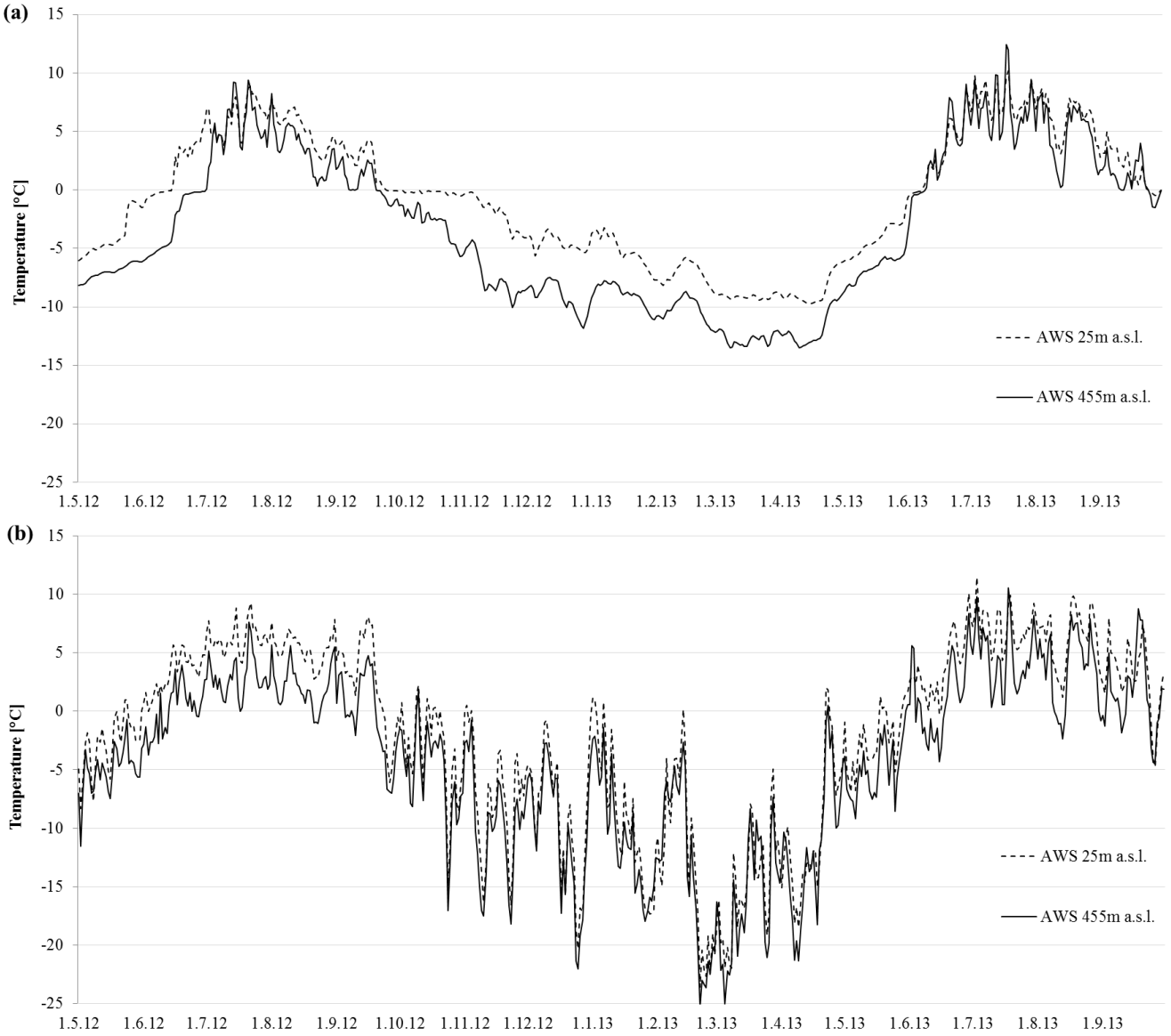

Figure S3

Time series of mean ± SD (n = 3) soil water content at -5 cm from AWS_{25} (25 m a.s.l.) and AWS_{455} (455 m a.s.l.) for three consecutive summer seasons (2011–2013). The grey area indicates time of sample collection in 2012. Note the stable soil water content from July until September. The volumetric measurement enable to determine soil water content only in a liquid state, which explains the very low water content in frozen soils during the winter period. These technical limitations explain also conspicuous fluctuations of soil water content during transient periods between winter and summer season, resulting from freeze–thaw cycles when temperature oscillated around zero.

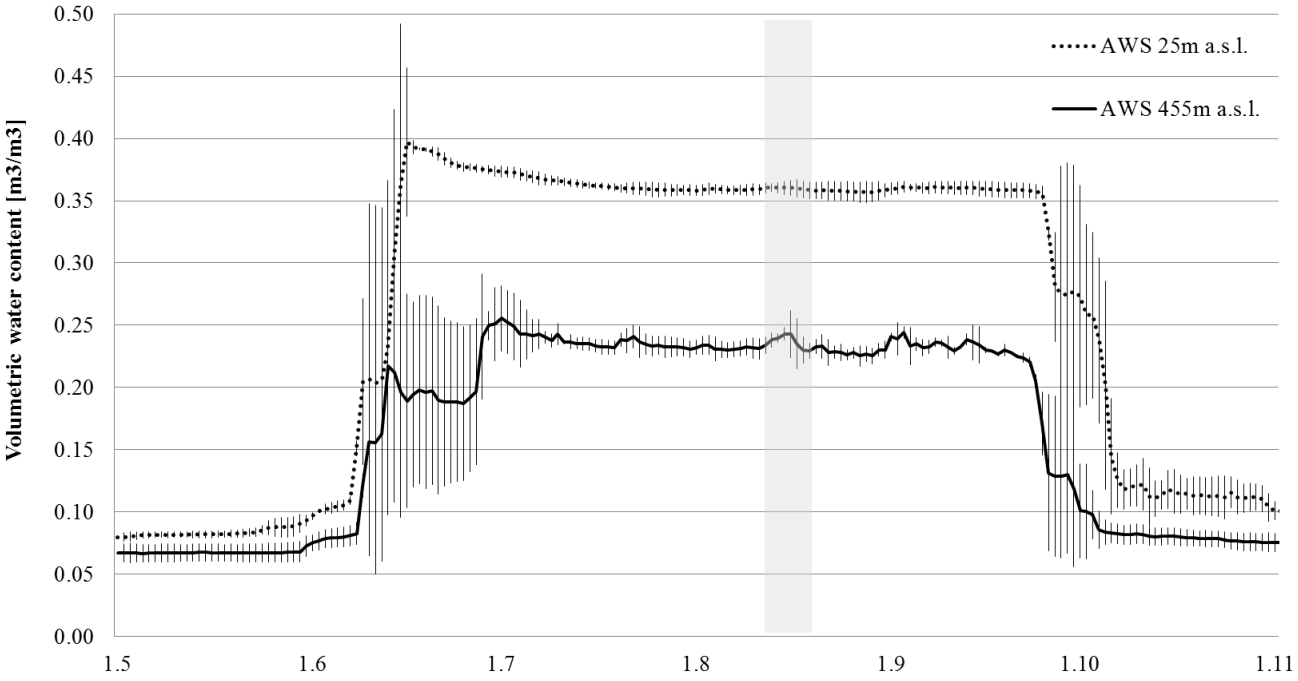

Figure S4

Loading of soil geochemical properties determined in soils along the altitudinal gradients. Ordination diagrams show results of the redundancy analyses constrained by the effect of altitude. *Arrows* indicate the direction in which the respective parameter value increases. *Triangles* are centroids (n = 9) of the sites with corresponding elevation. The portion of variance explained by the respective axis is given in the axis title. The orientation of majority of arrows and site centroids in parallel with RDA 1 indicate strong altitudinal effect on soil properties.

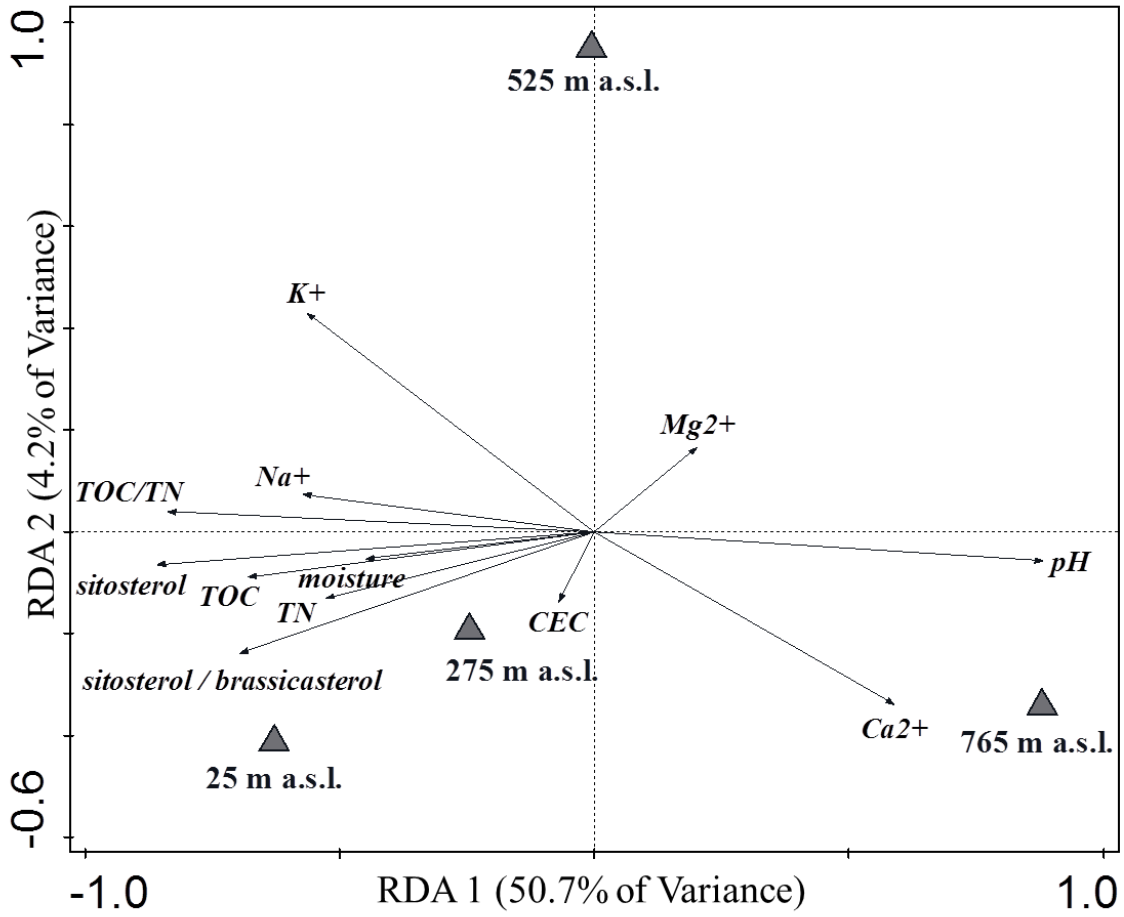

Figure S5

Mean contribution of various types of soil surface cover at particular sampling sites. The areas covered solely by stones were not considered in this figure in order to describe the surface cover in areas suitable for soil sampling (see Table S1 for data including the stony areas).

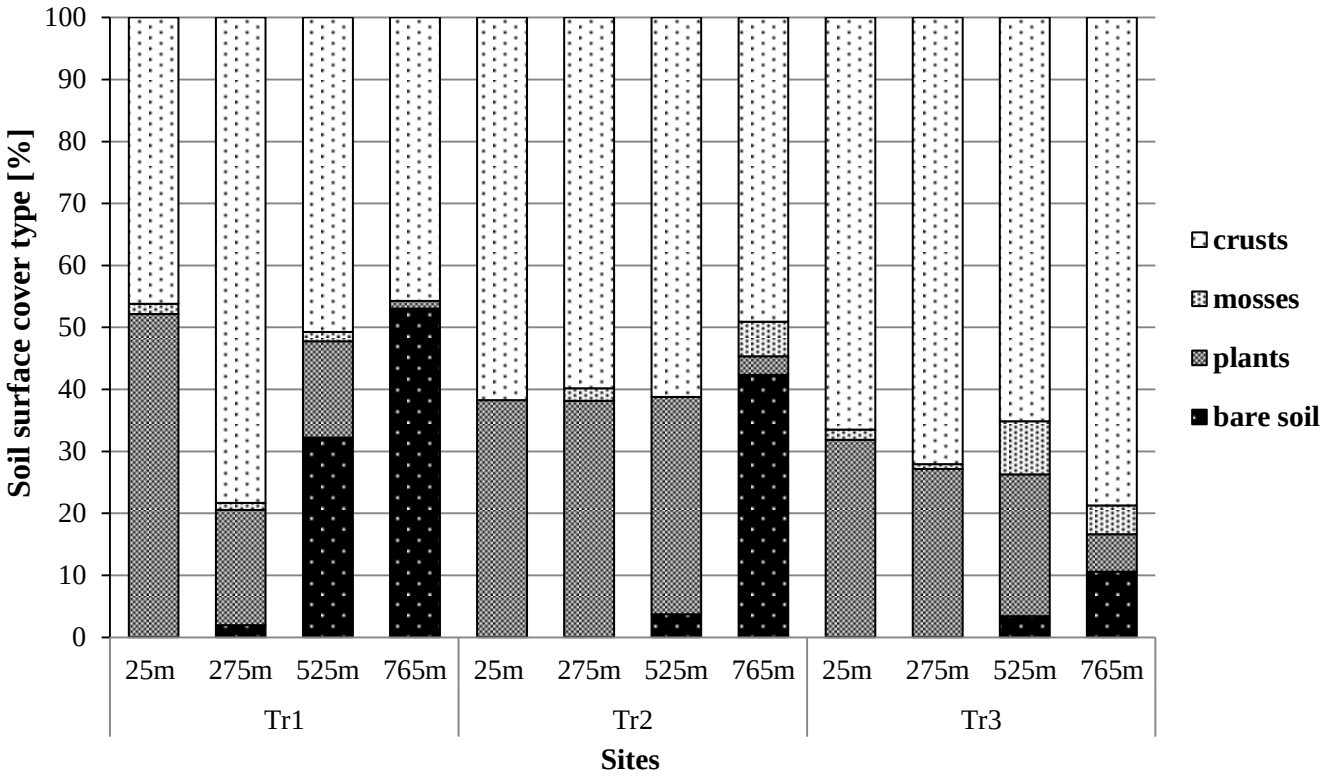

Table S1

Mean contribution of various types of soil surface cover and brief description of soils crusts predominant at particular sampling sites. Means ± SE (n = 3) are given in the upper part of the table. Results of two–way ANOVAs (F–values) of the effects of transect (Tr), altitude (Alt) and their interaction (Tr x Alt) are presented in the lower part of the table.

transect	altitude	soil surface cover type [%]					
	[m a.s.l.]	stones	bare soil	plants	mosses	crusts	crust type
Tr1	25	**c** 1.0 ± 0.8	n.o.	**a** 52 ± 6.2	**a** 1.7 ± 0.9	**b** 46 ± 6.3	lichenized
	275	**b** 11 ± 3.9	**b** 1.7 ± 0.9	**b** 17 ± 2.4	**a** 1.0 ± 0.0	**a** 70 ± 3.7	poorly lichenized
	525	**b** 17 ± 4.7	**a** 27 ± 6.2	**b** 13 ± 5.6	**a** 1.3 ± 1.2	**b** 43 ± 15	poorly lichenized
	765	**a** 47 ± 2.4	**a** 28 ± 2.4	**c** 0.7 ± 0.5	n.o.	**c** 24 ± 4.1	dark cyanobacterial
Tr2	25	**b** 4.0 ± 2.2	n.o.	**a** 37 ± 3.4	n.o.	**a** 59 ± 4.8	lichenized
	275	**b** 1.3 ± 0.9	n.o.	**ab** 38 ± 7.1	**b** 2.0 ± 0.0	**a** 59 ± 6.5	lichenized
	525	**a** 38 ± 17	**b** 2.0 ± 0.8	**b** 22 ± 9.0	n.o.	**b** 38 ± 9.2	poorly lichenized
	765	**a** 49 ± 4.2	**a** 14 ± 2.9	**c** 2.0 ± 0.8	**a** 3.7 ± 0.9	**b** 33 ± 3.1	dark cyanobacterial
Tr3	25	**c** 0.7 ± 0.9	n.o.	**a** 32 ± 9.4	**b** 1.7 ± 0.9	**a** 66 ± 9.9	lichenized
	275	**b** 13 ± 2.4	n.o.	**a** 23 ± 8.5	**b** 0.7 ± 0.9	**a** 63 ± 10	poorly lichenized
	525	**a** 33 ± 9.4	**b** 2.0 ± 1.4	**b** 15 ± 0.0	**a** 5.7 ± 0.9	**b** 44 ± 11	poorly lichenized
	765	**a** 46 ± 6.5	**a** 5.7 ± 0.9	**c** 3.3 ± 1.2	**b** 2.7 ± 1.7	**b** 42 ± 3.8	dark cyanobacterial
	d.f.						
Tr	2	0.01	**55.6 *****	**4.48 ***	2.33	**8.13 ****	
Alt	3	**36.1 *****	**58.7 *****	**69.4 *****	**18.5 *****	**3.09 ***	
Tr x Alt	6	**5.32 ****	**17.6 *****	**3.09 ***	1.65	**9.69 *****	

Different letters indicate significant differences between sampling sites along particular transects ($P < 0.05$; upper part of the table). Statistically significant differences are indicated by: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ (lower part of the table). n.o. – surface cover type was not observed.