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Title: *Structure and Properties of Peatland Soils in the Bolshezemelskaya Tundra: Bare Peat Circles, Specificities of their Formation and the Ecosystem Role*

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Subarctic terrestrial ecosystems are key components of the global carbon cycle, holding huge amounts of organic in peatland soils and permafrost (Hugelius et al., 2011). Soil cover of permafrost peatlands is rather complicated with bare peat circles characterized by specific soils where surface is affected by cryogenic processes. Bare peat circles, devoid of shrub-moss vegetation, are common patterned ground features of permafrost peatlands of tundra in the Northeast European Russia. The peat circles were studied in a peatland located in the Seida River Basin, Bolshezemelskaya Tundra. Recently, it was found that peat circles in permafrost peatlands are sources of high N2O emission into the atmosphere (Repo et al., 2009; Marushchak et al., 2011). However, despite their widespread occurrence and specific ecological role, specificities of the formation of the peat circles and their soil properties are still underexplored.

According to our data, the formation and existence of bare peat circles are affected by local cryogenic processes (frost heave and cracking) and wind surface erosion impacting the top of the active layer. A common feature for the studied soils is the presence of a specific cryogenic surface horizon without a histic layer. Wind erosion is thought to initially trigger the circle formation. Hydrothermal conditions in permafrost-affected soils of bare peat circles and surrounding vegetated sites are rather different during summer, which results in lower permafrost table under the circles. Taking into account the current and predict prognostic temperature increase in peat soils, it will accelerate microbiological activity and increase the decomposition rate of organic matter and release of greenhouse gases into the atmosphere (Davidson & Janssens, 2006).

Soils of bare circles differ from surrounding upland peat soils with shrub vegetation according to basic physical-chemical properties. Studied surface-cryogenic soils are characterized by a high degree of organic matter decomposition (or humification?) and, therefore, high carbon stocks in active layer due to high bulk density. Absence of vegetation cover on peat circles leads to low content of labile organic compounds.

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