

PALAEOBATHYMETRY OF THE LATE CRETACEOUS WĘGLÓWKA MARLS OF THE SUBSILESIAN UNIT (POLISH OUTER CARPATHIANS)

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Abstract: Late Cretaceous foraminiferal associations characteristic of the middle part of the continental slope (Late Turonian), upper part of slope (Late Santonian – Early Maastrichtian), external shelf – upper slope (Early Maastrichtian) and upper - middle part of slope (Late Maastrichtian) were recognised. Turonian - Maastrichtian eustatic fluctuations / changes of water column capacity were observed.

Introduction

Subsilesian Unit of the Polish Outer Carpathians, established by Książkiewicz (1951) occurs in the tectonic windows as well as along marginal zone of the Outer Carpathians. This unit can be correlated with the Ždanice Unit in Moravia (Unrug, 1979; Eliaš, 1979; Słomka, 1995). The Late Cretaceous variegated marls are characteristic sediments of this unit. According to the palinspastic reconstruction of the Carpathians the sediments of the Subsilesian unit were deposited on the elevated structure within the Carpathian basin.

Late Cretaceous sediments of the Subsilesian Unit, deposited near or above CCD level contain rich and highly differentiated calcareous and agglutinated benthic as well as, rarely occurring in the Outer Carpathians, planktonic foraminiferal assemblages. Micropaleontological analyses of these assemblages permitted to reconstruct palaeobathymetry of depositional environment of the Senonian variegated marls, a typical facies of the whole Subsilesian Unit.

Results

The foraminiferal assemblages of the Late Cretaceous part of the Węglówka Marls were analysed in the following areas: Żywiec tectonic window (1), Lanckorona – Żegocina zone: Sułkowice semi-tectonic window (2), Wadowice tectonic window (3),

Wiśniowa tectonic window (4) Żegocina tectonic windows (5), Zwiernik anticline (6), Węglówka Marls type locality (7), as well as Grabownica - Załuże area (8), (Fig 1).

Following the models of Sliter & Baker (1972), Haig (1979), Gasiński & Ślaczka (1985) and Olsson & Nyong (1984) palaeobathymetric analyses were accomplished. Qualitative and quantitative analyses of the Turonian – Maastrichtian foraminiferal associations permitted to recognize bathymetrical fluctuations of depositional environments within the studied basin:

- Turonian – Santonian foraminiferal assemblages pointed to a deposition at the lower part of the continental slope (Żywiec, Sułkowice, Wiśniowa tectonic windows, Zwiernik anticline, Węglówka semi – tectonic window, Grabownica - Załuże Fold).

The shallowing tendency upwards the sequence was observed -

- Campanian: foraminiferal assemblages indicated deposition in the upper – middle part of the slope (Sułkowice, Wadowice, Wiśniowa, Żegocina tectonic windows and Grabownica - Załuże Fold); shallower environment within the Western part of the basin (Sułkowice, Wiśniowa and Żegocina tectonic window) was noticed.

- Early Maastrichtian sediments of the Western part of the Subsilesian Unit (Sułkowice, Wiśniowa, Żegocina tectonic windows as well as Węglówka semi – tectonic window) were deposited at the external shelf – upper–middle slope palaeodepths. Nonetheless, investigations in the Eastern part of the studied area (Grabownica-Załuże Fold) suggested the middle slope depth of deposition.

- Late Maastrichtian foraminiferal assemblages occurring in the deposits of the Western part of the Subsilesian Unit (Sułkowice, Wadowice, Wiśniowa tectonic windows and Węglówka semi – tectonic window) indicated upper–middle part of the slope as depositional environment. However, sediments of the Grabownica – Załuże Fold were deposited in the middle and presumably also in the lower part of the continental slope.

Taking into consideration the results presented above the following palaeobathymetrical fluctuations / water column capacity were recognized:

- the Turonian was the period of the relatively greatest depths of the Subsilesian basin; then up to the Early Maastrichtian time the tendency to shallowing can be suggested, followed by the relative deepening in the Late Maastrichtian.

These fluctuations can be interpreted as the results of the Late Cretaceous Tethyan sea level fluctuations and / or local palaeobathymetric changes within the Silesian – Subsilesian basin connected with the local subsidence episodes.

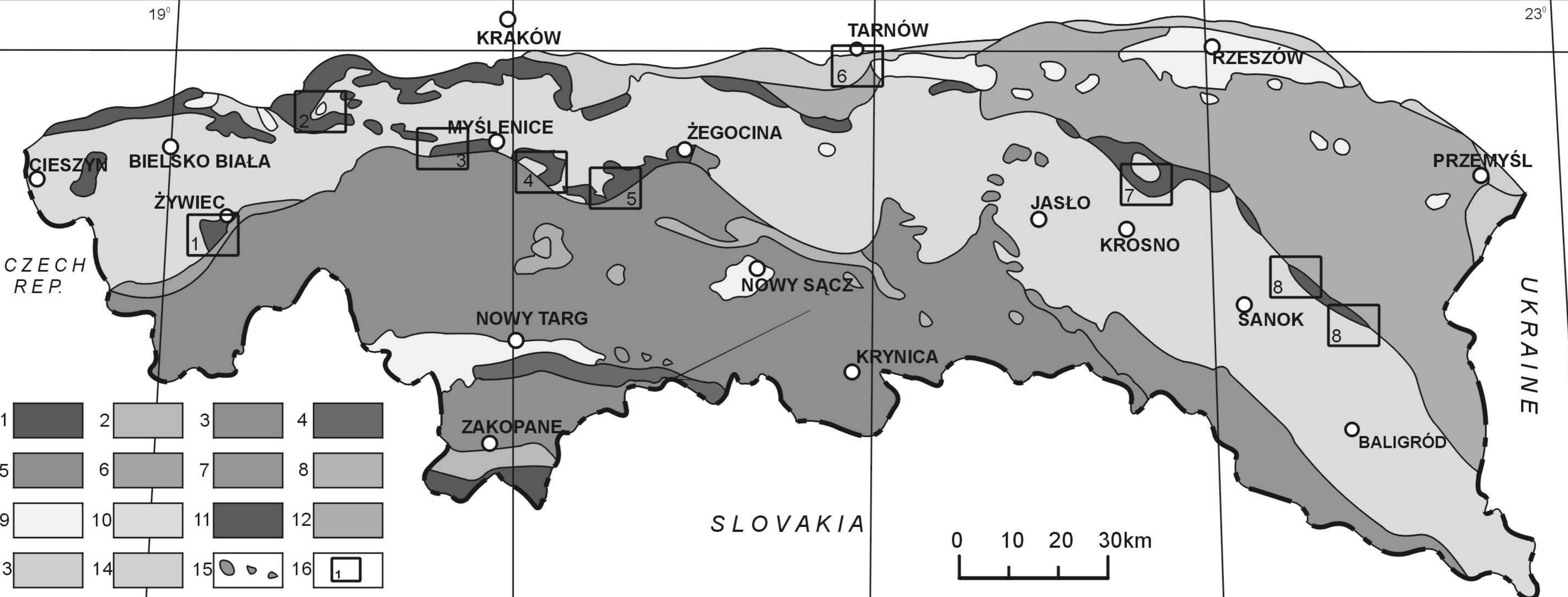
References

- Eliaš M. 1979: Facies and paleogeography of the Silesian unit in the western part of the Czechoslovak flysch Carpathians. *Věstník Úst. Úst. Geol.*, 54: 237-339.
- Gasiński M. A. & Ślęczka A. 1985: Paleobathymetric Model of the Upper Senonian Flysch Sediments of a Part of the Silesian Basin (Polish Carpathians). *Cretac. Res.*, 6: 207-218.
- Haig D.W. 1979: Global distribution patterns for Mid-Cretaceous foraminiferids. *J. Foram. Res.*, 9, 1: 29-40.
- Olsson R.K. & Nyong E.E. 1984: A paleoslope model for Campanian-Lower Maastrichtian foraminifera of New Jersey and Delaware. *J. Foram. Res.*, 1: 50-64.
- Sliter W.V. 1972: Cretaceous foraminifers – depth habitats and their origin. *Nature*, 239: 514-515.
- Sliter W.V. & Baker R.A. 1972: Bathymetric distribution of benthic foraminiferids. *J. Foram. Res.*, 2: 167-183.
- Słomka T. 1995: Głębokowodna sedimentacja silikoklastyczna warstw godulskich Karpat. *Polska Akademia Nauk, Oddz. Kraków, Prace Geol.*, 139: 1-132.
- Unrug R. 1979: Palinspastic reconstruction of the Carpathian arc before the Neogene tectogenesis. *Rocz. Pol. Tow. Geol.*, 49: 3-18.

Fig.1. Tectonic sketch map of the Polish Carpathians showing the locations of examined sections (after Malata *et al.*, 1996, supplemented).

1. crystalline core of the Tatra Mts. **2.** sedimentary rocks of the Tatra Mts. **3.** Podhale Flysch **4.** Pieniny Klippen Belt **5.** Magura Nappe **6.** Fore – Magura Nappe **7.** Dukla unit **8.** Grybów unit **9.** Miocene lying on Carpathians **10.** Silesian unit **11.** Subsilesian unit **12.** Skole unit **13.** Stebnik unit **14.** Zgłobice unit **15.** andezites **16.** investigated area: 1 - Żywiec tectonic window, 2 - Sułkowice semi-tectonic window, 3 - Wadowice tectonic window, 4 - Wiśniowa tectonic window, 5 - Żegocina tectonic windows, 6 - Zwiernik anticline, 7 - Węglówka Marls type locality, 8 - Grabownica - Załuże area

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