



## **Climatic change at the T/J boundary in the NW Tethyan Real (Tatra Mts, Slovakia)**

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The T/J boundary interval was the time of change from dry Triassic climate towards more humid early Jurassic conditions. Due to the Hettangian transgression, the Rhaetian Fatra Formation and the Hettangian Kopienec Fm, exposed by several sections in the Tatra Mts, represent scarcely preserved T/J passage sedimentary record in the Western Carpathians. The Fatra Fm consists of bioclastic limestones and of fine clastics deposited in a proximal marine setting. Its benthic fauna comprises index foraminifers (*Triasina hantkeni*), bivalves (*Rhaetavicula contorta*), corals (*Retiophyllia paraclathrata*) and brachiopods (*Austrirhynchia cornigera*). The palynofacies is dominated by terrestrial components and phytoclasts, the palynomorph assemblage by numerous *Ricciisporites tuberculatus*, while shallow-marine dinoflagellate *Rhaetogonyaulax rhaetica* prevails in the marine fraction. This microflora resembles the Polish *Ricciisporites tuberculatus* Zone, and the *Ricciisporites-Polzdiisporites* Zone of the SE Nord Sea Basin, both middle to late Rhaetian in age. A diversity decrease at the base of the uppermost member of the Fatra Fm indicates fresh water input. Eutrophication caused by continental run-off resulted in retreat of oligotrophic carbonate platform ecosystems. The O and C isotope anomalies are parallel with lithological changes and with microfaunal extinction levels. The clay-size fraction of all samples is dominated by mixed-layer illite-smectite (IS) phase with 10-25 % of smectite interlayers, accompanied by illite, chlorite, sudoite and kaolinite. Chlorite-smectite mixed-layers are infrequent. Prevalence of the IS indicates origin of the smectite precursor

by weathering in a wet-and-dry climate. A continuous increase of the IS content in the Fatra Fm sequence upwards occurs at the expense of discrete illite, while the kaolinite appears in the T-J boundary claystones as a response of increasing chemical weathering under raised humidity. Moreover, an unusual occurrence of the di-trioctahedral high Al- and Mg-chlorite (sudoite instead of a common tri-trioctahedral chlorite) could indicate diagenetic high-Mg fluids accompanying dolomitisation in the topmost Fatra Fm beds. These fluids along with Fe-rich ooids could have been related with a volcanic activity associated with T/J boundary climatic changes. The upmost limestone layers of the Fatra Fm are overlain by dark „Boundary Clay“ and by „Cardinia Sandstone“ of the Jurassic Kopianec Fm. Due to lack of age-diagnostic index fossils, precise position of the T/J boundary is uncertain. Based on microfacies analyses and negative excursion of the  $\delta^{13}\text{C}_{\text{carbonate}}$  isotopic curve, the boundary interval was placed near to the lithological boundary. Neither any significant palynostratigraphic events (FADs, LADs) have been detected within the boundary interval. Typical Rhaetian/Liassic palynomorph assemblages are dominated by bisaccate pollen grains, trilete spores and *Circumpolles*, while these of the Kopianec Fm are characterized by a significant increase of trilete laevigate spores, mainly *Deltoidospora* spp. and *Concavisporites* spp. The dinoflagellate cyst *Dapcodinium priscum* replaces *Rhaetogonyaulax rhaetica* in the marine fraction. Striking quantitative changes in the composition of the palynomorph assemblages are interpreted with respect to climatic changes within the T/J boundary interval.