

Project acronym: BIOCARSIB

Project title: New biotic and abiotic factors controlling carbon cycle in thaw lakes of western Siberia (in comparison with lakes of NE Europe)

Project leader: Liudmila Shirokova, University of Paul Sabatier, Toulouse, France

Discipline: Earth Sciences & Environment

Station(s): Khanymei Research Station (Russia)

Arctic and subarctic lakes play an important role in the global carbon cycle by burying carbon (C) in sediments and emitting greenhouse gases (GHG) to the atmosphere. Despite the importance of those lakes, the mechanisms and the relative magnitude of storage versus emittance of GHG are unknown for the largest part of arctic regions and thus is an important break in the comprehension of future lakes roles in C cycle (sources or sinks).

The C cycle in thaw lakes is controlled by pattern of dissolved organic matter (DOM) including (i) input of fresh terrestrial OM transported via superficial flow; (ii) processing of DOM in the lake column via photolysis and bio-degradation; (iii) production of exometabolites (phytoplankton, periphyton and submerged macrophytes) and (iv) DOM coagulation, storage in sediments and diffusive flux to water.

The project will use state of the art methods to assess the role of plankton and lake sediments in C cycle of thermokarst lakes, in poorly studied discontinuous permafrost region of western Siberia. The thaw lakes chosen for this study are available by usual car transportation within 10 to 20 km from the Khanymey Research Station. Objectives: 1) study of phytoplankton and bacterioplankton abundance, activity and interaction with DOM of terrestrial (peat) origin. Separation of cultures and their subsequent culturing in GET (Toulouse); examination on-site 2) collection of lake sediments and study of mineral fractions using structural XRD high resolution and STEM analyses. 3) Experimental modelling of lake sediments interaction with DOM of lake water and peat leachates.