Hyperthermal and greenhouse events in the Paleogene sequence of the Central Western Carpathians (PETM, EECO, MECO): multiproxy records from the Kršteňany section

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The Paleocene - Eocene boundary is marked by one of the most prominent event of global warming and perturbation of carbon cycle in the Cenozoic history. Multiproxy records of this hyperthermal event (PETM) and successive greenhouse events (EECO and MECO) have been determined in the Kršteňany section (Central Western Carpathians).

The pre-PETM interval of the section contains the Mid- to Late Paleocene microfauna of planktonic foraminifera with index species of the P3 and P4 Biozones - *Globanomalina cf. pseudomenardi*, *Morozovella apanthesma*, *Igorina pusilla* and *Parasubbotina varianta*. Nannofossils exhibit the presence of *Fasciculithus* and bloom of *Braarudosphaera*.

The PETM is approximated in the transitional interval from the grey and ochry-yellow marls in the depth between 45 m – 42 m. The base of the PETM is affected by dissolution (BFEE) and higher up marked by carbon isotope excursion with negative shift from + 0,24 to – 1.62 ‰ $\delta^{13}C$ (~CIE). Foraminiferal microfauna of the PETM dominated by sphaerical and haevily calcified acarininids (*A. subsphaerica*, *A. berggrenii*), *Globanomalina luxorensis*, etc. Nannofossils show the decline of *Chiastmolithus*, appearance of excursion taxa (*Discoaster araneus*) and presence of index species of the NP 10 Biozone (*Tribrachiatus contortus*, *T. orthostylus*). The specific components of the PETM interval represent pyritized diatom frustules and pteropods. In paleomagnetic scale, the PETM interval records the reverse polarity, corresponding to the C24r magnetozone around the P/E boundary.

The post-PETM sequence of the Kršteňany section proceeded to the Early Eocene climatic optimum (EECO), which is evidenced by the large-sized anguloconical and muricate foraminifers like *Morozovella lensiformis*, *M. formosa*, *M. occlusa*, *Acarinina strabocella*, *A. cuneicamerata*, *A. pentacamerata*, *A. praetopilensis*, *Muricoglobigerina seni*, etc. The share of subbotinid species, which are constrained to be the cool-temperate forms, increased to the Late Ypresian in *Subbotina (T) boweri* Zone. Ypresian nannofossils consist of the species, which provided the last occurrences in the NP 12 Biozone (*Tribrachiatus orthostylus*, *Ellipsolithus macellus*, etc.). Subsequent interval reveals a radiated nannoplankton bloom of the family *Discoasteraceae*, which more than 10% share indicates the EECO (mainly *D. barbadiensis* and *D. saipanensis*). Normal polarity of the C24n magnetozone has been recognized in the interval between 36 – 38 m (Middle Ypresian).

Lutetian – Bartonian sequence is rich in morozovellid, truncorotaloid and morozovelloid species. Their abundance is indicative for the Mid Eocene climatic optimum – MECO. The most frequent species of foraminiferal microfauna are follows: *Morozovella aragonensis*, *M. crater*, *M. spinulosa*, *Acarinina (T.) topilensis* and *Morozovelloides crassata* (E 8 – E 13). Late Lutetian – Bartonian formation is significantly enriched by *Turborotalia centralis* and *Orbulinoides beckmanii* (E 12) Nannoplankton zones of the NP 14 – NP 16 has been recognized based on the species of *Discoaster sublodoensis*, *Chiphragmalithus alatus* and *Discoaster tani nodifer.* The MECO is pronounced at the carbon isotope curve, where the sequence in interval between 17.0 – 5.0 m shows the distinct negative excursion of $\delta^{13}C$ up to – 6.75 ‰. The Mid Lutetian sequence records the normal polarity (18.2 – 32.4 m), which could correspond to the C21n magnetozone.

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