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Postojna, 2010

ESTIMATION OF AVERAGE END-PERMIAN AND EARLY TRIASSIC PALAEOTEMPERATURE FROM OXYGEN ISOTOPES (VELEBIT MT., CROATIA)

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The uppermost Permian and Lower Triassic dolomites of the Velebit Mt., Croatia, were deposited on the shallow-water carbonate platform of the western Paleotethys, close to the equator. The deposits are composed of two informal lithostratigraphic units – Upper Permian Transitional Dolomite and uppermost Permian and Lower Triassic Sandy Dolomite. Detailed palaeontological and geochemical characteristics of the analysed units are described by Fio et al. (submitted).

Late Permian whole rock δ18Ocarb, with respect to V–PDB, vary from –3.2 to –1.3‰ (average δ–2.6±0.4‰) and Early Triassic range from –3.2 to –2.2‰ (average δ–2.7±0.3‰). The oxygen isotopes are prone to diagenetic change if the deposits are influenced by metamorphic processes or hydrothermal fluids. Regarding very low and negative correlation of carbon and oxygen isotopes ($r2 = -0.04$, $n = 111$) and narrow range of oxygen isotope values (1.9‰) we can assume the primary magnitude of the isotope excursions.

According to the formula $t(°C) = 16.1 - 4.64(\delta c - \delta w) + 0.09(\delta c - \delta w)2$ (Kim and O'Neil, 1997; Bemis et al., 1998), assuming seawater δ18O, relative to V–SMOW to be 0‰ (Korte et al., 2005), and δw correction from V–SMOW to V–PDB –0.27‰, average Late Permian temperature was 27.4°C and Early Triassic 27.9°C. Minimal end-Permian temperatures were 21.0°C and maximal 30.5°C, while in Early Triassic from 25.4 to 30.5°C. Our isotope measurements and calculations therefore correspond to Kiehl and Shields (2005) palaeotemperature models, assuming western Palaeotethys temperatures from 28–30°C, and Kearsey et al. (2009) estimating latest Permian temperatures between 26 and 29°C.

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