Project acronym: LABSOCS

Project title: Linking Above- and Below-ground communities: Microbial effects on Carbon cycling under changing Tundra vegetation

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Discipline: Earth Sciences & Environment

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

This project seeks to investigate the extent to which mountain birch trees, their rhizosphere processes and ectomycorrhizal symbionts influence ecosystem processes and carbon cycling in the Swedish sub-arctic. It has been predicted that climate change will cause shrubs and trees to advance to higher latitudes and altitudes potentially resulting in net CO2 release from the soil. Previous work in the Abisko area found that there was a higher rate of carbon turnover in the forest than in the adjacent tundra. However, it is unknown to what extent carbon turnover rates vary within the open mountain birch forests and what influence individual trees have on the soil processes around them.

We aim to understand the spatial variation in ecosystem processes by establishing transects extending radially from the base of individual trees in the open mountain birch forest along which we will use both field and lab based molecular techniques to investigate various soil processes. Furthermore, we will examine the legacy effect of a known browning event in this area 5 years previously. More specifically we will use previous data of this past browning event combined with new measurements and techniques to study how carbon turnover, litter decomposition and mycorrhizal communities have recovered in areas surrounding defoliated and non-defoliated trees.

This work will contribute to a growing body of work in the Abisko area focussing on above and below ground plant-soil interactions and ecosystem processes in a sub-arctic tundra-heath ecotone environment and a global change context.