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PEDOGEOCHEMICAL CONDITIONS OF DARK CONIFEROUS LANDSCAPES OF CENTRAL PART «STOLBY» RESERVE

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Soil is environment inseparably connected both with animal-plant organisms and directly with human. Studying of geochemical processes occurring in the soil and the identification of causes determining the actual content of chemical elements is topical.

The research on the reserve «Stolby's'» territory goes back to its establishment and was focused mainly on phytocenoses. There have been made enough works studying the soil cover of the Eastern Sayan and the north adjacent steppe. However the soil cover of the north-western spurs have been little researched. The detailed description of the soil cover on the «Stolby» reserve was made by S.A. Kolyago (1961).

The object of the study is the soil cover of the dark coniferous taiga of north-western spurs of the Eastern Sayan. The studied areas absolute heights do not exceed 700-800 m above the sea level. The vegetation of this territory includes dark coniferous taiga with predominance of fir and pine in the forest stand, sometimes cedar and spruce are founded.

The purpose of research is to study the pedogeochemical conditions of the north-western part of the Eastern Sayan.

The catenary method was used to study the basic features of the pedogeochemical structure of the territory and eluvial, transeluvial, transeluvial-accumulative and superaqueous facies were allocated [1].

The description of soils macromorphological properties and soil-forming rocks made during the fieldwork was carried out by the standard method of soils and bedrock investigation [2]. The soil profiles were laid on the test areas in the most typical habitats for this forest type. The soils diagnosis was based on the Classification and diagnosis of Russian soils [3]. The main diagnostic horizons were of hard humus (AO) and dense soil-forming rock whose weathering products provide the soil horizon (BM) formation.

Chemical and physico-chemical properties of soils was determined with common methods [4].

To research soils and parent rock of the north-western part of the Eastern Sayan 2 catenas were allocated: catena 1 at the height 595-657 m which corresponds to the northern slope, and catena 2 – to the southern exposure slope (height interval 595-690 m).

The studied objects belong to the department of structural and metamorphic soils according to the „Classification and diagnosis Russian soisl“ [3]. Soils profile's coloring varies little with the depth and is presented with brown tones. In the most cases horizon AO is in dark brown color and has a lumpy structure. The horizon's depth varies from 5 to 10 cm. The structural-metamorphic horizon lies below and has brown or light brown color, sometimes with ohristym tint. Its depth is from 10 to 20 cm. A large amount of rubble is often found. The soils of thin profile (less than 40 cm) reveal the horizon BMC, which has also a significant gravelly.

Studies of soils formed on the surface of catane 2 eluvial facies (southern exposure, point 1) (see Fig. 1) allowed establishing the formation of cambisols (brown forest soils). These soils are classified as high humus by content of humus. Its amount in the top horizon is 13.0%. By pH aqueous extract value a weak acid reaction is characteristic to cambisols. First the acidity down the profile increases from 5.8 to 4.91, then it decreases to 5.12. The insignificant carbonate content in the profile results from the fulvic acids prevalence in humus and flushing soil water regime appropriate to dark coniferous areas. These soils are not saturated with exchangeable bases, their content increases down the profile. Cambisols are characterized with high content of iron oxides. The maximum number is observed in the lower part of the profile

(1026.46 mg/kg). It can be also explained by a good drainage and the soil average acidity. The soils differ in particle-size distribution. The sandy loam changes into the light loam, and bedrock is presented by sand.

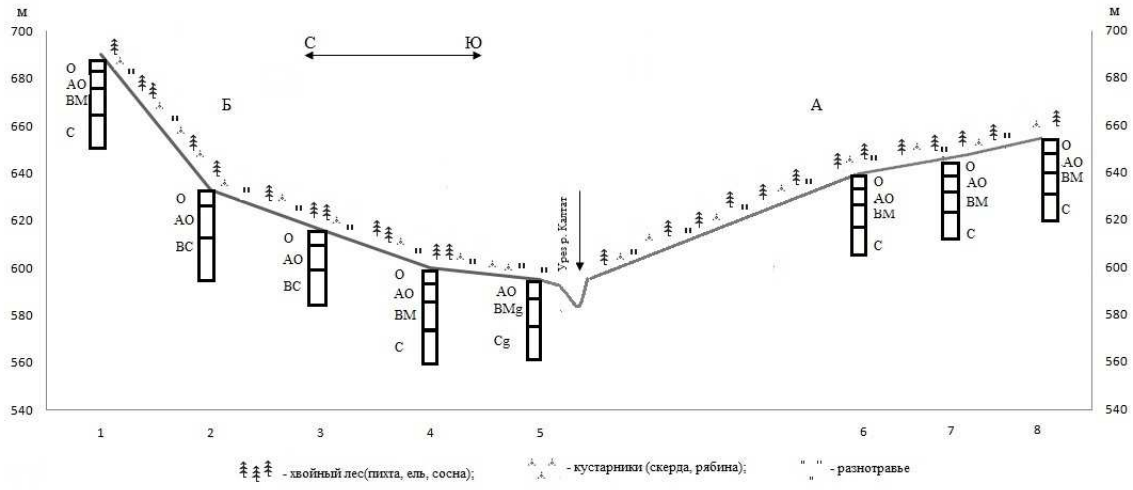

Fig. 1. Landscape-geochemical conjugation: A - catena 1, B - catena 2. Soils: 1 - cambisols; 2 - cambisols; 3 - cambisols; 4 - cambisols; 5 - cambisols gley; 6 - cambisols; 7 - cambisols; 8 - cambisols

Cambisols related to transeluvial facies of catena 1 (northern exposure, point 7) (see Fig. 1), are characterized as high humus (to 15.09% in the AO horizon). By pH of the soils aqueous extract they are characterized as weak acidic and medium acidic ones (4.7 to 5.0). Whereas the acidity grows 4.9 to 4.7 from the horizon AO to BM. Further from the horizon BM to C it decreases to 5.0. Cambisols profiles are characterized with a high content of Fe_2O_3, which goes up 371.8 to 686.4 mg/100 g of soil down the profile in the horizon C. The distribution of Al_2O_3 in the soils profiles is also characterized with descending migration. The particle-size distribution varies in cambisols profiles: from sandy loam to medium loam down to bedrock.

Based on the analysis of physical and chemical properties of gley cambisols being developed on the surface of catena 2 superaqueous facies (southern exposure, point 5) (see Fig. 1), the maximum quantity of total carbon was determined in the horizon AO - 24.1%. The acidity falls 5.83 to 6.46 down the profile. The content of particle-size fractions of soils is different: upper horizon - sandy loam, low - medium loamy. The amount of iron oxides increases to 1036.55 mg/kg downwards the profile to the bedrock. The aluminum oxides content is negligible.

Thus, the studies have shown that the main types of soils formed on the eluvial, transeluvial and transeluvial-accumulative facies are cambisols (brown forest soils), and on the superaqueous facies - gley cambisols (brown forest soils). It is explained by the type of vegetation forming these kinds of soils, climatic characteristics of the area and good drainage autonomous positions. Though the majority of soils experience general primary pedogenic processes - formation of underlay, humification, gleization, Al-Fe-humus process. All soils are rich in humus, highly concentrated in the upper humus-peat horizon. The content of iron and aluminum mobile forms in all the soils studied is high, and they are characterized with a downward migration specified by the flushing water regime.

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