

Project acronym: LABSOCS

Project title: Linking Above- and Below-ground communities: Could the 'wood-wide-web' destabilise sub-arctic Soil Organic Carbon Stocks?

Project leader: Nina L. Friggens, University of Stirling, UK

Discipline: Earth Sciences & Environment

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

This project seeks to understand the coupling between above-ground and below-ground ecosystem processes in the sub-arctic by investigating several aspects of biogeochemical cycling and the microorganisms which facilitate these cycles. Specifically this work builds on previous evidence of similar soil CO<sub>2</sub> effluxes and root in-growth along established transects suggesting the presence of common mycelial networks in the open mountain birch forests in Abisko. This mycelial network extends substantial distances away from individual trees potentially forming a 'wood-wide-web' throughout the forest.

We will investigate the presence and extent of this mycelial network using stable isotope (<sup>13</sup>C and <sup>15</sup>N) 'pulse-chase' experiments in which we will trace the pulse of stable isotope from tree to tree as well as over large distances within the Abisko mountain birch forest. A key component of this relates to investigating the existence and strength of a 'wood-wide web' of fungal hyphal filaments (mycelia) linking trees and fungi through mycorrhizal symbiosis.

This will be the first time this has been tested in the sub-Arctic, and the implications are profound for forest health, C turnover and stocks both above- and below-ground. Understanding soil and rhizosphere processes at both ecosystem scales as well as fine scales is increasingly urgent in light of global climate change and the predicted vegetation changes such as scrub expansion and treeline advance in Northern high latitude environments with the potential to accelerate climate change.