

Impact of surface running fires at boreal forest on soils and soil organic matter

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Boreal forests represent the largest biome of the planet. Boreal forest soils contain significant part of the planetary pool of soil carbon. Forest fires are one of the important factors of forest soil change. Forest fires are a (semi)natural and anthropogenic factor of the ecosystem development. The pyrogenic factor and the climate control the age and mosaic structure of the plant cover, its development, flows of matter and energy. The aim of this work was to characterize disturbances, changes morphological characteristics and organic matter soil under surface running fires with different intensity and during postpyrogenic successions.

The effects of surface fires on soils in various forest types (lichen pine, cowberry-green moss pine, sphagnum pine, blueberry-green moss spruce, green moss larch forests) are estimated. It is shown that pyrogenic effects on the soil of boreal forests are determined by different intensity of fires. Pyrogenic morphological signs are diagnosed in soils even after several centuries after fires. The most common changes in the physical and chemical properties of soils after fires are a decrease in acidity by 1–2 units of pH, an increase base saturation (Dymov et al., 2018). Pyrogenic carbon (PyC) of the upper mineral horizons of the soils is separated in the form of light densitometric fractions (free and occluded organic matter) and has an important diagnostic value. The composition of the densitometric fractions of post-pyrogenic soils is characterized by a narrow C:N ratio, high content of polycyclic aromatic compounds, high aromaticity of the soil organic matter, and high values of the wetting angle (Dymov et al., 2017). Common patterns in the soils of burned forests consists of a sharp decrease in the water soluble organic carbon compounds content in the first post-fire months, and the gradual restoration of their concentrations over time.

Reference:

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