TRANSGRESSIVE-REGRESSIVE CYCLES IN THE TITHONIAN AND BERRIASIAN PELAGIC LIMESTONES OF THE WEST BALKAN UNIT, BULGARIA

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Two Tithonian and Berriasian sections of pelagic limestone-marl alternations have been studied for determination of transgressive-regressive cycles based on the bedding pattern and abundance curves of microfossils. The biostratigraphy was provided by calpionellids, calcareous nannofossils and calcareous dinoflagellates (Lakova et al., 1999). The studied interval comprises the Upper Tithonian and Berriasian (p.p.) as documented on the continuous succession of the calpionellid zones *Crassicollaria, Calpionella* and *Calpionellopsis* and their subzones. The time interval spans 5.4 Ma between the Lower-Upper Tithonian boundary (147.2 Ma) and *Csis simplex – Csis oblonga* subzones boundary (141.8 Ma)

Relatively monotonous medium- to thin-bedded micritic and intraclastic limestones with thinner marly interlayers crop out. They belong to the slope and basinal environments of the Late Jurassic and Early Cretaceous basin in the West Balkan tectonic unit. The measuring is bed by bed and thin-section samples have been taken at each 1 m.

The Upper Tithonian and Lower Berriasian (Glozhene Formation) represent mainly limestones, the bed thickness ranging from 10 to 30 cm, exceptionally 5 cm or up to 70 cm. Very thin marly interbeds of 1-3 cm occur randomly separating the limestone beds. A total of 147 beds are counted, deposited within a time interval of 5.0 Ma. The Upper Tithonian is 10 m thick and consists of 42 beds ("elementary cycles" in the sence of Pasquier, Srtasser, 1997), each formed at average time of 40 Ka. The Lower Berriasian is 20 m thick and consists of 105 limestone beds or limestone-marl alternations, each "elementary cycle" of 32 Ka duration.

The overlaying part of Salash Formation (Upper Berriasian, p. p., *Csis oblonga* Subzone) is an irregular alternation of micritic limestones, clayey limestones and marls representing a fast shift onto hemipelagical depositional environment. The bed thickness is normally 5-10 cm, exceptionally 20-30 cm. The thickness is 10 m and the time interval of deposition is 0.4 Ma. The number of limestone-marl alternations is 42. Each "elementary cycle" deposited during average time 10 Ka, and the rate of sedimentation dramatically increased to 25 mm/Ka compared to 6-7 mm/Ka for the Glozhene Formation.

The limestones represent mudstones, rarely wackstones, built up of recrystalised carbonate of micritic size and planktonic microfossils – calpionellids, calcareous dinoglagellates, globochaetes, radiolarians, as well as ammonite aptichi. In addition, less common benthic foraminifers, ostracods, bivalves, and

crinoids occur deriving from hemipelagic or platform areas.

The bedding pattern has been analysed in order to differentiate zones of maximum flooding, boundaries of T-R cycles and transgressive-regressive trends. These are directly correlated to the parallel abundance curves of calpionellids, calcareous dinoflagellates and nannofossils. The maxima of microfossil abundance approximately coincide with zones of thinner and more marly beds and are interpreted as maximal transgressions. The minima of the microfossils abundance correspond to thicker, pure limestone beds and are considered as regressive surfaces or sequence boundaries. The elementary cycles have been grouped into seven 3rd-order T-R cycles, covering a time interval of 5.4 Ma, and have been correlated to the sequences chart by Handerbol et al. (1998).

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