

EGU2020-1897

<https://doi.org/10.5194/egusphere-egu2020-1897>

EGU General Assembly 2020

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The diagenesis of the Bryansk paleosol (MIS 3) in a suffusion micro-depression at the center of the Russian Upland

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A catena of the Holocene soils and interstadial Bryansk paleosol has been studied within a small closed depression in the Kazatskaya Steppe on the Central Russian Upland. This depression is located on the territory of the Central Chernozem Biospheric Reserve named after V.V. Alekhin, Kursk oblast, Russia and presumably originated from suffusion processes. The main objective of the work is to find out how the Bryansk paleosol (final phase of MIS 3) changes under the influence of not only the cryogenesis of the Valdai glaciation maximum (MIS 2), but also Holocene soil formation (MIS 1) under different conditions of the modern microrelief within the studied catena. We studied the macro- and micromorphological characteristics, certain physical and chemical properties of the Bryansk paleosol on one hand and those of the superimposed Holocene soil on another, taking into consideration various conditions of the present-day microrelief. The studied catena is a typical component of the landscape and soil cover structure for watersheds of the Central Russian Upland. On the micro-elevation rising 80 cm above the micro-depression bottom, the Haplic Chernozems are developed, on the slope – the Luvic Chernozems, and at the bottom – the Stagnic Chernozems. The change of the "normal" profile of paleosol of warm interstadial in final phase of MIS 3 started already in the last stages of its formation. The Bryansk soil is heavily deformed by cryogenic processes during the Valdai glaciation maximum (the Vladimir cryogenic horizon, MIS 2). The secondary diagenesis of the Bryansk paleosol is related to the Holocene soil-forming processes. The Holocene soils are superimposed on the Middle Valdai Bryansk paleosol, transforming it in different ways in different sectors of catena. On micro-elevation the Holocene diagenesis is minimal and consists in fragmentation by mesofauna, additional penetration of carbonates in the upper horizon of the paleosol. The micromorphological analysis showed that the fragmentation of soil mass by mezofauna is very significant, humus is abundant in the form of brown spots (organo-mineral complexes), and calcite is completely immersed into the clay fine material. The largest in size but rare grains of sparite have an unusual shape and probably biogenic origin. At the bottom of the micro-depression the Bryansk paleosol is the most transformed, and the entire profile of the Bryansk soil turned into illuvial horizon of the Holocene meadow-chnozem soil. At the micro-level of observation the clay fine material of the Bryansk soil is strongly consolidated (close *c/f* related distribution), has signs of anisotropy: circular, granular and crossstratified b-fabric, the mineral grains are almost invisible and have the dimension of fine dust, very thin Fe- clay coatings in the pores, Fe spots are scattered over the fine clay material, and very characteristic of the presence of many black and sometimes transparent with a black border

cube-shaped minerals (whewellite, weddellite?) which fill plant residues in the pores. This work was supported by the Russian Foundation for Basic Research; project N 19-29-05024 mk.