

Late Pleistocene–Holocene Geological History of the Danube–Dniester Shelf (Northwestern Black Sea)

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Introduction

The Late Pleistocene–Holocene geological history of the Danube–Dniester shelf was closely related to Black Sea level changes. The Black Sea postglacial transgression had an oscillating character with several regressions reflected in the sedimentation (Nevesky, 1967; Fedorov, 1982; Ivanov and Shmuratko, 1982). The present project is aimed at developing a spatial-temporal model of the Late Pleistocene–Holocene formation of the Danube–Dniester shelf, covering the last 30 kyr.

Methodology

Geological, geomorphologic, and paleobiological methods were jointly used as the basis for mapping ancient coastlines and reconstructing transgressive-regressive sea-level changes. These methods were dealt with in previous publications (Arslanov et al., 1982; Voskoboynikov et al., 1982).

The maps were based on detailed geomorphic surveys and numerous geological cross-sections, which were carried out by “ChernomorSRIproject” Geological Enterprise (V. Karpov) and the Odessa National University (I. Sulimov, V. Voskoboynikov, and G. Ivanov).

Ancient wave accumulation landforms (coastal barriers), as well as landforms not directly related to wave accumulation (the ooze-like sedimentation basins) were identified with the use of geomorphic methods.

Lithofacies complexes and their altitudinal positions were identified based on lithological and faunal evidence. Coastline position during the various transgressive and regressive sea-level stages was identified based on the spatial correlation of these complexes.

Paleogeographical cross-section maps for geomorphic and stratigraphically isochronous surfaces were plotted with the use of GIS-based modeling.

Results

We reconstructed the Late Pleistocene–Holocene history of the Danube–Dniester shelf and plotted a series of paleogeographic cross-section maps.

The areas of Pontic age watershed plateaus, paleo river beds, alluvial fans, as well the complexes of Upper Pliocene and Pleistocene terraces were identified. The reconstructed positions of coastlines show the successive emergence, development, and fossilization of several coastal areas in the course of the transgressive rise of Black Sea level. Continental loess-like formations are identifiable amongst the marine bottom sediments. The outcrops of Karangatian marine Upper Quaternary sediments are detectable both in the Danube–Dniester coastal area and the adjacent shelf, and, in fragments, on the ancient watersheds.

Paleogeographical cross-section maps show the lithofacies pattern and the coastline position during the Neoeuxinian, Bugazian, Kalamitian, and Dzhemetinian stages, as well as the present-day situation.

References

- Arslanov, Kh.A., Balabanov, I.P., Gey, N.A., Izmailov, Ya.A., Ostrovsky, A.B., Skiba, S.I., and Skryabina, N.G. (1982). Metody i rezul'taty kartirovaniia i geokhronologicheskoi priviazki drevnikh bere govykh linii na sushe i shel'fe Chernomorskogo poberezh'ia Kavkaza i Kerchensko-Tamanskogo raiona [Methods and results of mapping and geochronological attribution of shorelines on the mainland and shelf of the Caucasian coast of the Black Sea and Kerch-Taman area]. In *Kolebaniia urovnia morei i okeanov za poslednie 15,000 let* [Sea and Oceanic Level Fluctuation for 15,000 Years], P.A. Kaplin, R.K. Klige, and A.L. Chepalyga, eds, pp.144–150. Nauka, Moscow. (In Russian)
- Fedorov, P.V. (1982). Poslednikovaya transgressiya Chornogo moria i problema izmenenij urovnya okeana za poslednie 15,000 let [Post-glacial transgression of the Black Sea and the problem of the ocean level changes for the last 15,000 years]. In *Kolebaniia urovnia morei i okeanov za 15,000 let* [Sea and Oceanic Level Fluctuation for 15,000 Years], P.A. Kaplin, R.K. Klige, and A.L. Chepalyga, eds, pp.151–155. Nauka, Moscow. (In Russian)
- Ivanov, G.I., and Shmuratko, V.I. (1982). Ob osobennostiakh kolebaniu urovnia Chernogo moria v poslednikovoe vremya [Peculiarities of Post-Glacial Black Sea level oscillations]. *Vodnye resursy* 3:139–146. (In Russian)
- Konikov, E., Likhodedova, O., and Pedan, G. (2007). Paleogeographic reconstructions of sea-level change and coastline migration on the northwestern Black Sea shelf over the past 18 ky. *Quaternary International* 167–168:49–60.
- Nevesky, E.N. (1967). *Processi osadkoobrazovaniia v pribrezhnoi zone moria* [Sedimentation Processes in the Coastal Area]. Nauka, Moscow. (In Russian)
- Voskoboynikov, V.M., Rotar', M.F., and Konikov, E.G. (1982). Sviaz' ritmichnosti stroeniia tolsch golotsenovikh otlozhenii Prichernomorskikh limanov s kolebatelnim rezhimom urovnia Chernogo moria [Connection of the rhythmicity of Holocene sediments of Black Sea limans with oscillations of the Black Sea level]. In *Izmeneniia urovnia Chernogo moria* [Changes of the Black Sea Level], P.A. Kaplin, ed., pp.264–274. MGU, Moscow. (In Russian)