Project acronym: TRANSCLIM

Project title: The effect of warming on the Arctic soil microbiome assessed by soil transfer along an altitudinal gradient and between aspects

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Discipline: Earth Sciences & Environment: Ecosystems & Biodiversity

Station(s): Abisko Scientific Research Station (Sweden)

Our project was conducted at Abisko Scientific Research Station / associated station Latnjajaure. In order to assess the impact of global warming on the Arctic soil microbiome, a soil transfer experiment along an altitudinal gradient and between aspects was established on three nearby mountain summits based on sites from the global change monitoring project GLORIA (GLOBAL OBSERVATION RESEARCH INITIATIVE IN ALPINE ENVIRONMENTS). The main idea is that temperature differences along the transect serve as a proxy for climate change. Three summits along an altitudinal gradient of 700 m were used where the temperature difference between the highest and the lowest summit is approximately 5 °C during the growing season. This corresponds to the degree of warming expected in arctic and alpine regions by the end of this century. Thus, transferring soil along this gradient will allow for investigation of how soil microbial communities react to global warming. The same experiment was established in summer 2016 in the Swiss Alps and data from the Alps will be used in a combined analysis with this experiment. Comparing these two distinct cold determinated habitats (Arctic and Alpine) will additionally yield important insight into microbial ecology in these habitats and enable identification of environmental drivers of microbial community structures. Soil was obtained by digging with a shovel and implanted at the target site in stainless steel pots that are perforated at the bottom with a volume of 1.5 L. We took the first samples from this experiment after one year in 2018 and aim at additional sampling over time after 2 years (for which we apply here for Interact TA) as well as after 5 and 10 years. Temperature loggers were installed to monitor temperature changes between origin and target sites. At each sampling point, we assess bacterial and fungal diversity using 16S rRNA and ITS2 Illumina amplicon sequencing as well as soil physico-chemical parameters and microbial functional parameters such as bacterial growth rates thus linking microbial diversity, function and alteration of biogeochemical cycles in response to warming.