Ditrupa-Nummulites transitional facies in the Eocene shallow-water carbonates of the Tatra Mountains (Poland) as an indicator of episodic mesophotication

ELŻBIETA MACHANIEC[1], VLASTA ĆOSOVIĆ[2],
RENATA JACH[1] and EWA MALATA[1]

1 – Institute of Geological Sciences, Jagiellonian University, Oleandry St. 2a, 30-063 Kraków, Poland

2 – Department of Geology, Faculty of Science, University of Zagreb, Horvatovac 102a, 10000 Zagreb, Croatia

The Middle-Upper Eocene shallow water carbonates crop out along the northern margin of the Tatra Mountains in Poland. These deposits are unconformably overlying the older Mesozoic basement and pass upward into the Central Carpathian flysch. They represent a transgressive sequence, which is characterised by distinct facies variability, great units thickness and lateral facies changes which can be followed over a great distance.

Generally, the Eocene succession starts with conglomerates, which contain clasts of the Mesozoic rocks. The conglomerates are covered by littoral detritic carbonates of the Early Bartonian age, SBZ 17 according to the Shallow Benthic Zonation (Serra-Kiel et al., 1998). Although these deposits show a distinct facies variations, usually they are extraclastic packstones with larger benthic foraminifera (LBF) as bioclasts. At the beginning of the succession, tests of *Nummulites brongniarti* d'Archiac & Heim prevail among bioclasts, upward nummulitid tests and tube worms (*Ditrupa-Nummulites* facies) are dominant, while at the end of this part of succession (*Nummulites* bank facies) the robust tests of *Nummulites perforatus* (Monfort) are the most abundant. These deposits are covered by *Discocyclina*-bearing facies (*Nummulites-Discocyclina* bioclastic packstone and *Discocyclina* rudstone), which are overlain by glauconitic marls with planktonic foraminifera. The uppermost part of the succession is formed by organodetritic limestones, flora beds limestones and upper conglomerates, attributed to the Priabonian. The carbonates are succeeded by a thick complex of the Oligocene turbiditic deposits.

The studied *Ditrupa-Nummulites* facies represent bioclastic wackestones, with great diversity of macro- and microfossils. The assemblage contains tubes of serpulid polychaete of *Ditrupa*, fragments of thick-walled bivalve shells (*Ostrea* sp., *Pecten* sp.) and LBF (flat tests of *Nummulites puschi* d'Archiac, and robust and spherical tests of *Nummulites perforatus*). The contact imbrications and linear accumulation of foraminiferal tests are the most conspicuous textural characteristics. Tests of nummulitids bear evidence of physical and biological alternations, like being encrusted by foraminifera (*Miniacina* sp., *Haddonia* sp.) or having truncated test's poles or showing exfoliated outer surface of the youngest whorl. The defined taphonomic category 1 *sensu* Beavington-Penney (2004) supports seawards transport of LBF tests over a short distance either by the action of storm-driven currents, internal waves or sediment gravity flows.

Abundance of LBF suggests shallow, warm and well illuminated, oligophotic waters with low nutrient level (Hottinger, 1983). The episodic great occurrence of semi-infaunal ditrupas (suspensions-feeders), suggests a short period of an increasing organic influx to the sea-bottom. The co-occurrences of LBF, ditrupas, ostreas, and ecrusting foraminifera may indicate somewhat dwindling light conditions, typical for meso-oligophotic conditions (Pomar et al., 2014). The distribution of facies implies that some environmental changes took place in depositional setting during the Middle–Late Eocene. The development of *Ditrupa-Nummulites* facies is a result of the influx of organic matter to the sea-bottom, indicating the local instability within studied sedimentary environment.

References:

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