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Biocalcification crisis and negative stable carbon isotope anomaly at the Triassic-Jurassic boundary: a record from the pelagic Budva Basin (Montenegro)

A. E. Črne (1), Š. Goričan (1), H. Weissert (2), S. M. Bernasconi (2)

(1) Ivan Rakovec Institute of Palaeontology ZRC SAZU, Ljubljana, Slovenia,(2) Geologisches Institut, ETH Zürich, Switzerland (acrne@zrc-sazu.si)

Several mechanisms were proposed to explain the biotic crisis at the Triassic-Jurassic boundary. Among the effects caused by the excess CO_2 from CAMP volcanism, a biocalcification crisis was so far recorded only in neritic environments. Revised biostratigraphic work and measurements of stable carbon isotopes together with carbonate content were carried out across two pelagic Upper Triassic-Lower Jurassic sections in Montenegro in order to investigate, whether an abrupt reduction of carbonate input to the Budva Basin coincides with the Triassic-Jurassic boundary.

We studied two sections, Bar and Čanj, located in the coastal Montenegro. Structurally, the sections belong to the Budva Zone, which paleogeographically corresponds to the Budva Basin. The deep Budva Basin formed during the Middle Triassic rifting and was a NW continuation of the Pindos Basin.

The Upper Triassic of the Budva Basin is characterized by the *Halobia* limestone, white thin-bedded pelagic mudstones with replacement chert as nodules and layers and rare marl intercalations. The Lower Jurassic consists of about 30 m thick unit "Passée Jaspeuse", red and greenish thin-bedded siliceous limestones alternating with marls.

At both studied sections in the Budva Basin (Bar, Čanj) the Triassic-Jurassic boundary is placed near the lithological transition between the *Halobia* limestone and "Passée Jaspeuse" on the basis of radiolarian and conodont dating. While the contact between

the two stratigraphic units is sharp at both sections, a basal marly horizon (60 cm) is only present at Čanj.

Results of the stable carbon isotope analysis show values of 1.6-1.8 per mill (VPDB) in the Upper Triassic of both sections. At Čanj, lighter values of 0.3-0.9 per mill are observed exactly at the lithological boundary and are replaced upwards with values up to 2.0 per mill. In the Lower Jurassic "Passée Jaspeuse" the values stabilize around 1.0 per mill at both sections. At Bar no samples yielded lighter values of δ^{13}C, the most probable explanation is a stratigraphic gap at the Triassic-Jurassic boundary at this section. The negative anomaly at section Čanj coincides with an abrupt change from pelagic limestones containing 90 wt% of $CaCO_3$ to lime-poor siliceous deposits with 40 wt% of $CaCO_3$.

A sudden reduction of carbonate input to the Budva Basin across the Triassic-Jurassic boundary is interpreted to be a direct cause of the biocalcification crisis occurring contemporaneously with the perturbation of the global carbon cycle and/or to a shallowing of the CCD.