



Evolution and genesis of permafrost peatlands in southern limit of cryolithozone in European North-East

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The North-East of the European part of Russia is currently experiencing a degradation of permafrost due to climate warming. Permafrost peat plateaus extending only about 20% of the territory contain almost 50% of stocks of soil organic carbon (Pastukhov & Kaverin, 2013).

Currently in the region extreme southern limit of the permafrost zone with permafrost temperature 0 ... -1 ° C is the far north taiga. Sporadic island permafrost is preserved only in peat plateaus, which are an ideal object for assessing climate change impacts in the event of further thawing of permafrost.

On the basis of the macrofossil, palynological and ¹⁴C data of peat, Holocene evolution and current state of permafrost peatlands were studied in the extreme southern limit of the East European Cryolithozone. Palynological and radiocarbon data provides evidence of the start of peat accumulation in the early Holocene, about 8000 years ago, in the late Boreal (BO-2). Then the accumulation of peat first significantly slowed down, and then almost stopped between 2500-850 years ago. I.e. about 2500 years ago permafrost was aggradated, which manifested itself in the heave of peatland mounds and a sharp decline in peat accumulation due to dry conditions in raised surface peat. There was the formation of permafrost peat plateaus of modern appearance. Fens occurred from the late-modern Subatlantic (SA-3-SA-R) Holocene period, i.e. after the Little Ice Age and the beginning of the small climatic optimum (about 850 years ago), when the permafrost partially degraded, and formed non-permafrost sphagnum bogs. At the same time (SA-3-SA-R), the gradual and slower peat accumulation proceeded.

Vegetation of peat mounds prevents permafrost thawing in the current climate warming. As mounds surface dry out, lichens succeed mosses and bare peat circles are formed. But dry peat has higher insulating properties and prevents from further thawing. Thawing of permafrost peatlands starting from the surface occurs only as their destruct or on condition of hindered surface runoff with possible formation of lakes and fens. A relatively closed hydrological regime of peat plateaus explains widespread peat mounds with permafrost-affected soils – Cryic Histosols (40% of the area). Thus, permafrost peatlands could be considered as rather stable ecological systems.

The study was supported by the RFBR 14-05-31111 and UNDP/GEF ClimaEast 00059042 projects.