ENVIRONMENTAL CHANGES ASSOCIATED WITH YPRESIAN SAPROPELITE ACCUMULATION IN THE NORHERN CAUCASUS REVEALED BY NANNOFOSSIL AND GEOCHEMICAL STUDY

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During the Early Paleogene, the wide northeastern Peri-Tethys basin stretching from the Crimea to Central Asia shows three general episodes of oxygen depletion evidenced by occurrence of sediments rich in organic matter (TOC). They are: (i) a unique sapropelitic bed corresponding to Initial Eocene Thermal Maximum (IETM), (ii) a series of mid-Ypresian sapropelitic 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, sapropelitic interlayers (Muzylöv *et al.*, 1989) occurs in different facies environments in the Crimea, Caucasus, and Central Asia. The time span of their formation (upper NP12–lower NP13) 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 Kheu R., central N Caucasus. Eight dark thinly laminated interlayers (up to 4% TOC) 0.1–0.4 m thick are intercalated into 11 m thick greenish-gray marl. The SIs show distinct depletion of CaCO3, kaolinite enrichment, and Mo, Co, V, Ni, a.o. concentration. HI index is rather low (136–185), which implies substantial proportion of terrestrial organic matter. Nannofossils are rather abundant and diverse (>40 species), but show broad variation in abundance and species composition through the sequence. Pre-sapropelitic assemblage is featured by lower abundance and species diversity; it is dominated by *Zygrhablithus bijugatus* (up to 50%) and *Chiasmolithus* spp. (12%), more likely indicating cold oligotrophic conditions. Abundant reworked Cretaceous and Paleocene species prevailing over the autochthonous taxa are recorded 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 *Discoaster* and occurrence of common braarudosphaerids (16%). The drastic nannofossil turnover corresponds to the base of the lowermost SI. The forthcoming of the *Discoaster/Sphenolithus*-dominated assemblage, dilution of *Chiasmolithus*, and sharp reduction of *Z. bijugatus* signalize the onset of warmer and more eutrophic environment of layered sequence. *Discoaster* and *Sphenolithus* show coherent oscillations, but *Toweius* and *Z. bijugatus* 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 discoasterid values (up to 50%) implying very warm conditions and, possibly, higher salinity level just prior to SI accumulation. Among nannofossil taxa, only *Z. bijugatus* shows a dramatic drop within the SIs. Discoasterids become partially replaced by tolerant *Toweius* spp. coherently with occurrence of abundant dinocysts, which might indicate nutrient excess due to enhanced terrestrial input. *Discoaster* minima are marked in the marl along with reoccurrence of *Z. bijugatus* 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 *Discoaster* and increase of *Z. bijugatus* reflecting restriction of shelfal habitat in the course of regression and warmth and fertilization weakening.

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

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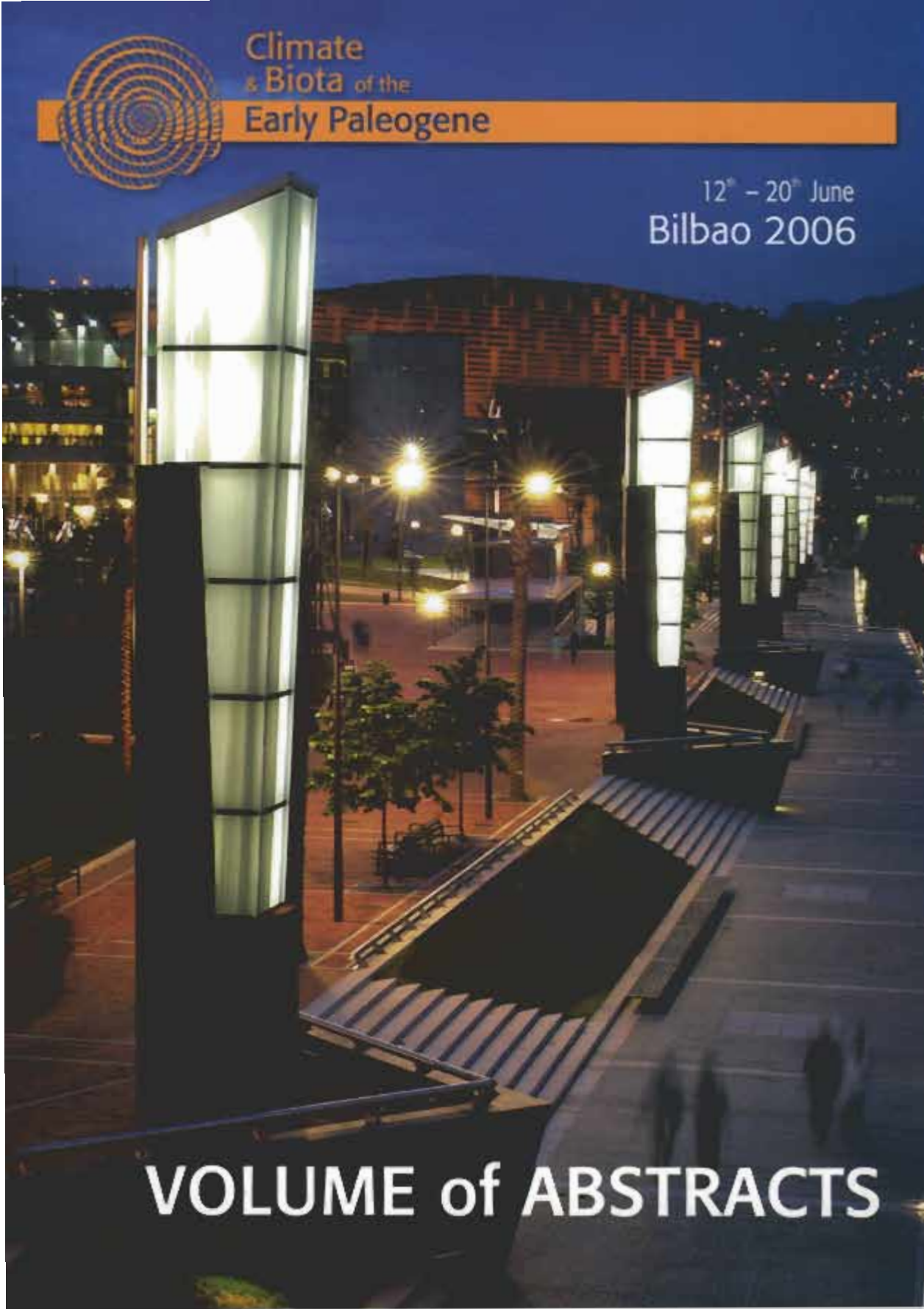
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