

## **Microrelief and vegetation as the factors of spatial redistribution of nutrients in the soils of forest ecosystems**

Olga Chernitsova (1) and Pavel Krechetov (2)

(1) Lomonosov Moscow State University, Department of Geography, Moscow, Russian Federation (olchernitsova@mail.ru) ,

(2) Lomonosov Moscow State University, Department of Geography, Moscow, Russian Federation (krechetov@mail.ru)

The study is aimed at the identifying factors and mechanisms controlling the redistribution of nutrients in the profile of sod-podzolic soils (Umbric Albeluvisols Abruptic in WRB, 2006). The data of chemical analyzes of soil samples of soddy-pale-podzolic soils under mixed coniferous-deciduous forests, picked from the genetic horizons of 28 soil profiles up to the depth of 120-150 cm in the key area with a polygonal-block microrelief (58.39°N, 56.52°E) were used. Soil profiles were placed at the key area considering vegetation and microrelief. Samples were analyzed for humus content, available forms of N, P, K, Ca, Mg and soil texture. Published data on the capacity and the structure of biogeochemical cycling in forest phytocenoses of different ages in the southern taiga were summarized. Field sketches were used for the construction of the digital elevation model of the key area and for plotting the vegetation map showing the crowns' projections of trees and shrubs of different species. Using spatial interpolation in GIS, series of schematic maps were created that characterize the depth of the lower boundary of genetic horizons and their thickness, as well as the texture of the different soil horizons, humus content and distribution of nutrients at different depths. These schematic maps were analyzed for patterns of radial and lateral differentiation of all examined features.

Pronounced textural differentiation of soils of micro-elevations and poor textural differentiation of soil of micro-depressions are revealed. It is shown that in the soils with the positions from micro-elevations through flat surfaces to micro-depressions the humus content in the upper layers (horizon A) increases 1.6-1.7 times, the content of nitrogen – 1.4-1.5, phosphorus – 2.6 8.4, calcium and magnesium cations – 1.8-2.9 times. This differentiation in nutrients' content is coming along with the settlement of more demanding to soil fertility plants in micro-depressions.

Also the bimodal distribution of the available forms of potassium, phosphorus, calcium, magnesium in the soil profile was revealed. The first maximum of nutrients content is detected in the humus-accumulative horizon A, the second – in the illuvial horizon Bt. The eluvial horizons EL are characterized by the minimum values. Considering the thickness of soil horizons, supplies of available forms of phosphorus, potassium, calcium and magnesium were estimated, which are 1.5-2.5 times higher in deeper soil horizons than in the upper ones.

The complex ecological and geochemical structure of forest ecosystems is regulated by both the lateral additional supply of mobile chemical compounds by the surface and subsurface runoff, including melted snow water, as well as the peculiarities of biogeochemical cycling (the age of the forest, the penetration depth of suction roots of various species of trees, the chemical composition of the litter).