

Onshore-offshore lithostratigraphic correlation of the Paleogene in Northeastern Bulgaria based on 3D modeling

Литостратиграфска корелация на Палеогена от сушата и акваторията в Североизточна България на базата на 3D моделиране

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The Paleogene sedimentary rocks in the north-easternmost part of the territory of Bulgaria, comprising parts of the onshore and offshore sector of the Moesian platform, have been established only by means of boreholes. On the basis of the primary lithological data from the geological reports (kept in the National Geologic Fund, the Bulgarian Ministry of Energy) we recognized seven lithostratigraphic units: Komarevo Fm (Datchev, 1975; Aladžova-Hrisčeva, 1990; Thanetian), glauconitic marker (early Early Eocene), Beloslav Fm (Gočev, 1933; Aladžova-Khrisčeva, 1984; Early Eocene), Dikilitash Fm (Gočev, 1933; Aladžova-Khrisčeva, 1984; Early Eocene), Aladan Fm (Gočev, 1933; Aladžova-Khrisčeva, 1984; Early Eocene), Avren Fm (Gočev, 1933; Dzurarov, Darakchieva, 1986; late Early Eocene–Late Eocene), and Ruslar Fm (Zlatarski, 1927; Aladžova-Chrisčeva, 1991; Oligocene). The purpose of our study is to conduct an onshore-offshore lithostratigraphic correlation based on 3D modeling by involving data from 338 onshore and 4 offshore boreholes (Fig. 1).

The variety of the lithological features and the characteristics of the boundaries of the recognized lithostratigraphic units allowed us to visualize them by using different approaches. The Komarevo Fm, glauconitic marker, and Aladan Fm, showing distinct lithological features and sharp boundaries, are represented as separate bodies. The Beloslav and Dikilitash Fms, characterized by similar lithology and indistinct boundary between them, are shown as a unified body, while the great lithological variety of the Avren and Ruslar Fms gave us an opportunity to subdivide both of them into three distinct packages shown as separate bodies (Fig. 2).

All the units demonstrate constant lithological characteristics throughout the area of their distribu-

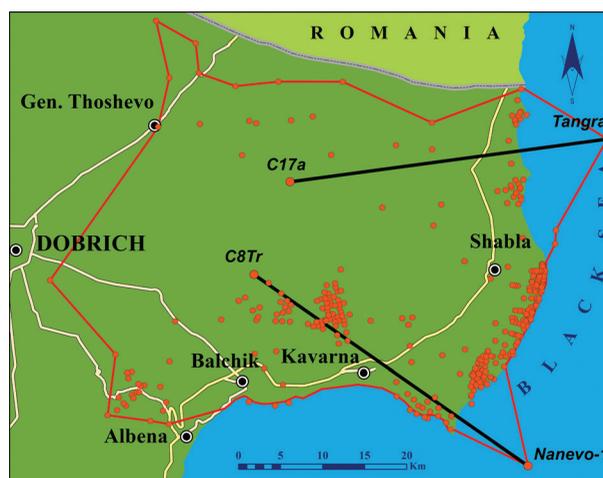


Fig. 1. Locality of the onshore and offshore borehole sections in NE Bulgaria used in the 3D modeling. The red polygon is the boundary of 3D modeling area, the black lines show the location of the lithostratigraphic sections given on Fig. 2.

tion, as the thickness of most of them shows a distinct trend passing from northwest to southeast. The lowermost formal units (Komarevo, Beloslav and Dikilitash Fms) have a tendency to decrease slowly their thickness and (with exception of the Komarevo Fm) they are missing in the coastal onshore and offshore sections. The glauconitic marker is presented in separate onshore areas as well as in the south offshore sections, but its small thickness (usually ~1 m) is an obstacle to visualize it on scale. The Aladan Fm demonstrates the most stable spatial characteristics – it is the widespread amongst the Paleogene units, as in the northern part of the studied area its thickness increases gradually to the east and southeast, while in the southern part

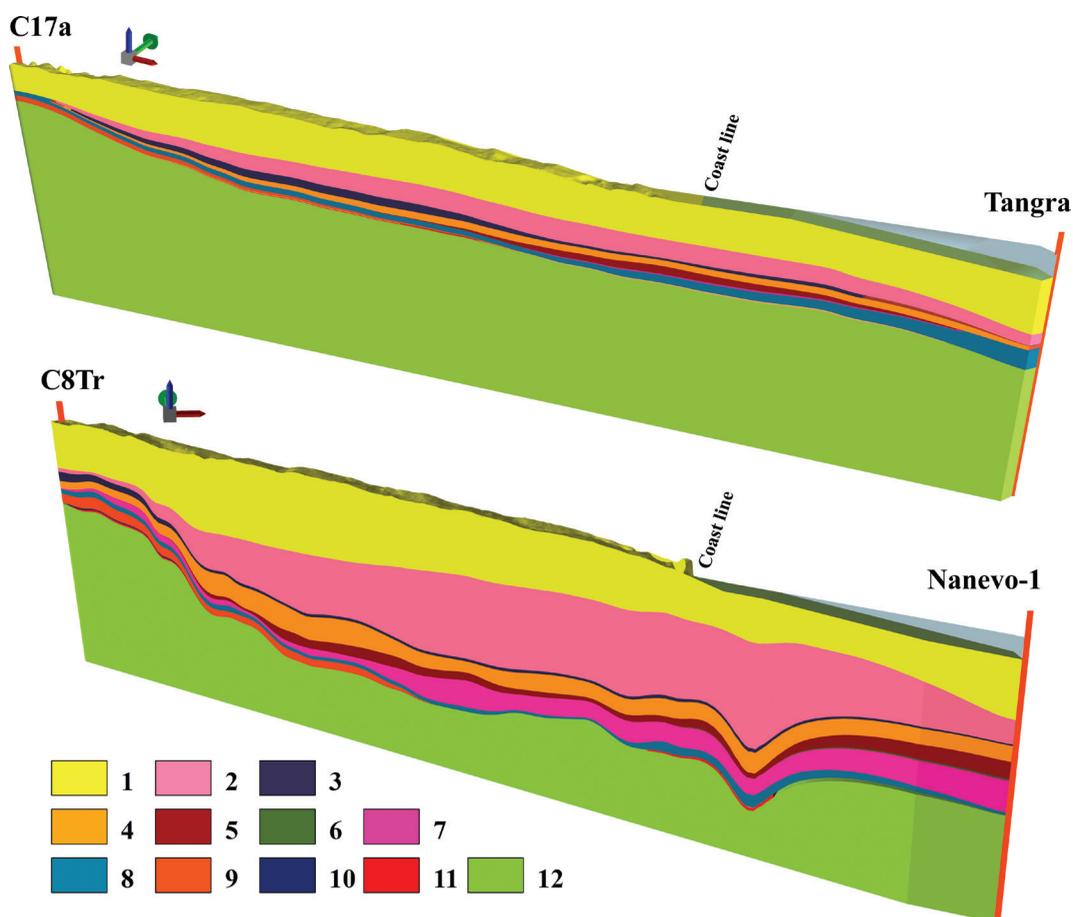


Fig. 2. Two sections showing the spatial distribution of the Paleogene lithostratigraphic units: 1, cover (Neogene); 2–4, Ruslar Fm (2, sandy-clayey package; 3, marly package; 4, clayey-sandy package); 5–7, Avren Fm (5, marly package; 6, clayey package; 7, marly limestone package); 8, Aladan Fm; 9, Dikilitash and Beloslav Fms; 10, glauconitic marker; 11, Komarevo Fm; 12, base (Mesozoic to Paleozoic)

it is almost constant with exception of the offshore area close to Kaliakra Cape. In the northern part of the studied area, the Avren Fm was recorded mainly in the onshore sections as it is represented by the marly limestone and marly packages, whose thickness increases gradually to the south. In the southern part both packages are present, as their thickness increases gradually to the east. The clayey one was established in the south-easternmost area only (both onshore and offshore). The Ruslar Fm is represented by its three packages in the whole studied area with the exception of the northernmost offshore locality, as its thickness increases generally to the southeast in the onshore sector. The offshore sections reveal gradual decreasing of the thickness.

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