

CarboPerm: An interdisciplinary Russian-German scientific and technological cooperation project on the formation, turnover and release of carbon in Siberian permafrost landscapes

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Permafrost-affected soils of the northern hemisphere have accumulated large pools of organic carbon (OC) since continuous low temperatures in the permafrost prevented organic carbon decomposition. According to recent estimates these soils contain 1670 Pg of OC, or about 3-times the carbon within the atmosphere. Rising arctic temperatures will result in increased permafrost thawing resulting in a mobilization of formerly frozen OC. The degradation of the newly available OC will result in an increased formation of trace gases such as methane and carbon dioxide which can be released to the atmosphere. Rising trace gas concentrations due to permafrost thawing would thereby form a positive feedback on climate warming.

CarboPerm, a 4.5 million Euro project for scientific and technological cooperation, is a joint German-Russian research project funded by the German Federal Ministry of Education and Research. It comprises multi-disciplinary investigations on the formation, turnover and release of OC in Siberian permafrost. It aims to gain increased understanding of how permafrost-affected landscapes will respond to global warming and how this response will influence the local, regional and global trace gas balance.

Permafrost scientists from Russia and Germany will work together at different key sites in the Siberian Arctic. These sites are: the coast and islands at the Dmitry Laptev Strait, the Lena River Delta, and the Kolyma lowlands close to Cherskii. The scientific work packages comprise studies on (i) the origin, properties, and dynamics of fossil carbon, (ii) the age and quality of organic matter, (iii) the recent carbon dynamics in permafrost landscapes, (iv) the microbial transformation of organic carbon in permafrost, and (v) process-driven modeling of soil carbon dynamics in permafrost areas.

The coordination will be at the University of Hamburg (scientific), the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research in Potsdam (logistic) and the Arctic and Antarctic Research Institute in St. Petersburg.

CarboPerm will strengthen permafrost research in underrepresented areas which are hardly accessible to international researchers. The obtained results will improve our understanding of the future development of the sensitive and economically relevant arctic permafrost regions.