Nannofossils in Paleogene sediments from the Madzarica site in the Ovče Pole Basin, Republic of Macedonia

Нанофосили в палеогенски седименти от находище Маджарица в Овчеполския басейн, Република Македония

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Kew words: nannofossils, Paleogene sediments, Ovče Pole Basin.

Introduction

The site Madzarica belongs to the Ovče Pole Basin (Republic of Macedonia). The Ovče Pole Basin is a large Paleogene sedimentary basin with NW–SE trend that is superimposed on varied older rocks in the eastern part of the Vardar Zone on the territory of the Republic of Macedonia (Fig. 1). First data for Late Eocene (Priabonian) age of the Ovče Pole basin, based on gastropods, bivalves, corals, and nummulitids, were given by Maksimovič et al. (1954). Later, Stojanova (2008), Stojanova et al. (2012, 2014), and Valchev et al. (2013), based on foraminifers also confirmed the Upper Eocene–Oligocene range of the sediments.

This study aims to achieve a further understanding of the age of the Paleogene sediments from the Ovče Pole Basin by means of nannopaleontological examination of calcareous nannofossils.

Geological setting, materials and methods

According to the current knowledge, the Paleogene sediments of the Ovče Pole Basin are nearly 3.5 km thick. In terms of their lithology, these rocks are developed in flysch succession that can be sudivided into 4 units: basal unit, lower flysch unit, unit of yellow sandstones and upper flysch unit. Our work was focused on the upper flysch unit, which is 1500–2000 m thick. For the purposes of this study, the Madzarica section, which is located at 3 km SE of the village of Karaorman, was sampled. A total of 18 samples were collected from approximately 65 m thick sequence of alternating rhytmic clayey-carbonate-limestones-sandy sediments, and positive results for the nannofossils from the clay-marly-carbonate sedimentary layers were obtained. The nannofossil sampling in the Madzarica section was made on every 3 meters. The overall procedure for allocating the nannofossils was performed with standard processing methods, which include microscopic preparations with Canada balsam. Paleontological determination were made under JENAPOL-d light microscope with magnification ×2000.

Results and discussion

The nannofossil studies of the sediments from the upper flysch unit of the Madzarica section were found to be positive for samples 1, 6, 7 to 18. Nineteen calcareous nannofossil species were determined in thirteen samples. The nannofossil forms are well-preserved, and the obtained nannofossil association (samples from 7 to 18) is represented by the following species: *Coccolithus pelagicus* (Wallich), *Reticulofenestra bisecta* (Hay, Mohler and Wade), *Zygrhablithus bijugatus* (Deflandre), *Lanternithus minutus* Stradner, *Lanternithus simplex* Bown, *Cyclicargolithus floridanus* (Roth & Hay), *Clausicoccus subdistichus* (Roth & Hay), *Pontosphaera multipora* (Deflandre), *Pontosphaera versa* (Bramlette & Sullivan), *Cyclicargolithus abisectus* (Muller), *Cyclicargolithus floridanus* (Roth & Hay), *Helicosphaera clarissima* Bown, *Helicosphaera compacta* Bramlette & Wilcoxon, *Reticulofenestra lockeri* Müller, *Nannotetrina cristata* (Martini), and *Discoaster nodifer* (Bramlette & Riedel). By analyzing the stratigraphic position of individual species of nannofossil association, the Madzarica section suggest the presence of the nannoplankton biozone NP 20 (Martini, 1971), and the sediments belong to the Upper Eocene. In the samples 1, 6 and 7 of the Madzarica section, some Upper Cretaceous nannofossils were also found: *Eiffellithus eximius* (Stover), *Watznaueria barnesiae* (Black), and *Nannoconus* Kamptner. The latter seem to be resedimented into the Paleogene sediments from the surrounding cretaceous cliffs, during

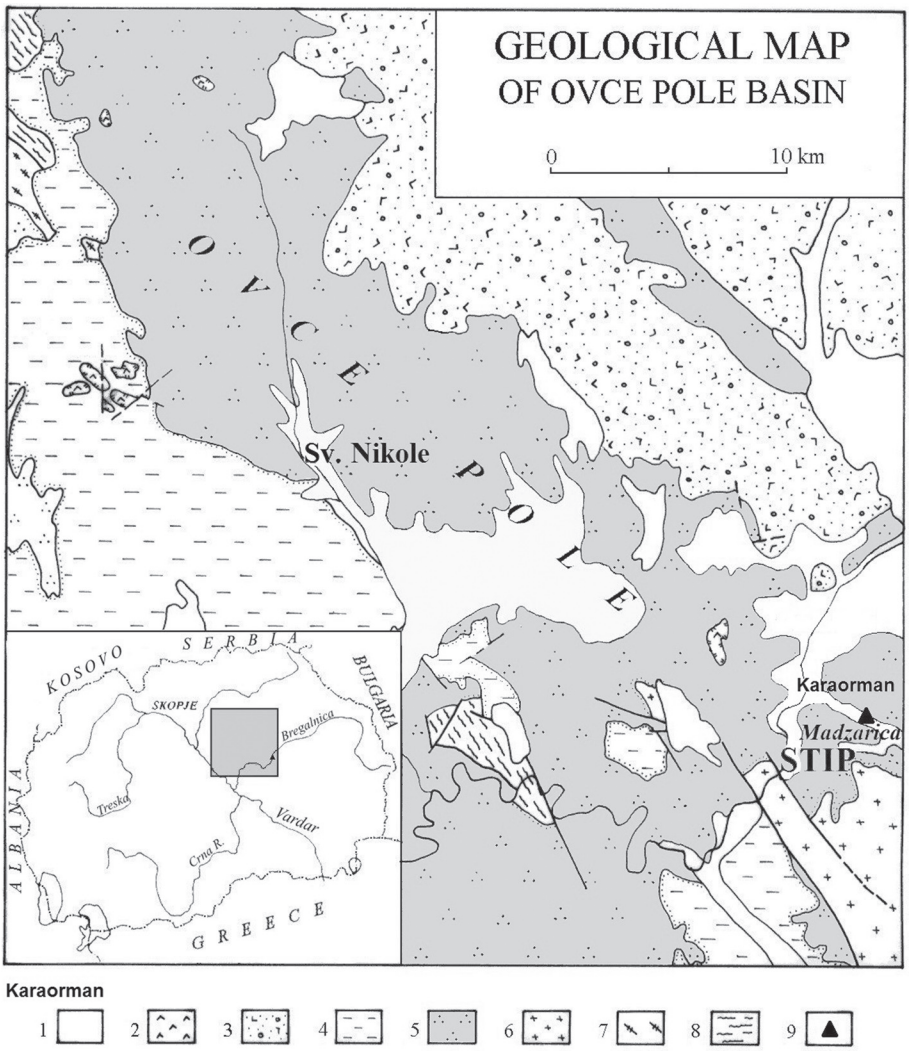

Fig. 1. Geological map of the Ovče Pole Basin: *1*, Quaternary; *2*, Neogene effusive rocks; *3*, Tertiary volcano-sedimentary rocks; *4*, Neogene sediments; *5*, Upper Eocene sediments; *6*, Jurassic granites; *7*, Jurassic gabbro-diabases; *8*, Paleozoic schists; *9*, studied section

the process of erosion and deposition of the Paleogene sediments.

Conclusion

If we compare the results from the previous foraminifer research and the newly obtained nannofossil data, it can be stated that the highest parts of the sediments from the upper flysch unit of the Madzarica section belong to the Upper Eocene–Priabonian slice.

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