



Project acronym: SOCRATES

Project title: Soil Organic Carbon Research in Arctic Terrestrial EcoSystems: Digging Deep to Understand Better

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Discipline: Earth Sciences & Environment: Other - Environment

Station(s): Kevo Subarctic Research Station (Finland)

The goal of the project is to assess the properties of organic matter and microbiological activity in the surface organogenic and subsoil mineral horizons of subarctic soils in the representative ecosystems (dwarf-shrub tundra, mountain birch forests, pine stands and mires). The result of the work will be the assessment of storages, composition and resistance to the microbiological transformation of organic matter in the topsoils and subsoils. We'll obtain new data on the characteristics of low-molecular carbon turnover in soils depending on vegetation type and depth. These data will make it possible to assess the impact of climate warming in the subarctic on the carbon cycle, primarily carbon of root exudates and litter. We'll obtain new data on changes in soil microbiological activity depending on the conditions of temperature, humidity, as well as the main characteristics of the soil (pH, nitrogen availability, mineral nutrition content). These data will allow us to predict changes in CO₂ emissions from warming. We hypothesized that (1) despite the low content of organic matter, subsoil has important role in the modern carbon cycle due to complex stabilization mechanism involving rock and microorganisms; (2) microbiological and extracellular enzymes activity in topsoil and subsoil have different temperature sensitivity and these differences can be used to predict the impact of climate change on the carbon cycle in the Arctic soils; (3) the role of the subsoil in the carbon cycle will increase under the climate change. The results of the project will allow us to assess the parameters of the carbon cycle in the soils of the northern ecosystems, depending on climatic parameters and will give a more reasonable forecast of their behaviour in a changing environment. Summary, we'll be able to answer the main question of this project: "Are subsoil horizons just a storeroom or an invisible iceberg in

the carbon cycle in the northern soils?"