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Rock magnetic characteristics of loess-soil series in the Azov region (Beglitsa and Chumbur-Kosa sections)

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Introduction. The Beglitsa and Chumbur-Kosa sections are located in the Eastern Azov region. Here, in the coastal cliffs of the Azov Sea, loess-soil series of the south of the Russian border, formed in the middle and late Pleistocene, are exposed. The Beglitsa loess-soil section is a stratotype of the Late Pleistocene LPS of the region (Konstantinov et al., 2018). Here, two developed paleosols MIS-5c and MIS-5e, dense liss soils MIS-4 and MIS-3, as well as the poorly developed paleosol MIS-3 are reached (Velichko et al., 2017). In the Chumbur-Kosa section, a thick thickness of the LPS of the Upper and Middle Pleistocene is revealed, where 4 PCs are distinguished, which correspond to the interglacial epochs MIS-5, MIS-7, MIS-9 and MIS-11 (Chen et al, 2022). The thickness of these sections is about 20 meters.

Methods. In the sections of Beglitsa and Chumbur-Kosa, 13 and 22 oriented blocks measuring 10x10x15 cm were visible, representing all the loess horizons and pedocomplexes exposed in the studied finds. Oriented cubic fragments measuring 2x2x2 cm were cut from the blocks, which corresponds to 160 and 128 pieces for the Beglitsa and Chumbur-Kosa sections. For rock magnetic studies, a pilot collection of 10 pieces (5 from each section) was studied, consisting of various soil and loess horizons of the Beglitsa and Chumbur-Kosa sections. To measure the temperature dependence of magnetic susceptibility (kT) and the anisotropy of magnetic susceptibility, visit the laboratory of the Institute of Physical Sciences of the Russian Academy of Sciences (MFK-1, AGICO). Coercivity spectrometer J-meter (KFU), used to measure normal magnetization and coercivity characteristics. The 32 measurement (10 samples for Beglitsa and 22 samples for Chumbur-Kosa) of determination around V = 1 cm3 was studied with a continuous increase in the external magnetic field (in a maximum field of 1.5 T).

Results. Based on the results of the temperature dependence of magnetic susceptibility, it can be concluded that magnetite is the main carrier of magnetic susceptibility (Curie temperature (Tc) = 580°C) with a smaller contribution from the hematite component. Most examples of bending use a heating curve around 520–550°C, which is presumably due to the Hopkinson effect. It is also worth noting that all samples have a very weak magnetic susceptibility, which can have a negative impact on the use of magnetic methods in these conditions. Based on the results of hysteresis parameters obtained as a result of measurements on the J-meter coercivity spectrometer at KFU, the following were obtained: 1. values of inductive magnetization Ji, residual saturation magnetization Jrs, saturation magnetization of ferromagnets Jfer, magnetization of paramagnets Jpar). 2. Coercivity characteristics (coercivity Vs and residual coercivity Bcr). 3. Various biparametric rock magnetic characteristics. The obtained data on the anisotropy of magnetic susceptibility indicate that the magnetic texture of the loess-soil deposits of the Beglitsa and Chumbur-Kosa reference sections is probably deformed and secondary, and the resulting formations are not suitable for paleowind reconstruction. Based on the results of the rock magnetic work, it can be noted that the main magnetic mineral in the Beglitsa and Chumbur-Kosa sections is magnetite with a minor contribution of the hemagite component. Using Day plot, it was determined that the images of the lower sections were viewed in the same zone (very close to each other), which indicates a slight difference in the sizes of the magnetic particles. The concentration of magnetic particles is very low (visible on the kT curve), the susceptibility is very weak, which allows us to assume that it is not possible to reconstruct the directions of paleowinds from these sections.