



**Project acronym:** BioSoCr

**Project title:** Biological soil crusts in polar cold desert biomes

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**Discipline:** Earth Sciences & Environment: Ecosystems & Biodiversity

**Station(s):** Czech Arctic Research Station (Svalbard/Czech Republic)

Biological Soil Crusts (BSCs) dominate primary production and ecosystem functions in high Arctic cold deserts and are the first colonizers of exposed soils after glacial retreat. Despite their prominent role as ecosystem engineers, our understanding of the factors regulating their diversity, composition and functioning remains incomplete. Recent studies revealed that the geochemical characteristics of the underlying substrate appear to exert a strong selective force on the composition of polar BSCs, but large-scale studies covering broad geographic ranges to confirm this are still lacking. This prevents region-wide upscaling to assess the role BSCs play in the “Greening of the Arctic”. Here we propose to investigate the effects of bedrock type and related environmental factors on the composition, development and functioning of BSC in Svalbard along transects of developmental stages in glacier forefields. Eight locations in West Svalbard and Nordaustlandet situated on igneous, metamorphic and sedimentary bedrock will be sampled. We will integrate drone-based hyperspectral imaging of the BSCs with HPLC-based pigment analysis and vegetation surveys. The remote sensing data will be further ground-truthed with high-throughput sequencing of taxonomic marker genes to resolve their diversity. Field experiments will be run and combined with shotgun metagenomics to study the N-cycle and the functional potential of BSCs in relation to environmental conditions. These data will be integrated with recently obtained results by the team from Kongsfjorden and an East Antarctic Oasis, which will allow us to develop a bipolar comparison of the biodiversity and functioning of BSCs.