

Project acronym: P-Peat

Project title: Understanding Phosphorus cycling in Peatlands under Climate Change

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Discipline: Earth Sciences & Environment

Station(s): Abisko Scientific Research Station (Sweden), Chokurdakh Scientific Tundra Station (Russia)

Phosphorus (P) is an essential element for life that limits productivity in many terrestrial ecosystems. Histosols accumulate a large amount of P due to its high presence of organic matter and adsorption processes, but little is known on the mechanisms that occlude or potentially remove P from old peat layers.

The P-Peat project wants to understand long-term P storage in peatlands, distinguishing and quantifying the role of organic matter cycling vs. inorganic sorption in the long-term stoichiometry. Climate change is increasing microbial activity and decomposition and favoring the thawing of permafrost in arctic and subarctic peatlands, leading to drastic geochemical changes. The unknown consequences of future changes in histosols on P cycle suppose big hurdles that P-Peat will address.

For this purpose, peat cores and samples will be obtained from Abisko (Sweden, discontinuous permafrost) and Chokurdakh (Russia, permanent permafrost). P speciation and multiple geochemical proxies will be measured vs. depth. The composition and structure of the aboveground vegetation will be described and sampled for stoichiometric determination. Water chemistry will be determined. Chemical differences between acrotelm and catotelm will be studied. P-Peat will also compare P cycles between arctic (Chokurdakh) and subarctic mires (Abisko) and active layer vs. permanently frozen peat.

The project intends to develop a theoretical modeling of P cycling for continuous and discontinuous permafrost peatlands. As an outreach, material for general public and scientific community will be produced.