PALEOCLIMATIC, ENVIRONMENTAL AND BIOTIC CHANGES DURING TRIASSIC/JURASSIC BOUNDARY TIME

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Abstract: Start of the Jurassic period was affected by both climate and biotic turnovers evoked by major orbital fluctuations combined with little known (extraterrestrial?) factors. These changes resulted in one of major mass extinctions. The paper brings results of integrated research of the T/J sequence, as a part of the UNESCO international geological correlation project No 458 „Triassic and Jurassic Boundary Events“.

Key words: Triassic/Jurasic, orbital rhythms, climate turnovers, biotic extinction

One of the five most drastic mass extinctions happened at the end of Triassic, ca 200 Ma ago, when 80% of species were lost (biotic crisis preceeded this in the sea by at least several hundred thousand years, cf. Pálfy et al., 2000). A decline of primary productivity during the T/J transition, associated with release of methane from marine clathrate was supposed by Pálfy et al. (2001) and supported by carbon isotope analyses. Pálfy and Smith (2000) paralellized another similar (upper Lias) extinction with oceanic anoxic event evoked by flood basalt eruptions in southern Gondwana.

Marine transgression at the end of Triassic has been connected with frequent oscillatory se-level movements (Michalík et al., 1991). Renewation of scattered shallow-marine embayments enabled the origin of famous world-wide opportunistic faunas with many endemic elements. In the whole Europe, the start of Jurassic period was affected by extensive transgression and re-organization of sedimentary basins. This is the cause of origin of widespread gap on the base of many Lower Jurassic sequences.

In Western Carpathian, Triassic / Jurassic passage beds are well preserved in sequences formed in the Fatric Basin (Michalík 1980). Well exposed section was described (Gaździcki et al., 1979) in the Juráňova Valley, West Tatra Mts. It encovers upper part of the Carpathian Keuper deposits, Rhaetian Fatra Formation, Hettangian Kopieniec Formation and lower part of Sinemurian Allgäu Fm. The sequence studied belongs to the Krížna Nappe in a basinal

development (the Zliechov Unit). Sedimentology, microfacies, biostratigraphy of the uppermost Triassic beds were studied in detail. The basal part of the Kopieniec Formation rests on oolitic limestones with high content of chromium and vanadium. Co-occurrence of chamosite and goethite ooids indicates mixing of material from different environments (Michalík et al., 1982)..

Typical pale sandstone member at the base of the Kopieniec Formation with thin rich-muscovite-bearing clay interbeds (Gaździcki et al., 1979) contains heavy mineral spectrum dominated by tourmaline (Michalík et al., l.c.). Siliciclastic admixture represents a new feature, seldomly observed in underlying limestone sequence (Michalík 1977). More southwards, these sandstones are replaced by reddish siltones comparable with the "Schattwald beds" of Eastern Alps (Borza et al., 1980).

Laminated texture which occur sometimes in upper part of the Rhaetian Fatra Formation desire special interest, as it records seasonal changes attributable to more sensible climatic regime. Although they were not studied in detail yet, it seems that these changes can be parallelized with high frequency orbital changes. The cause of principle global climatic change at the T/J boundary is not easy to interprete. From this point of view, interpretation of anomal concentrations of Cr, V and other microelements can be of a crucial importance.

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