DYNAMICS OF PROPAGATION OF THE BIOSPHERIC EVENT AT THE PALEOCENE/EOCENE TRANSITION

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At the Paleocene/Eocene transition, drastic and manifold biotic and abiotic variations took place in the hydrosphere, on land, and in the atmosphere. The totality of these changes resulted in a large-scale biospheric event (BE). Many attempts were made to find out causes and consequences of particular phenomena in the context of this event, but none of the models focused on single phenomena can explain their interplay. We tried to link together different manifestations of BE and suggest its tentative scenario.

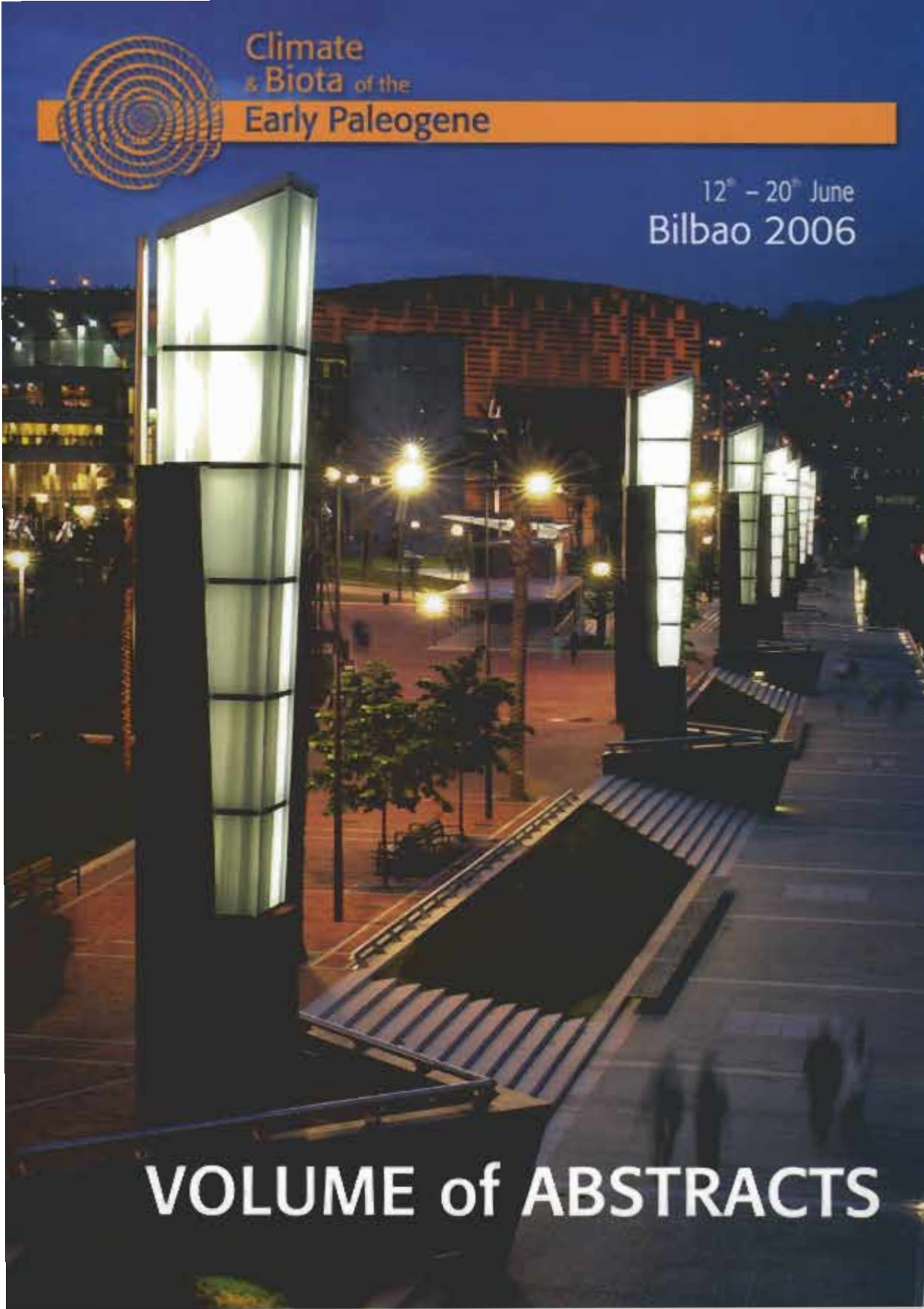
Enhanced tectonic activity at the P/E boundary caused short-period sea-level changes, namely the rapid sea-level fall of several tens of meters followed by a rash sea-level rise of large magnitude. The initial regression resulted in emergence of large wetlands. Marshlands forming in the *humid* areas prevailing at that time accumulated a wealth of organic matter, biophile elements, and authigenic kaolinite. These areas emitted a large amount of methane into the atmosphere providing the formation of carbon dioxide rich in the light C isotope. This resulted in (i) greenhouse strengthening followed by negative shift of $\partial^{18}O$ in sediments and (ii) assimilation of isotopically light C in the carbonate and organic matter of living organisms. Environmental perturbations during BE could have facilitated methane release from deep oceanic sediments (gas hydrates), likely contributing to the thermal effect, but the mechanism of this process is still poorly understood. The regression caused closure of marine passages and emergence of land bridges enabling mammalian migration. In the *arid* areas, the regression gave rise to isolated or semi-isolated basins, where salts and Mg-silicates accumulated.

During the rapid transgression that followed, insoluble and dissolved organic matter, P, Fe, etc., elements accumulated in the *humid* terrestrial areas during the preceding regressive stage were supplied into the basin causing a vigorous plankton productivity outburst in nearshore areas. In the NE Peri-Tethys and some sectors of southern Peri-Tethys, as well as other epicontinental seas, increased fertilization was accompanied by dramatic turnover from predominantly calcareous plankton communities to organic-walled plankton (picoplankton, dinoflagellates, etc.) forming enormous biomasses and initiating accumulation of TOC-rich sediments. As a consequence, anoxic environment occurred here and there in bottom water, affecting adversely bentic biota. The most part of biophile elements were consumed in these eutrophic zones, and their penetration into the open ocean areas was significantly limited, which resulted in oligotrophic conditions. The erosion and redistribution of kaolinite-rich sediments formed in the wetlands favored kaolinite concentration in marine sediments. In the *arid* areas, flooding of brackish ponds caused the warm saline water input into the basin resulting in water column stratification, reduced aeration, and occurrence of anoxic conditions in bottom water destroying bentic biota. Erosion of sediments rich in Mg-silicates, which accumulated during the preceding regression, caused their redistribution in basinal sedimentation.

Upon gradual termination of the transgressive phase, biophile element inflow ebbed, and plankton productivity declined; the methane supply into the atmosphere and thermal effect

reduced coherently with normalization of C and O isotope composition. Hence, the main BE features disappeared.

Supported by RFBR Projects nos. 06-05-65282 and 04-05-64835.


Climate
& Biota of the
Early Paleogene
12th – 20th June
Bilbao 2006
VOLUME of ABSTRACTS