

Permafrost soil organic matter (de)composition in times of global warming

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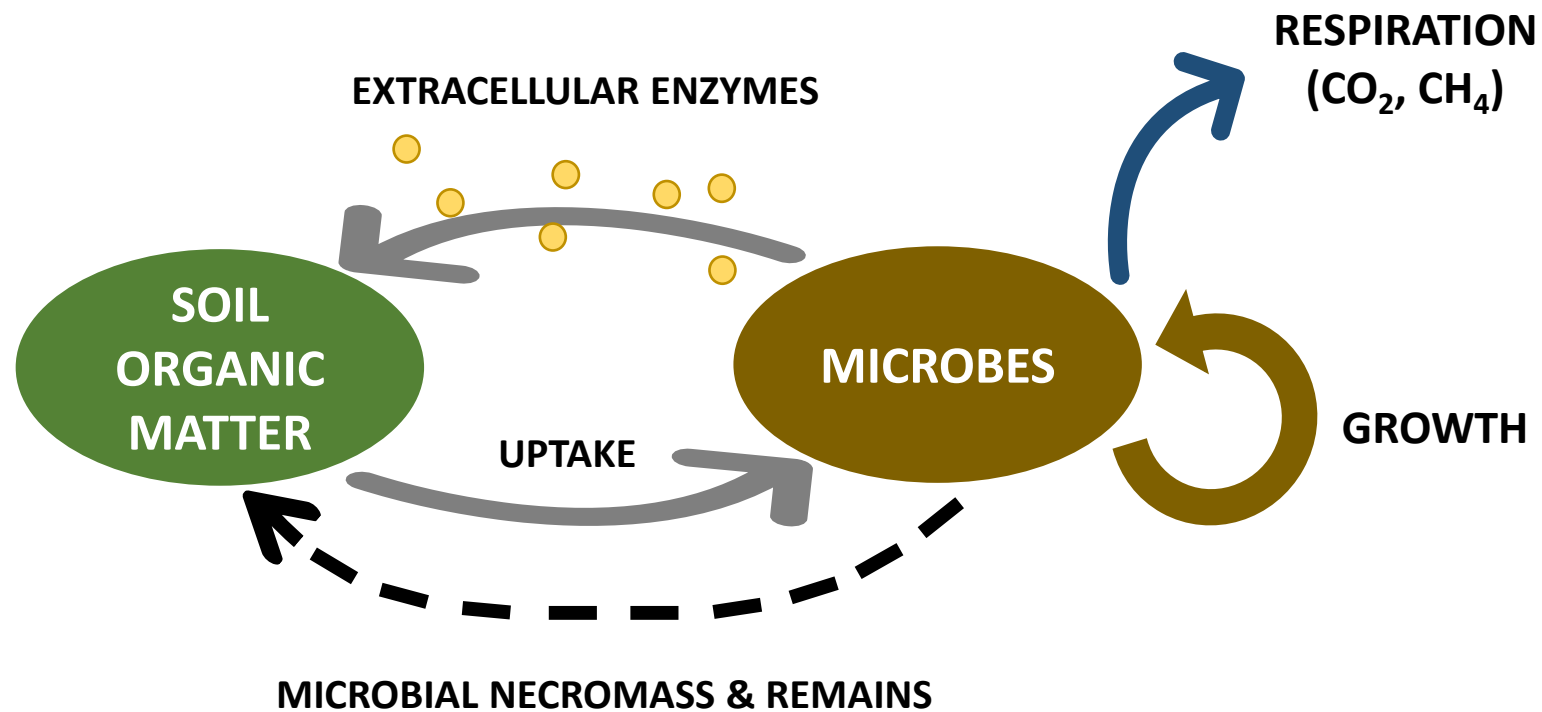
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⁴Vrije Universiteit Amsterdam, Department of Earth and Climate, Amsterdam, Netherlands

⁵Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Potsdam, Germany



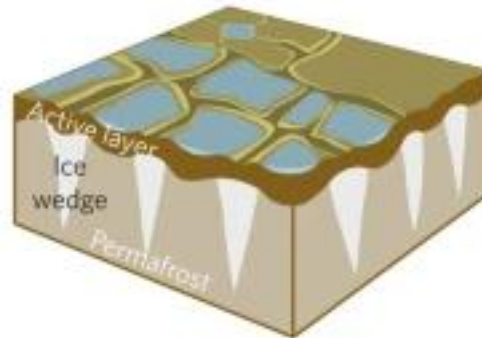
Permafrost thaw amplifies microbial decomposition



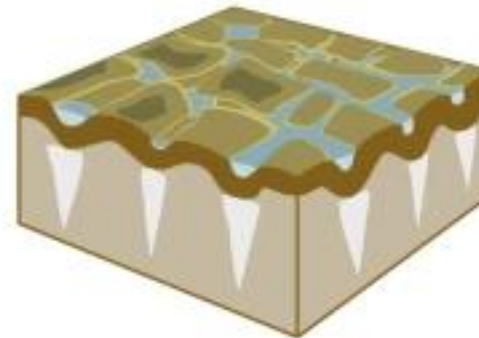
Permafrost soils are heterogeneous



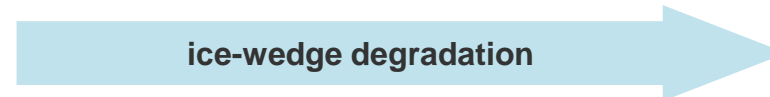
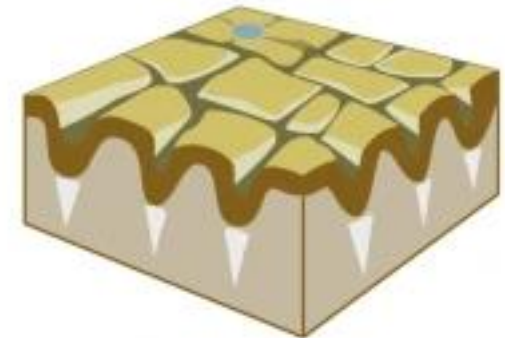
low-center polygons



flat-center polygons



high-center polygons

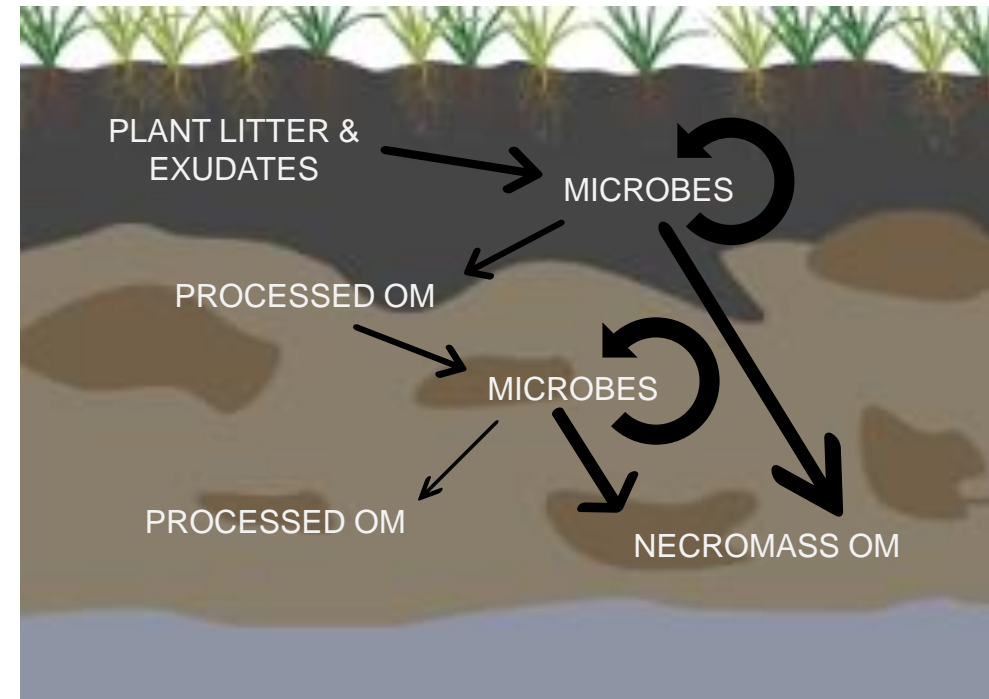


Liljedahl et al., 2016

Research Objectives

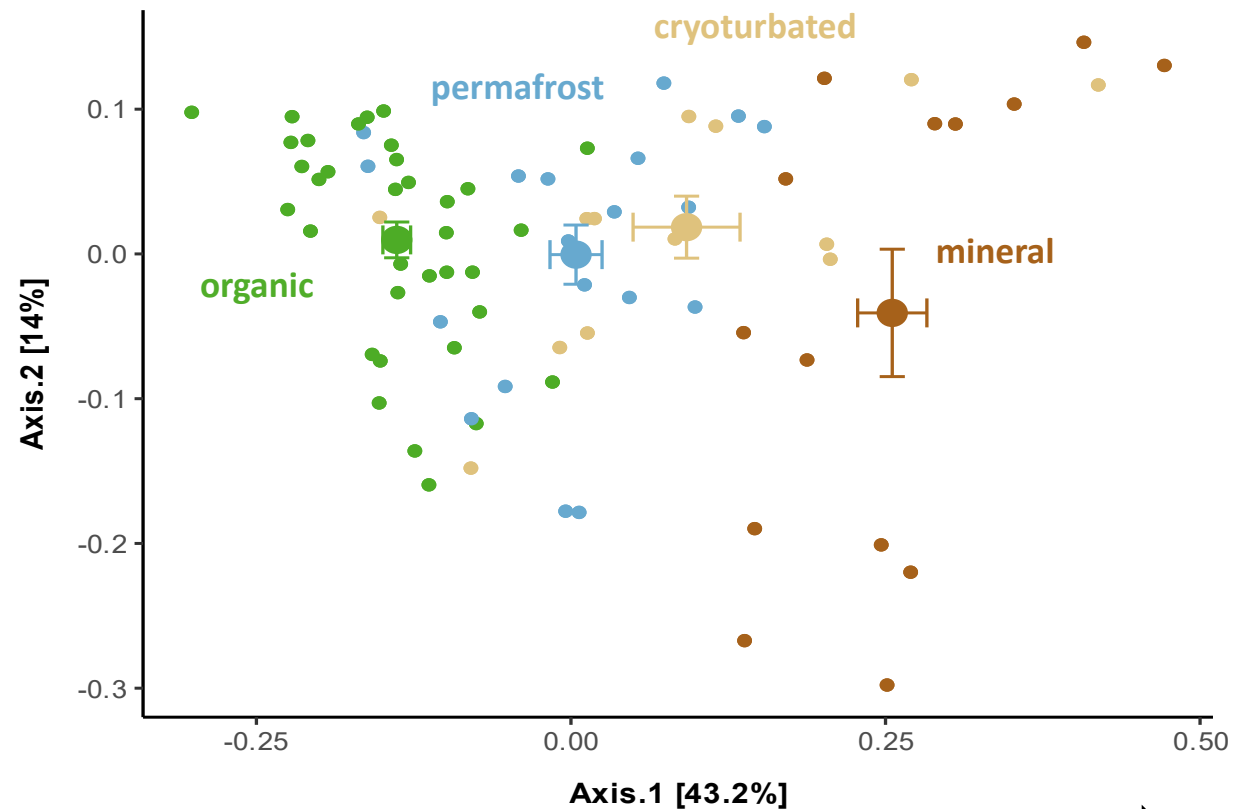
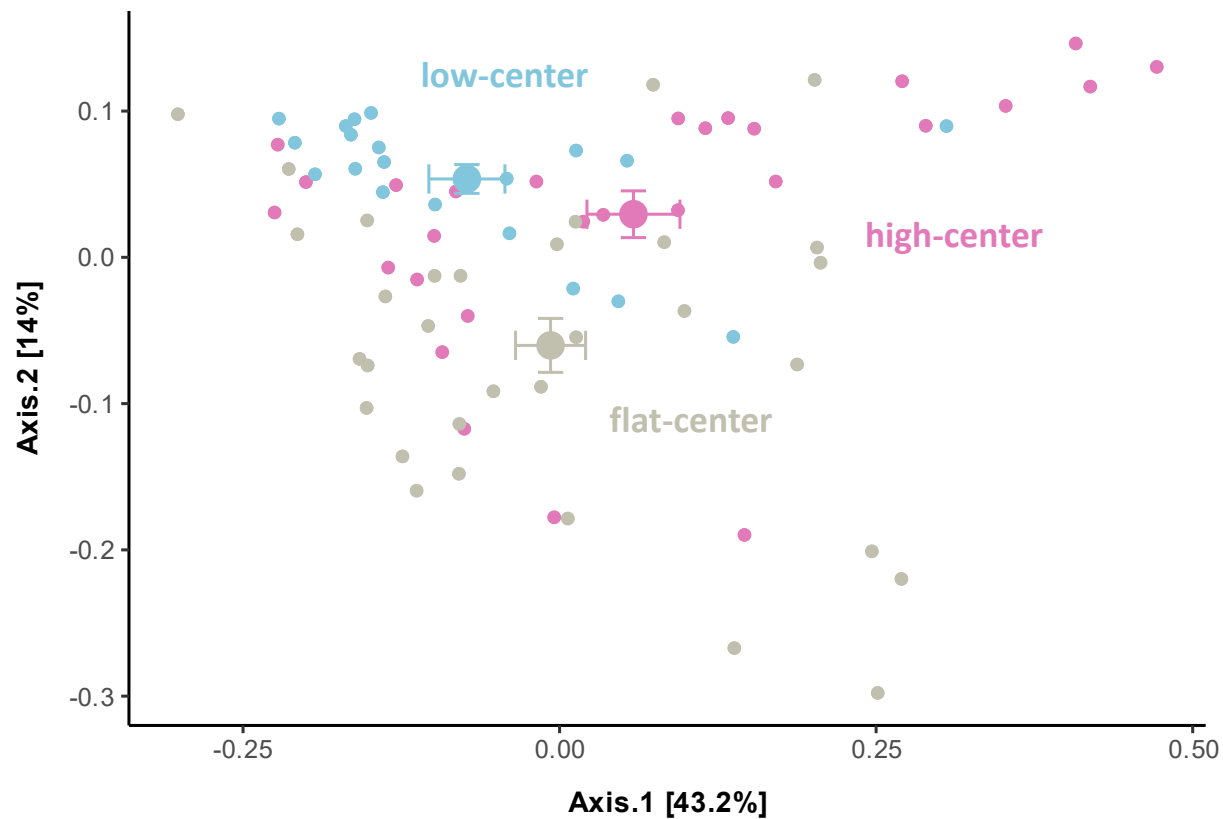
1 Characterize **soil organic matter composition** by pyrolysis-GC-MS

2 Characterize **bacterial community composition** by amplicon sequencing (16S rRNA gene)



SOM composition differs between polygons and soil layers

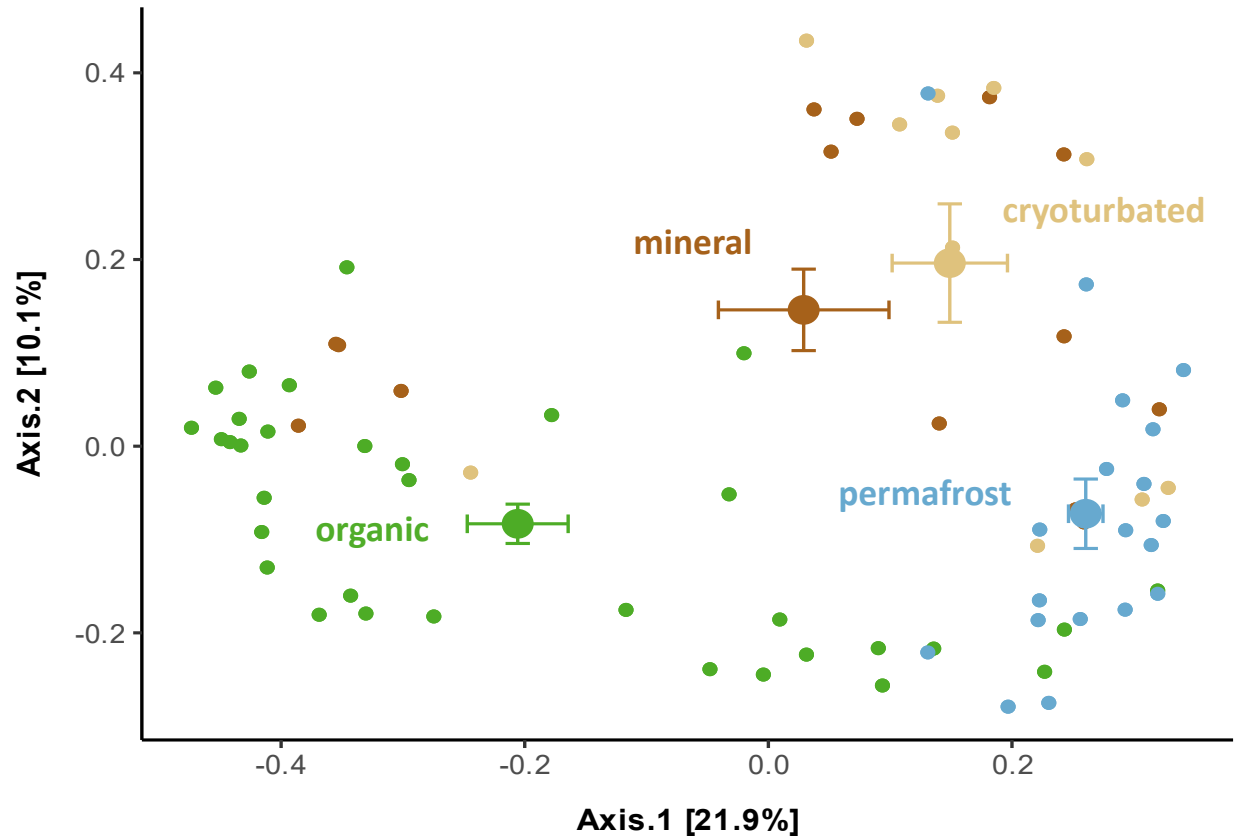
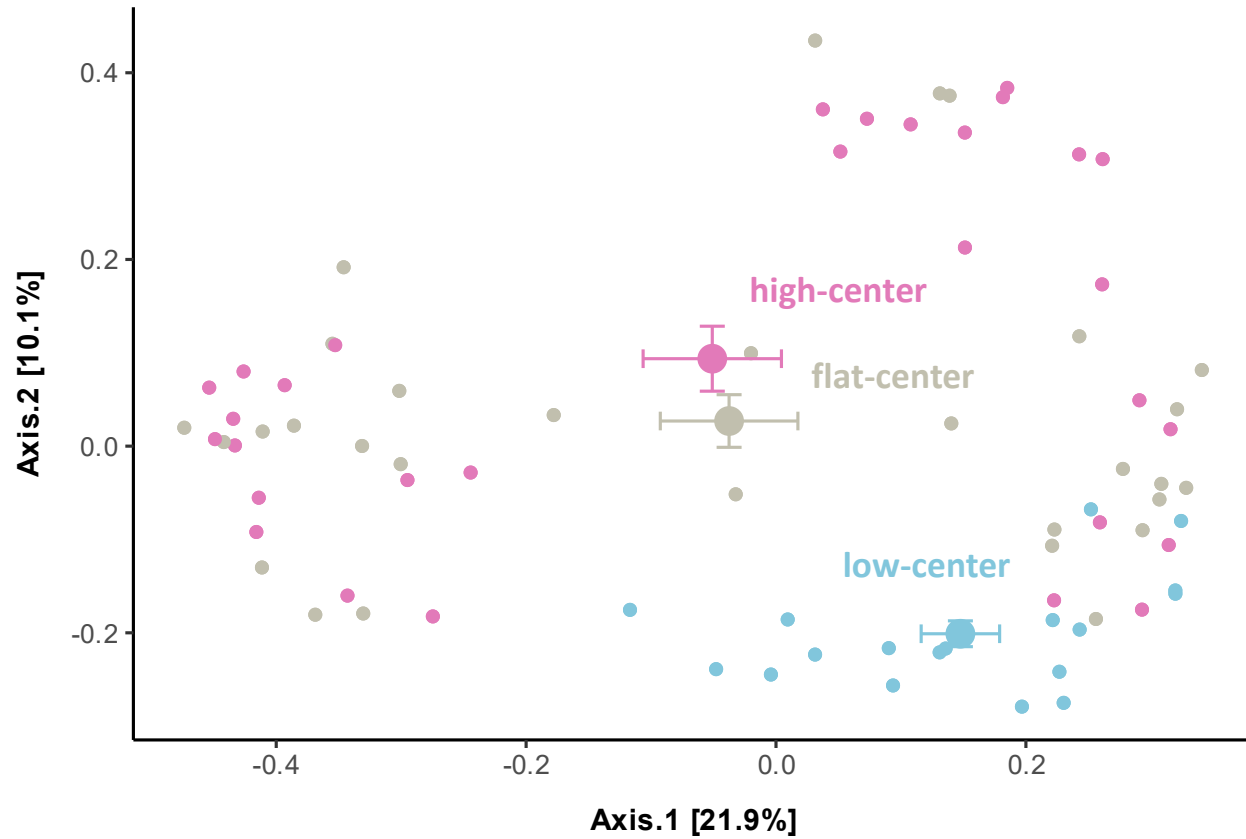
PCoA, PERMANOVA (Bray-Curtis)
polygon type p = 0.001 ***
soil layer p = 0.001 ***



organic Carbon: $R = -0.81$, $p < 0.001$

Community composition differs between polygons and soil layers

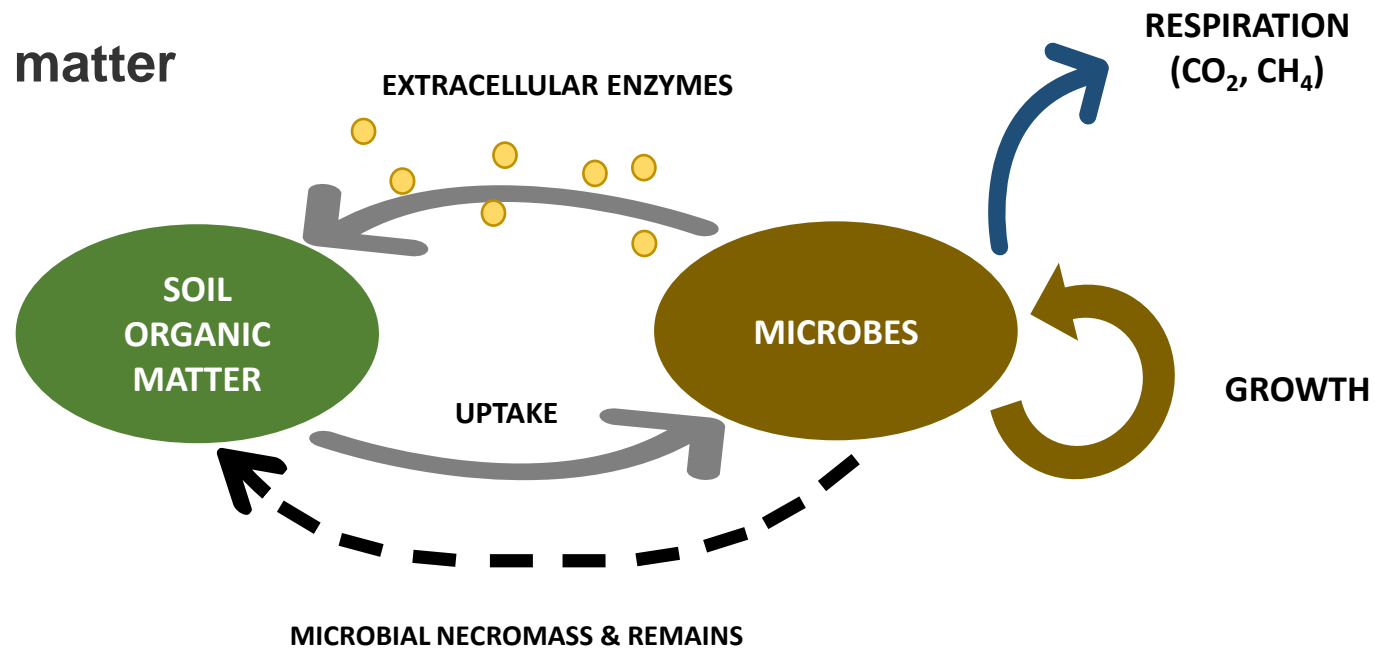
PCoA, PERMANOVA (Bray-Curtis)
polygon type p = 0.001 ***
polygon type:soil layer p = 0.001 ***
soil layer p = 0.001 ***



Take Home Message

Spatial heterogeneity within soil organic matter and bacterial community composition

Composition affects decomposition



Thanks to all co-authors and my colleagues at **ter:labs!**
TERRESTRIAL ECOSYSTEM RESEARCH



Study Area

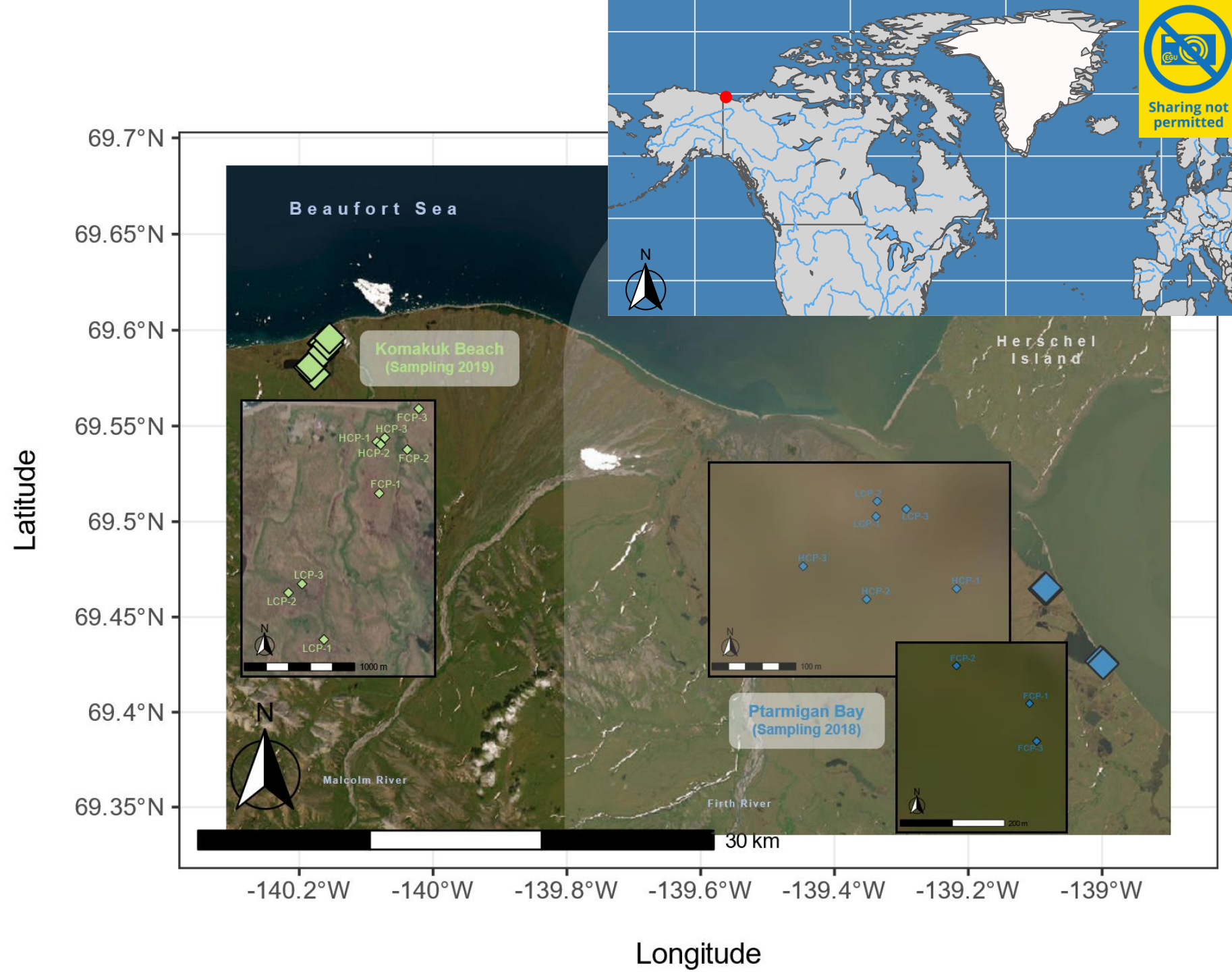
2 sampling campaigns

3 polygon types

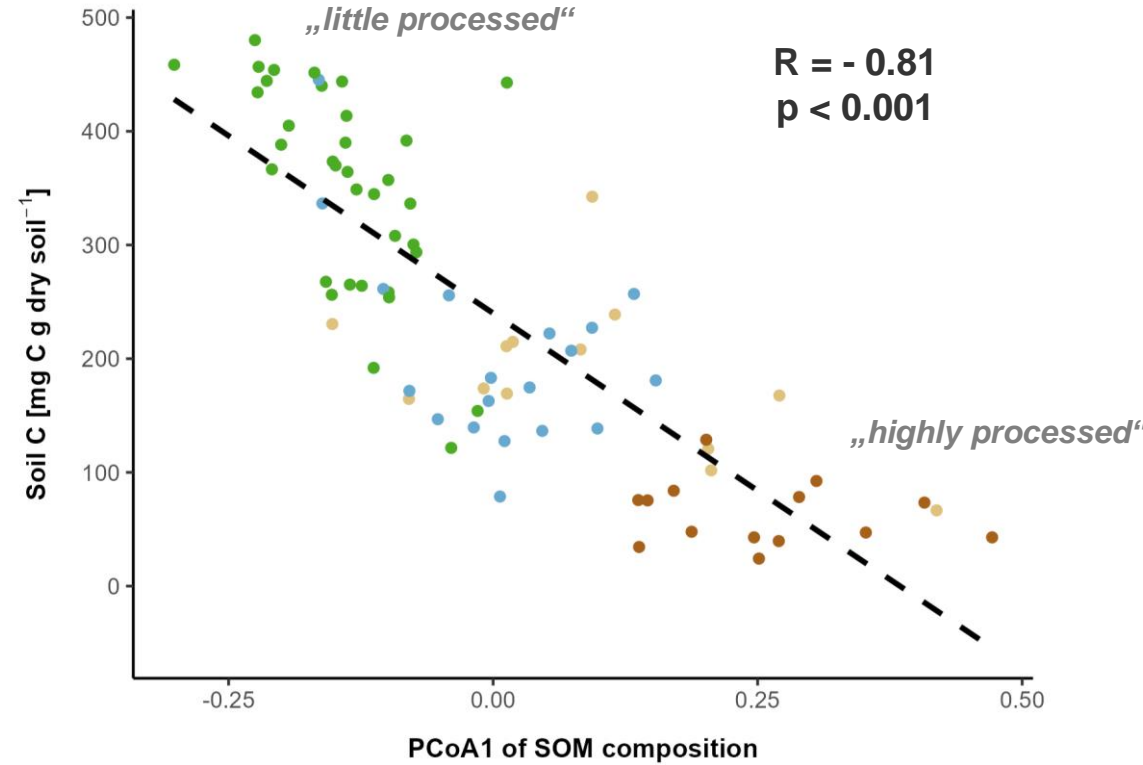
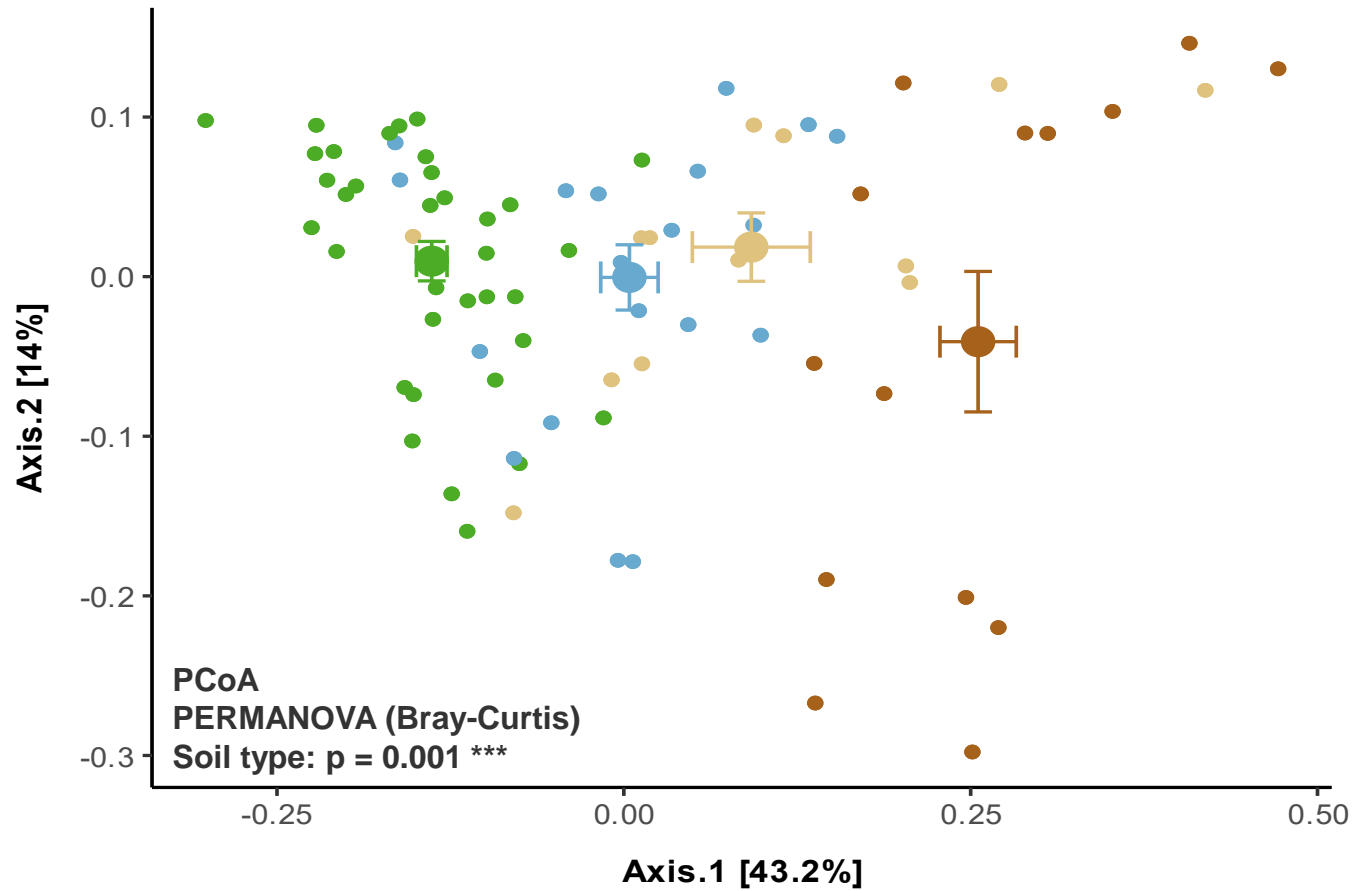
- low-center
- flat-center
- high-center

4 soil layer types

- organic
- mineral
- cryoturbated
- permafrost



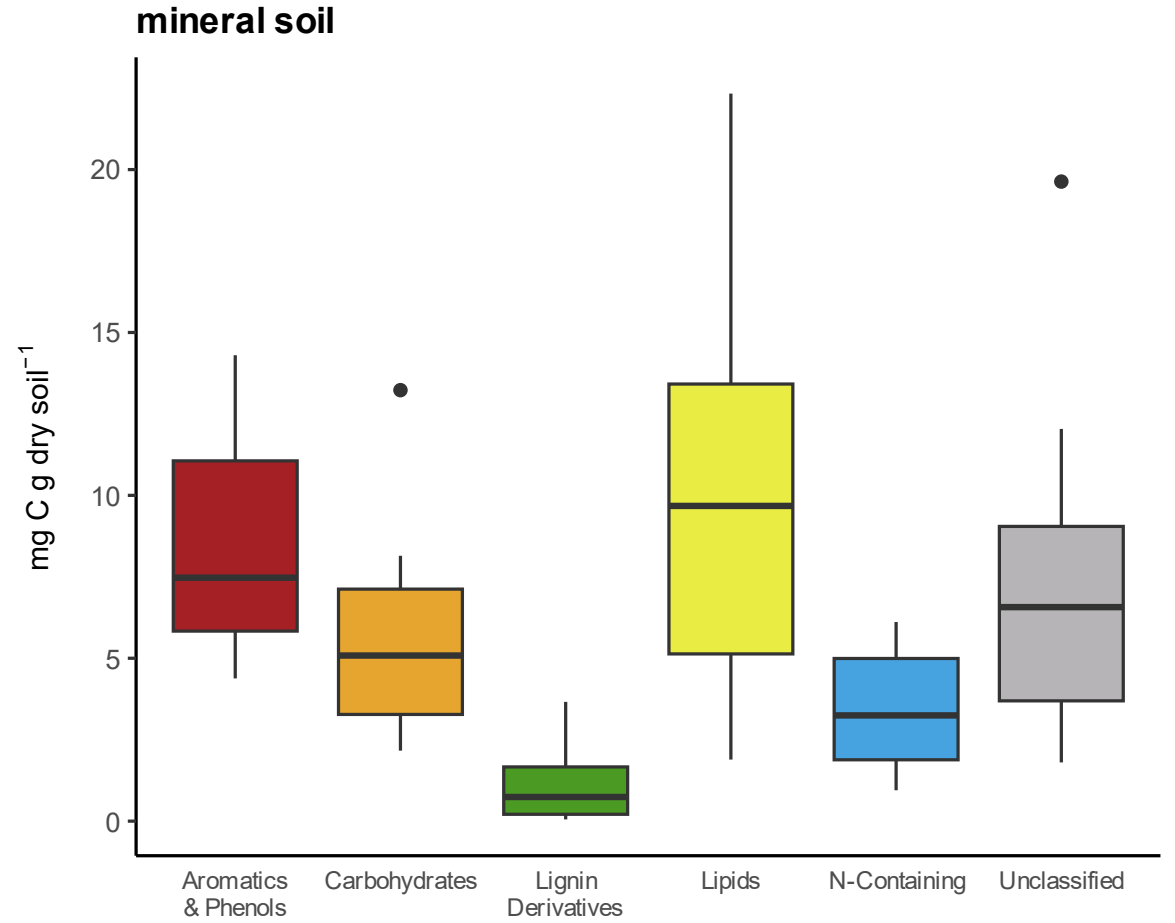
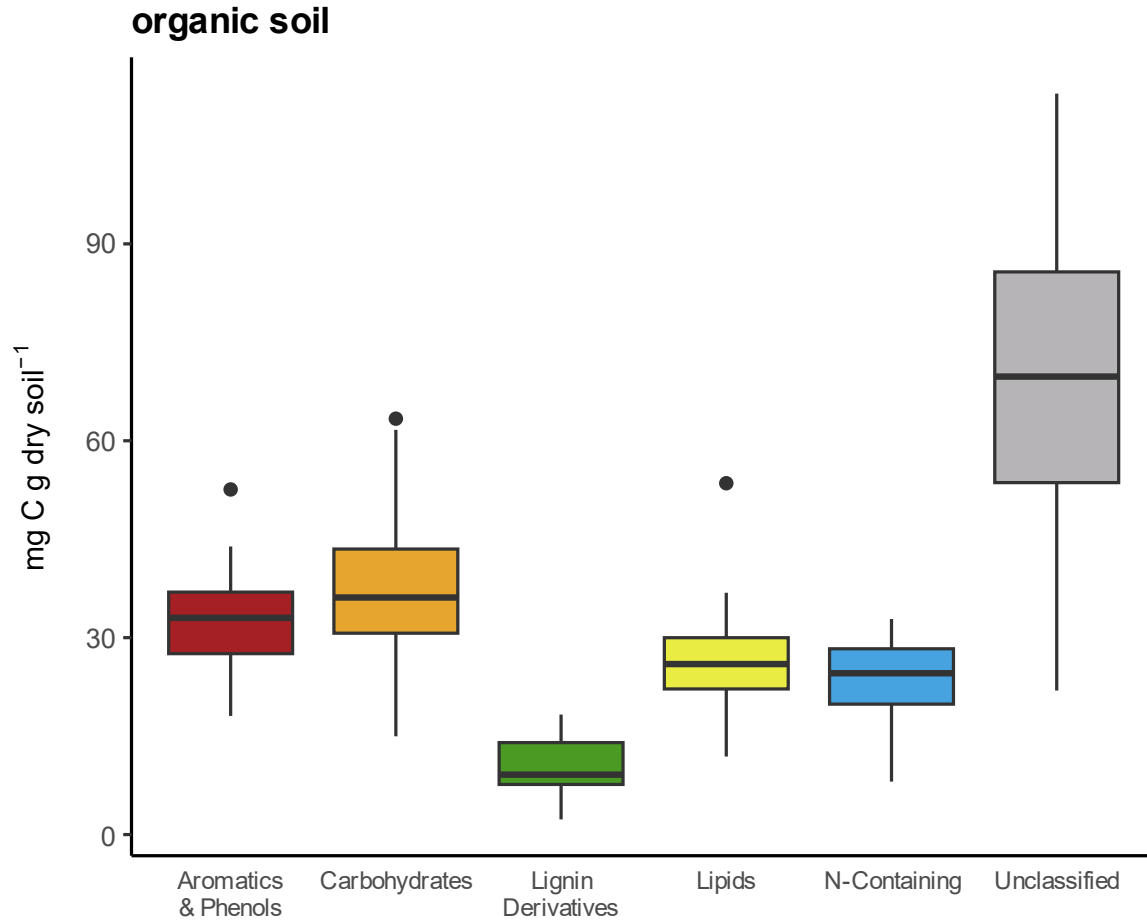
Supplement



Soil type

- organic
- mineral
- cryoturbated
- permanently frozen

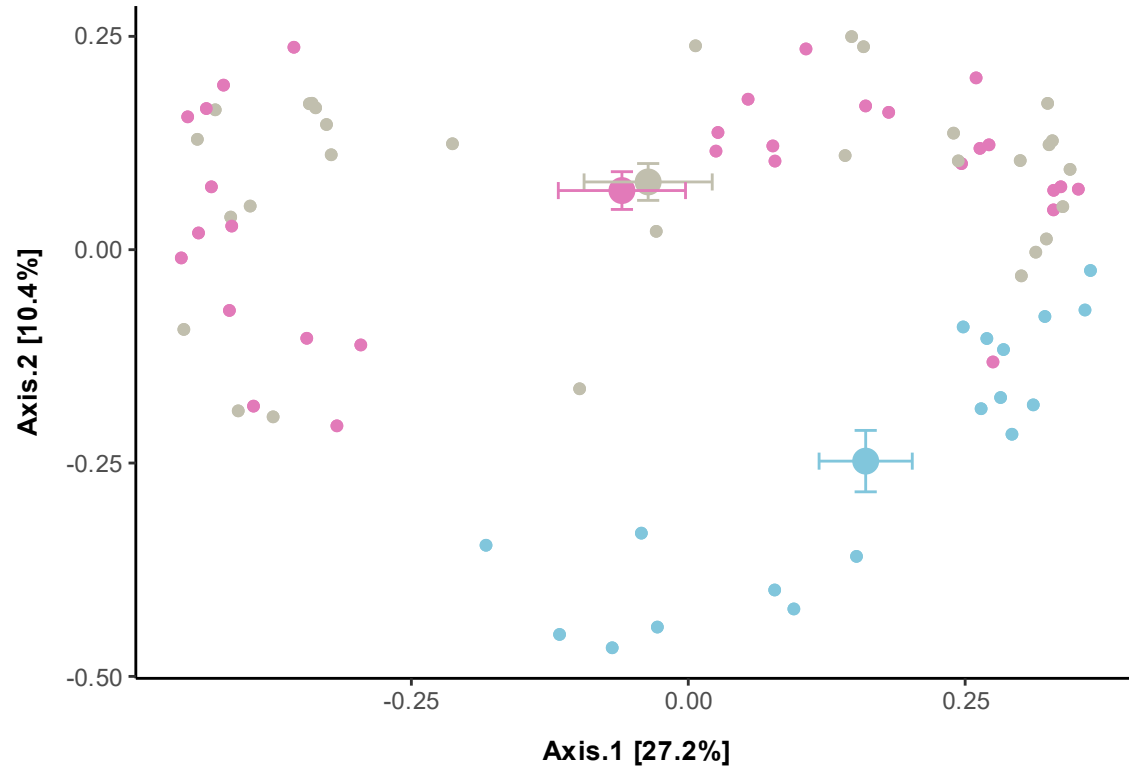
Supplement



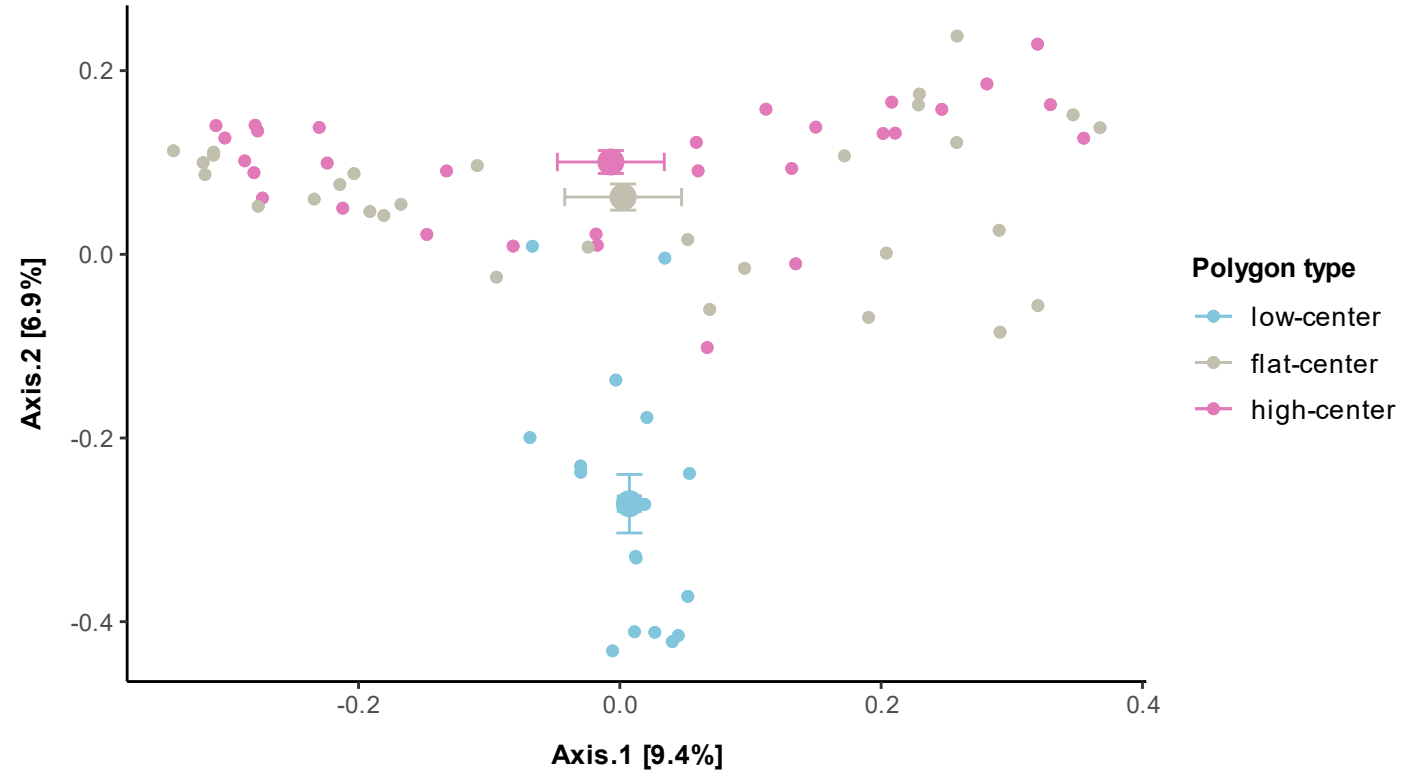
Supplement



Bacterial/archaeal community composition



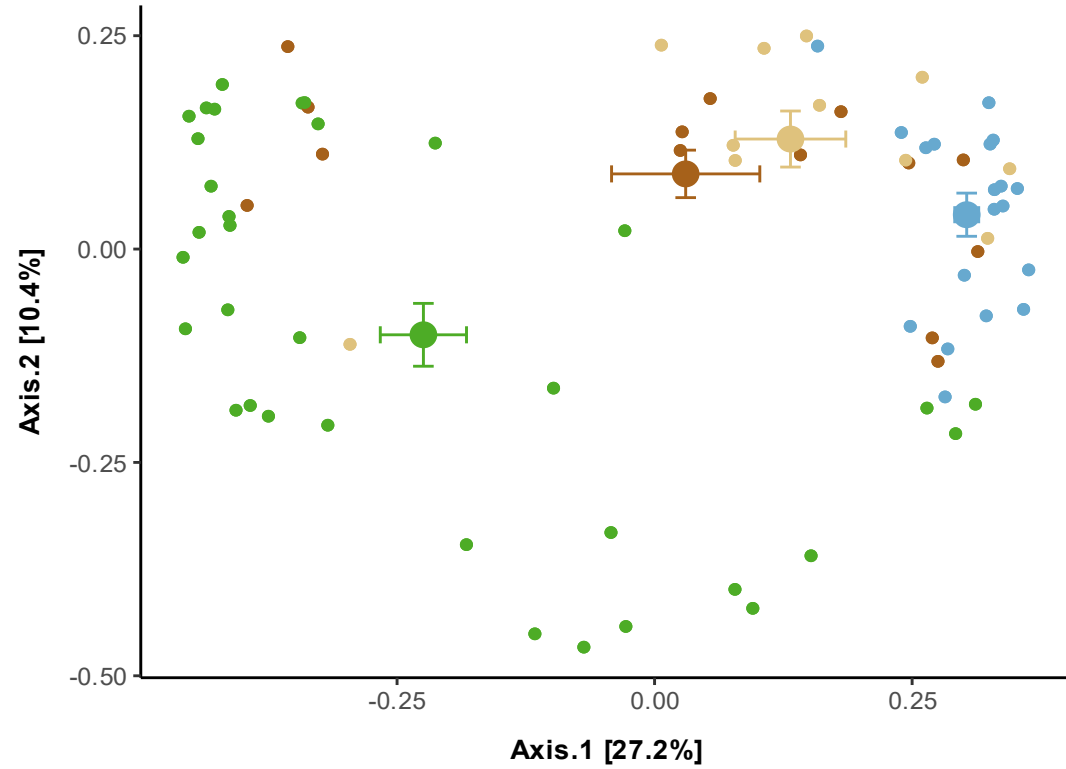
Fungal community composition



Supplement

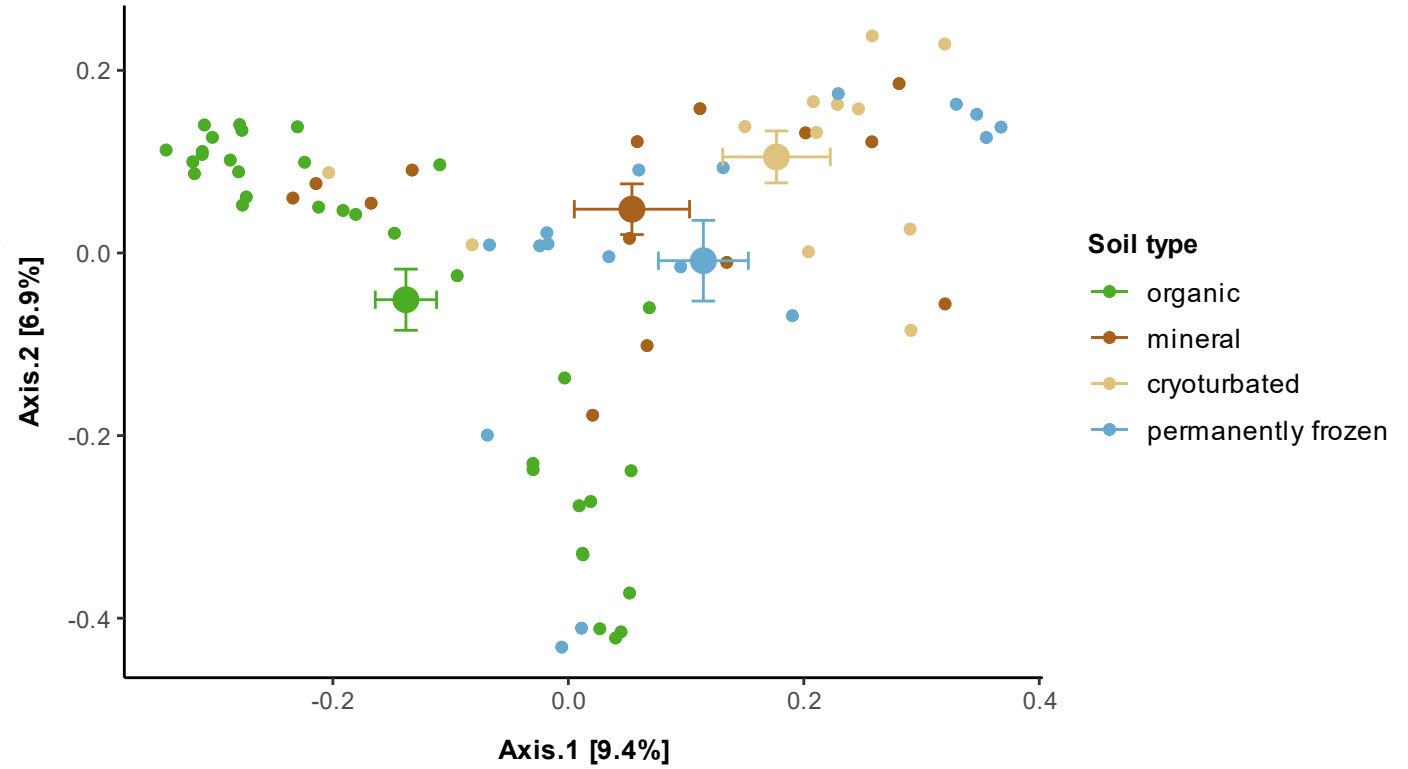


Bacterial/archaeal community composition



PERMANOVA (Bray-Curtis)
Soil type: $p = 0.001$ ***

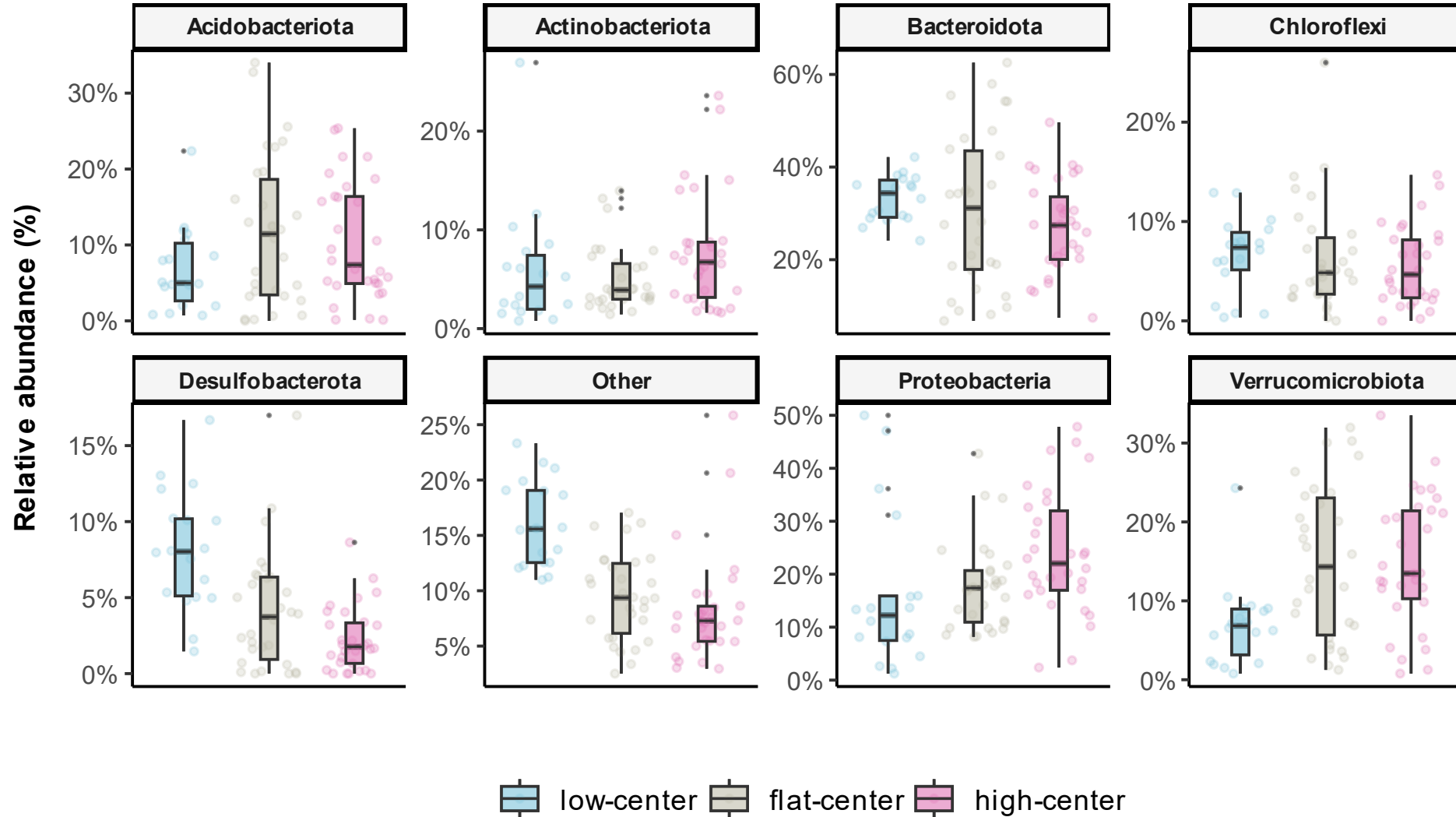
Fungal community composition



PERMANOVA (Bray-Curtis)
Soil type: $p = 0.001$ ***

Supplement

Top phyla by polygon type



Supplement

Top phyla by soil type

