The Permian–Triassic boundary interval in the Velebit Mountains: new facies, bio- and chemostratigraphic features

Aljinović, Dunja; Richoz, Sylvain; Smirčić, Duje; Chen, Yanlong; Nestell, Galina; Jazvac, Ivan

THE PERMIAN–TRIASSIC BOUNDARY INTERVAL IN THE VELEBIT MOUNTAINS: NEW FACIES, BIO- AND CHEMOSTRATIGRAPHIC FEATURES

GRANICA PERM–TRIJAS NA VELEBITU: NOVA FACIJESNA, BIOSTRATIGRAFSKA I KEMOSTRATIGRAFSKA OBILJEŽJA

Dunja Aljinović[1], Sylvain Richoz[2], Duje Smirčić[1], Yanlong Chen[3], Galina Nestell[4], Ivan Jazvac[5]*

[1] University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Pierottijeva 6, 10 000 Zagreb, Croatia
[2] Department of Geology, Lund University, 22 362 Lund, Sweden
[3] State Key Laboratory of Continental Dynamics, Shaanxi Key Laboratory of Early Life and Environments, Department of Geology, Northwest University, Xi'an, 710 069, China
[4] University of Texas at Arlington, Department of Earth and Environmental Sciences, Arlington TX 76 019, USA
[5] Jazvaci 22, 47 201 Draganić, Croatia
*corresponding author: ijazvac@rgn.hr

Keywords: *External Dinarides, Late Permian and Early Triassic dolostone facies, Late Permian foraminifers, Hindeodus parvus, carbon isotope curve, microbially influenced dolomitization*

The Permian–Triassic boundary (PTB), one of the most investigated stratigraphic boundaries, is marked by dramatic changes in oceanic and atmospheric chemistry that consequently caused the most severe mass extinction of all time. These changes can be seen in the type and style of deposition in the PTB interval that is characterized by transition from skeletal-dominated to microbial-dominated carbonate production. Most of the studies concerning this important time interval have been made in shallow to deep marine depositional environments in addition to some terrestrial sections. However, there is very little information about how shallow lagoonal, sabkha and intertidal sediments reacted to these drastic changes. Indeed, shallow marine deposition was often prone to dolomitization and thus difficult to date. In the Brušane-Sy section located south of the village Brušane (Velebit Mountains) in the External Dinarides (Croatia), we have observed continuous dolostone sedimentation throughout the Permian-Triassic boundary interval and obtained new facies, bio- and chemostratigraphic data (conodonts, foraminifers, $\delta^{13}C$ curve). A high-resolution micropetrographic study shows different dolostone texture and preservation of primary constituents in the Permian vs. the Early Triassic dolostone. The Permian dolostone deposits are differentiated as: 1) dolomicrite/mudstone with microbial (cyanobacterial) interlayers, the occurrences of stromatactoid fabric, desiccation cracks/tepee structures signifying deposition in intertidal/supratidal conditions; and 2) dolobiomicrite/wackestone and dolobiomicrite/packstone microfacies types with fairly preserved abundant calcareous algae and their spores (acritarchs), foraminifers (Hemigordiopsids with some Nodosariids and Fusulinids), gastropods, bivalves and ostracods that were deposited in the subtidal low energy zone of a shallow lagoon. Primary structures of the Permian dolostone show well-preserved fabric due to favourable dolomitizing conditions, i.e., primary dolomitization. However, significant appearances of dissolution voids indicate diagenesis in the meteoric/marine vadose zone. The presence of the vadose sediment features is not likely for the *sabkha*-dolomitizing conditions under arid climate conditions usually related to this type of dolomitization. The influence of microbial activity should rather be taken into consideration for interpreting the intense dolomitizing process. On the contrary, the Triassic dolostone, whose age is confirmed by finding of the conodont species *Hindeodus parvus* for the first time in the PTB interval of the Velebit Mts., exhibits a completely different dolostone texture in comparison to the Permian microcrystalline dolomite type. Early Triassic dolostone strata conformably overlie Late Permian dolostone deposits and exhibit medium- to coarse crystalline unimodal planar-s type texture, possibly indicating exceptional aftermath dolomitizing conditions (shallow burial-like) and the influence of microbial and decaying organisms to the formation of the coarse crystalline dolomite texture. The $\delta^{13}C$ values do not represent the global oceanic signal but either depict the values of a restricted basin or were influenced by the early dolomitization. Moreover, the meteoric diagenesis subsequently overprinted this signal.