September 5-7, 2021 Gorgan, Iran-Online Conf.

2nd International Conference on Quaternary Sciences

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2nd INTERNATIONAL and 4th NATIONAL Conference on Quaternary Sciences

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Pedostratigraphy of the Kuban loess-paleosol sequences

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Loess-paleosol series (LPS) are the most significant paleogeographic archive containing information on landscape and climatic changes during glacial and interglacial epochs. LPS are widespread in Eurasia and studying them is of great importance for paleoclimatic reconstructions. Our research was carried out in the south of the East European Plain, in the Kuban River valley. In this area, loess-paleosol deposits have been explored since 1960s (Lebedeva, N.A., 1963), the section near the village of Temizhbekskaya is especially well known (Dodonov et al., 2006; Shorkunov, 2011). Our study area is located in a transit position between Siberian, Central Asian loesses and loesses of Eastern and Western Europe, however, it is still poorly studied by modern methods. The research of the LPS in the Kuban River valley is of great meaning for regional chronostratigraphy and study of the patterns of atmospheric transport in the south of the East European Plain. Currently, one of the urgent tasks in studying the Kuban loess area is to clarify the stratigraphic position of specific loess-paleosol horizons of the section according to the existing chronostratigraphic scheme of the East European Plain (Velichko, Morozova, 1915). In addition, a number of questions remain unsolved: the number of paleosols, the absolute age of individual horizons, and the influence of the evolution of the Kuban River on the change in the sources and the rate of sedimentation. To settle these issues, we carried out field work in the central part of the valley where on the right bank of the Kuban river valley a 40 m outcrop was revealed during the survey between Tbilisskaya and Kazanskaya villages (N

45°22'54.055" E 40°19'34.961"). A 25-meter section was studied in the upper part of the natural outcrop. The field study of the Kropotkinsky section included: lithological characteristics of deposits, identification of the stratigraphic units, and description of paleosols, detailed sampling for a set of analyzes (magnetic susceptibility, grain size measurements, micromorphology, OSL and paleomagnetic dating, morphoscopy of sandy quartz grains, etc.). At the moment, the first results have been obtained on the general structure of the units of this section. The upper unit is represented by subaerial deposits consisting of four intervals which correspond to different structure of paleosols and loess horizons separating them (Fig. 1). Thick layers of alluvial sands lie at the base of the section. The section structure from top to bottom in general looks as follows. The upper part of the section is represented by modern anthropogenic disturbed typical chernozem underlain by light yellow loess-like loam which is affected in the upper part by modern soil formation processes.

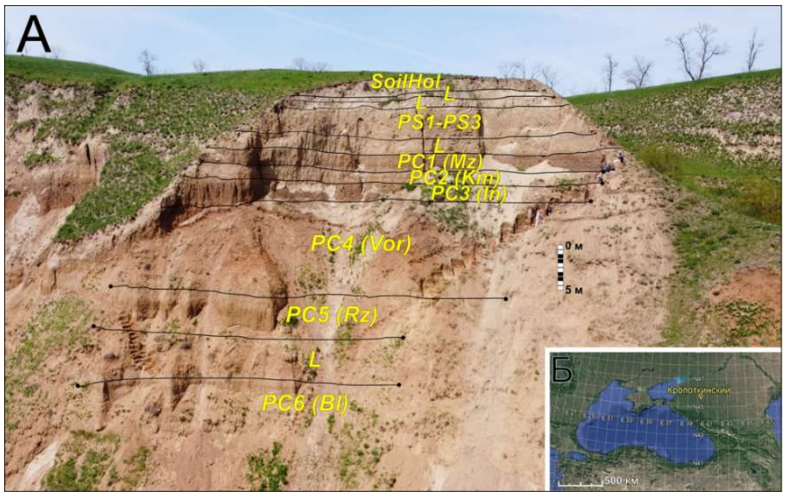

Figure 1. General view of the Kropotkinski section.

The upper interval of the subaerial unit formed during the last glacial period and therefore it is distinguished by a large thickness of loess and the presence of three weakly developed paleosols. Paleosols (PS1-PS3) are represented by the humus horizon A, carbonate BCA with small concretions of gypsum and crotovinas, as well as gypsum in BCS with small carbonate band. In the second interval, there are

three well-developed pedocomplexes (PC) alternating with thin loess layers. Paleosols are brown colored, enriched with carbonates and gypsum. PC1 is dark brown and consists of ACaS horizon with a flattened prismatic structure and gypsum-carbonate AB horizon with a large number of carbonate nodules, massive gypsum roses and biotubules. Two paleosols are clearly defined, separated by loess layer actively affected processed. The general appearance of the pedocomplex and its characteristics make it possible to preliminarily correlate it with the Mezin pedocomplex (MIS 5) of the Eastern Azov loess region (Velichko et al., 2014). PC2 is gray-brown and contains thick humus zones with carbonate nodules and carbonate mycelium. In the lower part of PC2 there are horizontal layers of carbonate nodules alternating with loamy material. These features allow correlating PC2 with the Kamenka pedocomplex of Eastern Azov (MIS 7). The dark brown PC3 has significant thickness and is represented by two horizons: the upper one is heterogeneous, with a large number of carbonate nodules, cutans and gypsum, the lower one is heavy loamy, with a small amount of carbonate mycelium and gypsum concretions. Some fissures are filled with red and dark humus material. PC3, apparently, can be correlated with the Inzhava pedocomplex of Eastern Azov loess (MIS 9). The third interval is represented by a powerful PC4 consisting of 3 paleosols with a characteristic red hue. Paleosols are represented by horizons Acai, ABCaiS, with thick carbonate horizons at the base, in which there are large carbonate structural nodules. The paleosols of this interval are characterized by the presence of slickensides, increased clay content, and platy structure. The striking appearance of the PC4 makes it possible to correlate it with the Vorona pedocomplex of Eastern Azov (MIS 11-15). The fourth interval is represented by two well-developed brown PC5 and PC6 separated by thick loess layers (2-3 m) also affected by soil formation processes. PC5 is saturated with carbonate mycelium and small Mn concretions to the bottom of the layer, and is replaced by loess containing pedotubules and Mn concretions. The position in the section and the general appearance of PC5 allow correlating it with the Rzhaksa pedocomplex (MIS 17). PC6 differs in a dense cuboid structure, a large amount of Mn concretions and carbonate fillings, and it can be related to the Balashov pedocomplex (MIS 19), which should be below the Bruhnes-Matuyama paleomagnetic boundary. Below PC6 there is a thick loess horizon and unit of alluvial sands of 15-20 m. Thus, a thick subaerial stratum is distinguished in the section, consisting of 6 pedocomplexes formed during periods of warming and

loess layers accumulated during glacial periods. The alternation of paleosols and loesses in the section reflects climate changes over the past 800 thousand years. This section is very promising for paleogeographic reconstructions and clarification of the chronostratigraphic scheme of the loess area in the south of the East European Plain. In further work, to clarify the chronostratigraphic chart of the section, a complex of modern laboratory analyzes will be carried out. The study was supported by the Russian Foundation for Basic Research, project 18-55-91010 (paleosol research) and the Russian Science Foundation, project 19-77-10077 (field work).

Key words: Kuban loess region, Loess; Paleosol; Pleistocene; South East European plain.

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