©Institut f. Erdwissensch., Geol. u. Paläont., Karl-Franzens-Universität Graz; download www.biologiezentrum.at

Ber. Inst. Erdwissenschaften K.-F.-Univ. Graz	Bd. 8	ISSN 1608-8166	Isotope Workshop Volume	Graz 2004

Permian-Triassic boundary events in continuous marine successions in Hungary

Attila Demény[1], János Haas[2], Kinga Hips[2], Norbert Zajzon[3]

[1]Laboratory for Geochemical Research, Hungarian Academy of Sciences, Budapest, Budaörsi út 45., H-1112, Hungary; e-mail: demeny@geochem.hu
[2]Geological Research Group, Eötvös Loránd University, Budapest, Pázmány P. s. 1/C, H-1117, Hungary
[3]Department of Mineralogy, Eötvös Loránd University, Budapest, Pázmány P. s. 1/C, H-1117, Hungary

In continuous marine successions the Permian-Triassic boundary was recognised in several outcrops in the Bükk Mts, North Hungary and in a few core sections in the NE part of the Transdanubian Range.

Although rocks in the Bükk Mts (sampled at the „Bálvány section”) has been affected by very low-grade metamorphism, the sections are still well preserved. It is reflected in the preservation of the original sedimentary features and even fragile thin-shelled fossils. The topmost Permian is made up of dark grey limestone, rich in fragments of crinoids, calcareous algae, mollusks, brachiopods, ostracods, foraminifera. There is a dramatic decrease in the amount of the bioclasts in the last two limestone layers that are overlain by a 1 m thich shale bed. The lower two third of this bed still contains a poor biota but its upper part is almost free of any bioclast. The overlying platy limestone contains a poor fossil assemblage indicating stress conditions.

The $\delta^{18}O$ values are fairly constant at –7 ± 0.5 ‰ in the whole section. In contrast, the carbon isotope compositions show systematic variations up-section. In the limestone layers 1.5 m below the base of the shale, the $\delta^{13}C$ values are about +3 ‰. Preceeding the complete disappearance of Permian fossils the $\delta^{13}C$ values start to decrease gradually, reaching –0.5 ‰, in the lower part of the shale bed, then they suddenly drop below –4 ‰ just at the second biotic decline. After the sharp negative peak the $\delta^{13}C$ values recover to 0 ‰ and stay constant at cca. –1 ‰. The observed change show no relationship with lithology as reflected by the carbonate content. Thus, the observed variation is not related to formation of diagenetic or metamorphic carbonate and can interpreted as a primary signal.

©Institut f. Erdwissensch., Geol. u. Paläont., Karl-Franzens-Universität Graz; download www.biologiezentrum.at

The isotopic signature of the Bálvány section resembles other well-preserved sections worldwide. However it differs significantly from that in the Transdanubian Range where the boundary was found in ooidic limestone akin to that in that in the Southern Alps (Tesero Horizon). In these sections $\delta^{13}C$ values show gradual decrease and there is a slight $\delta^{13}C$--$\delta^{18}O$ correlation, but the definite negative $\delta^{13}C$ peak is missing. This feature may either be related to primary or secondary causes. Based on literature data, the primary cause can be the changing magnitude of $\delta^{13}C$ shift depending on facies and latitude. Secondary causes can be sedimentary or diagenetic. The influence of diagenesis is supported by the weak $\delta^{13}C$-$\delta^{18}O$ correlation, whereas sedimentary reworking – and thus smoothing the negative $\delta^{13}C$ peak – is indicated by Permian fossils enclosed in ooides in lower Triassic layers.

The strong and symmetric $\delta^{13}C$ peak at the second biotic decline observed in the Bálvány section (Bükk Mts., North Hungary) indicate a rapid process that contributed to the ocean–atmosphere system with a huge mass of ^{12}C followed by system recovery at the same rate. The most plausible explanation is release of methane hydrate from deep sea sediments due to rapid warming, then rapid cooling and hydrate formation that removed the excess ^{12}C from the system. The gradual and long term $\delta^{13}C$ shift from Permian to Triassic $\delta^{13}C$ values (from +3 to –1 ‰) would indicate a collapse and incomplete recovery of the organic productivity.

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: Berichte des Institutes für Geologie und Paläontologie der Karl-Franzens-Universität Graz

Jahr/Year: 2004

Band/Volume: 8

Autor(en)/Author(s): Demeny Attila, Haas Janos N., Hips Kinga, Zajzon Norbert

Artikel/Article: Permian-Triassic boundary events in continuous marine successions in Hungary. 28-29