Geoarchaeological study of big Essentuksky 1 kurgan in Ciscaucasia, Russia

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The chrono-sequence of paleosols, buried under different constructions in the big kurgan Essentuksky 1 in Ciscaucasia (Stavropol region), built by people of the Maikop culture in the second quarter of the 4th millennium BC, was studied. The height of the kurgan was 5.5-6 m and diameter – more than 60 m. It had four earthen constructions and three – made of stones. We studied the composition of the material of kurgan's constructions, paleosols buried under four earthen kurgan's constructions and the surface soil on the area adjoining to the kurgan. The macro- and micromorphological observations and set of analytical and instrumental methods were used to study the properties of soils in the chrono-sequence and composition of material from the earthen constructions. According to archaeological data, the kurgan was built for time-span from 25, but not more than 50 years. During this interval, the morphological and physicochemical properties of soils changed, namely, there was a decrease in the thickness of the humus profile and the content of organic carbon, an increase in the content of gypsum, carbon of carbonates, a shift of the area of their accumulation up the profile, and transformation of the forms of carbonate features. The percentage of the exchangeable sodium and magnesium in the composition of exchangeable bases increased and magnetic susceptibility decreased. The most “arid” properties are found in the paleosol buried last in the studied chronological sequence: the humus horizon is the lightest, the profile is most enriched in carbonates, there is the highest content of exchangeable sodium and magnesium in the composition of exchange bases, the lowest magnetic susceptibility and the maximum amount of gypsum in the second meter of the profile. During the indicated time-span of the construction of the kurgan, Haplic Chernozems Loamic changed in Calcic Chernozems Loamic. For the studied time-span, a palynological analysis revealed a decrease in forest area and an increase in the portion of grassy vegetation. In the composition of grasses, there was an increase in the proportion of steppe and xerophytic species. The climate of the studied interval (the beginning of the development of the Maikop culture in the Ciscaucasia) is characterized as drier and hotter in comparison with nowadays. The material for the earthen layers of the kurgan's constructions was taken from the gleyic horizons of the Gleysols (the lowest layer in the first and second constructions) and from the Ah and AhB horizons of the Chernozems (the overwhelming majority of the layers). This study was supported by the Russian Science Foundation, project no. 16-17-10280.