Sea-level changes and lithological architecture of the Paleocene-early Eocene sediments of the western Crimean basin, Ukraine

Margarita A. Khoroshilova[1], E.A. Shcherbinina[2]
[1] Geological Department of the Moscow State University (horoshilova@gmail.com)
[2] Geological Institute of the Russian Academy of Sciences, Moscow, Russia

During the Paleogene time, sedimentary basin of the western Crimea, Ukraine was bordered by land of coarse topography, which occupied the territory of modern first range of the Crimean Mountains, on the south and by Simferopol uplift on the north and displays a wide spectrum of shallow water marine facies. Paleocene to early Eocene marine deposits are well preserved and can be studied in a number of exposures. Correlated by standard nannofossil scale, five exposures present a ~17 Ma record of sea-level fluctuations.

Danian, Selandian-Thanetian and Ypresian transgressive-regressive cycles are recognized in the sections studied. Major sea-level falls corresponding to hiatuses at the Danian/Selandian and Thanetian/Ypresian boundaries appear as hard-ground surfaces. Stratigraphic range of the first hiatus is poorly understood because Danian shallow carbonates are lack in nannofossils while accumulation of Selandian marl begins at the NP6. The second hiatus ranges NP9 - NP10 nannofossil zones.

The Danian cycle is built up of rudstones and shows minimal depth of the Paleocene basin. Second cycle is composed of Selandian packstone and wacke-packstone, Thanetian mud-wackestone, mudstone, wackestone, packstone, wacke-packstone and corresponds to maximal deepening related to a new transgression during which the sea depth evidently exceeded a hundred meters in the middle Thanetian. Ypresian cycle made up of floatstone, mudstone, wackestone, pack-wackestone, mud-wackestone displays relatively lower depth and tends to be shallower upsection culminating by nummulitic limestone.

Analyses of the lithological features, $CaCO_3$ content, siliciclastic compound and variations in calcareous nannofossil abundance give an opportunity to reconstruct sea-level fluctuations of lower (4th) order for the Paleocene-Early Eocene interval. Selandian-Thanetian cycle displays two peaks of major sea-level highs in the upper part of NP6 zone (mudstone) and in the middle NP8 zone (pack-wackestone, wackestone) inferred from higher $CaCO_3$ concentrations, higher abundance of nannofossils and lower amount of siliciclastic material. Maximal depth of the basin was reached during this last short transgression (NP8 nannofossil zone).

In the lower part of the Ypresian cycle, $CaCO_3$ increase related to high nannofossil abundance is observed coherently with reduced amount of siliciclastic compound that marks transgressive pulse culminated in the upper NP12 zone (mudstone) and followed by long-termed slow regression. Frequent sea-level fluctuations of the fourth order which minima are marked by rhythmic intercalations of nummulite-bearing layers complicate this regressive trend during Ypresian cycle.

Such a lithological record of sea-level fluctuations in the western Crimean basin generally is in good agreement with the sea-level trend in the whole area of northeastern Peri-Tethys, the occurrence of thick upper Ypresian nummulitic limestone related to long-termed sea-level lowstand is the only specificity of early Paleogene Crimean basin.