Consequence of geochemical and biotic variations before, during and after PETM in the Caucasian Basin, southern Russia

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The Paleogene lithological record of the southern part of wide epeiric basin of the NE Peri-Tethys contains sapropelitic bed (SB) corresponding to PETM critical event. The study of 0.6 m thick SB in Kheu section, central northern Caucasus, revealed 8.6% TOC, remarkable drop in $CaCO_3$, negative carbon (CIE) and oxygen isotope excursions and specific microplankton assemblages corresponding to this level. The SB lithological architecture displays several types of internal cycles implying tripartite general structure with more calcareous central part embedded between low-calcareous clays and four bands composed of darker clays with higher TOC and paler calcareous clays. The combination of pre-PETM events incorporates minor fluctuations in $\delta^{13}C$ and $\delta^{18}O$, relatively reduced productivity of calcareous plankton, initial evolution in the lineage of *Rhomboaster* nannofossils and variations in the ratio of dinocyst ecological groups. The onset of the main CIE at the base of the SB is followed by wide occurrence of so-called "excursion taxa" of nannofossils (rhomboasters and asymmetric discoasters) and dinocysts (*Apectodinium augustum* and *Wilsonidium pechoricum*). The $\delta^{13}C$ and $\delta^{18}O$ curves harmonically follow four lithologial bands within the SB and show relatively more positive values within more calcareous middle part of the bed. The most critical environmental changes are evidenced at the earliest and terminal stages of the SB accumulation. Three episodes of vigorous environmental perturbations are documented in the uppermost part of the SB within fourth lithological band: two levels of broad negative $\delta^{18}O$ peaks corresponding to oligotaxonic nannofossil assemblages composed of warm-water discoasters and "sterss species" *Thoracosphaera* and non-calcareous level with highest TOC. The CIE body persist above the SB and show very gradual $\delta_{13}C$ increase starting at ~1.3 m above the SB but it never reaches pre-PETM values. Many Paleocene nannofossil taxa reappear above the SB at the level of later CIE stage but become extinct during $\delta_{13}C$ recovery phase. *Apectodiunium augustum* acme corresponds to the SB, but rare specimens persist to be presented further upsection after CIE termination. $\delta_{18}O$ became recovered at 1.2 m above the SB and after that increases in 1.5‰. This post-PETM warming trend is supported by coherent increase in abundance of warm-water nannofossils (*Discoaster* spp.).

Our multidisciplinary study showed that PETM incorporates relatively long-lived series of environmental changes where the SB represents the peak of PETM preceded by minor variations in $\delta_{13}C$ and $\delta_{18}O$ and initial changes in microfossil communities. The PETM recovery was very gradual involving the extinction of the Paleocene nannofossil and dinocyst taxa survived during the most critical PETM environment.

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