ENVIRONMENTAL CHANGES ASSOCIATED WITH YPRESIAN SAPROPTILE ACCUMULATION IN THE NORTHERN CAUCASUS REVEALED BY NANNOFossil AND GEOCHEMICAL STUDY

SCHEREBININA Elizaveta and CAVRILOV Yuri

Geological Institute of the Russian Academy of Sciences, Yubileyny 7, Moscow 119007, Russia (scherебининамир@ru)

During the Early Paleogene, the wide northeasten Peri-Tethys basin stretching from the Crimea to Central Asia shows three general periods of oxygen depletion evidenced by occurrence of sediments rich in organic matter (TOC). They are: (i) an unique sapropelic bed corresponding to Initial Eocene Thermal Maximum (IETM), (ii) a series of mid-Ypresian sapropelic interlayers (SI), and (iii) Kuma fm. (Bartonian), more or less uniformly rich in TOC throughout its stratigraphy.

The second of these episodes is least studied. A series typically comprising 5–8, occasionally 1–15, sapropelic interlayers (Murylov et al., 1989) occurs in different facies environments in the Crimea, Caucasus, and Central Asia. The time span of their formation (upper NP2–lower NP3) corresponds to eustatic regression and the early Eocene climatic optimum.

To elucidate the environment changes corresponding to the accumulation of TOC-rich sediment, we studied thoroughly the most complete and lithologically contrasting Ypresian sequence exposed along the Khov R., central N Caucasus. Eight dark thin laminated interlayers (up to 49 TOC 0.1–0.4% in thick are interbedded into 11 m thick greenish-gray marl. The SIs show distinct depletion of CaCO3, kaolinite enrichment, and Mn, Cr, V, Ni, etc. concentration. IB index is rather low (136–185), which implies substantial proportion of terrestrial organic matter. Nannofossils are rather abundant and diverse (>100 species), but show broad variation in abundance and species composition through the sequence. Pro-sapropelic assemblage is followed by lower abundance and species diversity; it is dominated by Zygophyliodes bigigatus (up to 50%) and Chiasmolithus spp. (90%), more likely indicating cold oligotrophic conditions. Abundant reworked Cretaceous and Palaeocene species prevailing over the autochthonous taxa are re-occluded just prior the lower SI, suggesting a vigorous regressive pulse.

The cool water Chiasmolithus reach its maximum abundance (27%) in this interval concurrently with temporal elimination of warm water Discocyst and occurrence of common braarudapedalma (16%). The drastic nannofossil assemblage corresponds to the base of the lowermost SI. The forgoing of the Discocyst/Sphinctodinium dominated assemblage, dilution of Chiasmolithus, and sharp reduction of Z. bigigatus signal the onset of warmer and more eutrophic environment of layered sequence. Discocyst and Sphinctodinium show coherent oscillations, but Toweia and Z. bigigatus follow a reverse trend. Generally, total nannofossil abundance declines within SIs, but its minima just precede or immediately postdate SIs and correspond to the highest discordant values (up to 50%) implying very warm conditions and, possibly, higher salinity level just prior to SI accumulation. Among nannofossil taxa, only Z. bigigatus shows a dramatic drop within the SIs. Discocysterae becomes partially replaced by tolerant Toweia spp. coherently with occurrence of abundant dinocysts, which may indicate nutrient excess due to enhanced terrestrial input. Discocyst minima are marked in the marl along with reoccurrence of Z. bigigatus suggesting the temperature and fertilization drop in the periods between SI accumulation. Pontosphaera spp., which are usually common in neritic areas, progressively decline toward the top of the sequence, with gradual decline of Discocyst and increase of Z. bigigatus reflecting restriction of shelf habitat in the course of regression and warmth and fertilization weakening.

This, accumulation of individual SIs seems to have occurred in the course of isolated warm and nutrient influxes against a generally still warm and mesotrophic environment.

RFBR Project nos. 04-05-64835 and 06-05-62822.
VOLUME of ABSTRACTS