



SAPIENZA
UNIVERSITÀ DI ROMA



34TH IAS

INTERNATIONAL
MEETING OF SEDIMENTOLOGY
ROME
10 - 13 SEPTEMBER 2019

*"SEDIMENTOLOGY TO FACE SOCIETAL CHALLENGES
ON RISK, RESOURCES AND RECORD OF THE PAST"*



CONFERENCE PROGRAM

ISBN 978-88-944576-4-3

Loess-sandy-soil series of Bryansk region (Russia) as an archive of paleoecological information

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The more studied and widespread Late Pleistocene soil in the East European Plain refers to the climate warming 32-24 kyr BP called Bryansk interval (Paudorf, Shtillfrid "B", etc.). Often this soil is covered by loess and modern (Holocene) soils in the loess-sandy-soil series. Late Valdai (Wurm) loess are heterogeneous and are separated by humic or gley horizons in many stratigraphic sections. The existence of paleosols levels with different characteristics is evidence of periods with relatively mild climatic conditions or interstadials of the final stage of the Late Valdai glaciation. Another interesting feature of these deposits is the presence of thick sandy loess strata, which recorded the cryogenic deformations. Thus, the aim of this study is to clarify the regional climate conditions on Late Glacial-Holocene boundary for the Bryansk region, based on the studying of buried soil properties in the loess-sandy-soil series. Studied sandy-loess sediments contain two sinlithogenic soils. The radiocarbon dates for these soils are 16500 ± 230 BP (Ki-17414) and 12930 ± 170 BP (Ki-17413), which correspond to the last stage of Valdai glaciation and reflect two interstadials corresponding to Lascaux and Belling interstadials (Wurm IV) and MIS2. Both soils have a number of common traits: gleying profile, iron accumulation, the presence of iron-manganese concretions, lower values of the magnetic susceptibility and increase in humus, organic phosphorus and calcium carbonate content. Among the interstadial soils after Bryansk interval (younger than 24 kyr BP) there is well known Trubchevsk humus horizon (gleying level) and dated 16.5-15 kyr BP (Lascaux interstadial, Wurm IV). The horizon is described as a weak brown level with silty loam composition, carbonates and organic stains along the pores, inclusions of sandy material. There are also signs of waterlogging: ferrugination spots and grayish tint in this horizon. The results of carbon isotopic composition of organic matter indicate a moderately humid conditions of paleosol and underlying sediments formation ($\delta^{13}C = -25.6-26.7\text{‰}$). It also points to the arid climate ($\delta^{13}C = -23.1-24.5\text{‰}$) during the subsequent accumulation of loess loam horizon overlying the paleosol. This loess layer was probably formed during the Yaroslavl cryogenic stage of the Valdai glaciation 13-14 kyr BP. Buried soil with age 12930 ± 170 BP (interstadial Belling) lies in the sediments and has a deformed character, stands out in the lenses of humified loam material between ferruginate sandy layers. Drier conditions are illustrated by the results of the carbon isotopic composition of organic matter ($\delta^{13}C = -24.9\text{‰}$) and the high content of calcium carbonate (39.1%). Thus, the interstadial Belling is characterized by drier climate than Lascaux Interstadial (Trubchevsk Interstadial). The most lightweight carbon isotope composition ($\delta^{13}C = -28.4-29.5\text{‰}$) measured for the Holocene second humus horizon (2180 ± 60 BP Ki-17415, 1650 ± 60 Ki-18775). Chernozem under meadow vegetation with C-3 type of photosynthesis on this area of modern gray forest soils was formed. Accumulation of stable highly condensed molecules of organic matter in the second humus horizons of modern soils, apparently, is a relic of the chernozem soil formation stage. This work was supported by the RSF (grant № 17-14-01120)