Cryptogamic cover determines soil attributes and functioning in polar terrestrial ecosystems

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We still lack studies that provide evidence for direct links between the development of soil surface cryptogamic communities and soil attributes and functioning. This is particularly true in areas free of potentially confounding factors such as different soil types, land uses, or anthropogenic disturbances. Despite the ecological importance of polar ecosystems and their sensitivity to climate change, we are far from understanding how their soils function and will respond to climate change-driven alterations in above- and belowground features.

We used two complementary approaches (i.e. cover gradients in the forefront of retreating glaciers as well as long-time deglaciated areas with well-developed cryptogamic cover types) to evaluate the role of cryptogams driving multiple soil biotic and abiotic attributes and functioning rates in polar terrestrial ecosystems.

Increases in cryptogamic cover were consistently related to increases in organic matter accumulation, soil fertility, and bacterial diversity, but also in enhanced soil functioning rates in both sampling areas. However, we also show that the ability to influence soil attributes varies among different polar cryptogamic covers, indicating that their differential ability to thrive under climate-change scenarios will largely determine the fate of polar soils in coming decades.