9. Comparative study on soil carbon storage of permafrost ecosystems in northeastern Eurasia

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Abstract

Deciduous conifer genus *Larix* forest ecosystems in northeastern Eurasian continent are characterized by severe continental climate, with very low annual precipitation less than 400 mm and wide temperature difference. These larch forest ecosystems are also unique biome because of locating on continuous permafrost. We examined soil carbon storage regime in larch ecosystems located on continuous permafrost region, including 24 profiles in eastern Siberia and 11profiles in central Siberia. Soil organic carbon (SOC) storage values had wide ranges and large standard deviations in both eastern and central Siberia. Average SOC storage were 27.4 kgC m^{-3} in eastern Siberia and 12.1 kgC m^{-3} in central Siberia. Average soil C/N ratios in central Siberia (19.8 ± 2.8) showed statistically higher than those of eastern Siberia (14.2 ± 5.9) (Mann-Whitney U test, $p<0.0021$). Most soils in eastern Siberia showed sandy or silty texture and had higher fine earth ratio and organic C contents so that those soils showed large SOC storage values, compare to central Siberian soils that had more gravels derived from weathered old basalt mantle plume. Carbonate carbon (CC) accumulation occurred at most of soils in Yakutian basin area, and also occurred under drought condition such as south-facing slope in central Siberia. Soils at thermokarst topography often showed apparent cryoturbation and alkaline pH in subsoil. No carbonate-C accumulation was found in the forest tundra transition zone in Kolyma lowland. Soil parent material and current climate condition may affect permafrost soil properties in both eastern and central Siberia.