



The effect of high water table on carbon storage in the soil of forest ecosystems in forest-tundra zone of Central Siberia

1 L. Mukhortova

V.N.Sukachev Institute of Forest, SB RAS, Krasnoyarsk, Russia (biosoil@forest.akadem.ru/
Fax: +7 3912-433686)

Northern forests grow on the boundary of forest vegetation spreading under the extreme conditions for tree species. Such ecosystems are unstable because they have very low rate of matter and energy turnover, weak ability of soil and water to natural cleansing and low biological productivity. So some disturbance of ecological equilibrium under these conditions can leads to the irreversible consequences and changes functioning of these ecosystems.

Changes in soil organic matter formation and carbon sequestration across forests influenced by high water table were studied at the forest-tundra of Central Siberia, Krasnoyarsk region, Russia. Four forest plots with different location on relief were selected to study effect of high water table on the soil organic matter pool. In each study plot the stock of forest litter, root material and soil humus were taken into account. Total carbon stock in soil system was divided into the fractions of light-mineralized organic compounds (mobile and immobile) and stable part of soil organic matter.

Total carbon storage in the soil of these forest ecosystems makes up 5.80 –12.59 kgC m⁻² and increases with increasing of soil moisture degree. Forest floor contribution to the total carbon stock can reach from 12.1 to 30.7% and the role of this component in the total carbon storage decreases in 2.5 times from natural well-drained plots to the most flooded plot. Contribution of stable organic compounds to the total carbon

storage makes up from 49.0 to 63.2% and increases in 3 times with increasing of soil moisture. This difference is equal to 5.01 kgC per m². With increasing of altitude decreasing of total soil organic matter storage is observed, and plant residues pool in the soil and contribution of plant residues to the total carbon stock increase.

The results of this research demonstrated that effect of high water table on the forest ecosystems in forest-tundra zone can reflect on the organic matter stock in soil system. It can be mediated by influence on structure of live soil cover and by input of significant amount of plant residues as a result of tree death. And also it can influence directly on the soil conditions, which changes rate and direction of decomposition processes.

This research was supported by the Project 06-04-90596 BNTS_a of the Russian Fund for Basic Research.