Characteristics of cyclic Upper Triassic platform carbonates in the Transdanubian Range, Hungary and in the Pelagonian Zone, Greece – a comparison

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For comparative studies of the Upper Triassic cyclic platform carbonates, the Transdanubian Range, Hungary and the Pelagonian zone, Greece were chosen. Palaeogeographically, they represent two distant segments of the passive margin of the Neotethys Ocean. During the Late Triassic, on this wide margin an extremely extensive tropical carbonate platform domain was developed referred to as the Dachstein-type carbonate platform system. The Transdanubian Range (TR) represents a segment of the continent encroaching platform, whereas the Pelagonian-Subpelagonian zone (PG) may have been a large isolated platform surrounded by deep-water basins. The discussed Upper Triassic thick platform carbonates (Fődolomit/Hauptdolomit Formation and Dachstein Limestone in TR, and Pantokrator Formation in PG) are made up of cyclically arranged facies deposited under similar environmental conditions in the interior zones of the platforms. Three major characteristic facies types can be distinguished: shallow subtidal–lagoonal (e.g. megalodon-bearing, bioclastic, and/or peloidal, and/or oolitic wackestones, packstones or grainstones), intertidal (e.g. microbial stromatolites, fenestral mudstones) and supratidal-pedogenic (e.g. calcretes-dolocretes, palaeosoils), which correspond to the three typical and macroscopically distinguishable lithofacies (members C, B and A) of Fischer's (1964) Lofer-cycle. The cycles are usually bounded by discontinuity surfaces (d) related to subaerial exposure and subsequent pedogenic alteration. The meter-scale (Lofer) cyclicity is predominant throughout the successions. However, various stacking patterns including symmetric complete (d-A-B-C-B'-A'-d), truncated, incomplete, and condensed cycles or even alternating peritidal and subtidal facies without any disconformity are recognized in both areas studied. Pervasive or partial early diagenetic dolomitization affected some parts of the cyclic successions in both areas. However, age-dependence of the early dolomitization was clearly demonstrated only in TR, where the older part of the carbonate platform succession (latest Carnian to Middle Norian) was subject to pervasive dolomitization, whereas the younger part is non-dolomitized and there is a transitional unit between them. This trend is attributed to changing climate from semiarid to more humid. In the NE part of TR the carbonate platform drowned at the Triassic-Jurassic boundary, whereas the platform conditions prolonged until the end of the Hettangian in the SW part of TR. However, the Hettangian segment is characterized by non-cyclic subtidal oncoidal limestones, implying upward deepening trend. In contrast, in PG the platform conditions continued until the early to middle Early Jurassic, and the Lower Jurassic succession is typified by well developed pedogenic features suggesting long lasting subaerial exposure intervals, i.e. an upward shallowing trend.

Summing up, the Upper Triassic platform carbonates of the TR and PG show strikingly similar features concerning the litho- and biofacies, the stacking pattern and the thickness of the elementary cycles, despite their distant and different palaeogeographic setting within the western Neotethys realm. This suggests eustatic signal, i.e. the cyclic deposition was essentially controlled by orbitally forced eustatic sea-level changes, although the contribution of autocyclic mechanisms cannot be excluded either. Definite signatures of subaerial exposure (karstic features and vadose meteoric diagenesis) at and below the cycle boundaries also support the allocyclic control.