

Estimation of carbon pools and depositary functions of permafrost-affected soils of the Russian Arctic

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Chemical composition of SOC determines its decomposability and may affect soil organic matter stabilization rate (Beyer 1995; Ejarque, Abakumov, 2015). This is quite important for understanding variability in SOC pools and stabilization rate in context of changes in plant cover or climate (Rossi et al. 2016). Moreover, ^{13}C nuclear magnetic resonance spectroscopy, which provides detailed information on diversity of structural composition of humic acids and SOM, may also be used to study the SOM dynamics under decomposition and humification processes (Kogel-Knabner, 1997; Zech et al., 1997). This study is aimed to characterize molecular organisation of the humic acids, isolated from various permafrost-affected soils of Yamalregion and to assess the potential vulnerability of soils organic matter in context of possible mineralization processes. Organic carbon stocks for studied area were $7.85 \pm 2.24 \text{ kg m}^{-2}$ (for 0-10 cm layer), $14.97 \pm 5.53 \text{ kg m}^{-2}$ (for 0-30 cm), $23.99 \pm 8.00 \text{ kg m}^{-2}$ (for 0-100 cm). Results of solid-state ^{13}C -NMR spectrometry showed low amounts of aromatic components in studied soils. All studied humic powders are characterized by predominance of aliphatic structures, and also carbohydrates, polysaccharides, ethers and amino acids. High content of aliphatic fragments in studied humic acids shows their similarity fulvic acids. Low level of aromaticity reflects the accumulation in soil of lowly decomposed organic matter due to cold temperatures. Our results provide further evidence of high vulnerability and sensitivity of permafrost-affected soils organic matter to Arctic warming. Consequently, these soils may play a crucial role in global carbon balance under effects of climate warming. This study was supported by the grant of Saint Petersburg State University "Urbanized ecosystems of the Russian Arctic: dynamics, state and sustainable development" and the Government of the Yamalo-Nenets Autonomous District.