Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11533, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11533
EGU General Assembly 2008

Recovery of marine productivity after the K-T boundary: Molecular evidence from Stevns Klint, Denmark

J. Sepúlveda (1,2), J. Wendler (3), R. Summons (4), K.-U. Hinrichs (2)

(1) International Graduate College – Proxies in Earth History (EUROPROX), University of Bremen, Germany

(2) Organic Geochemistry Group, Department of Geosciences, University of Bremen, 28359 Bremen, Germany

(3) Geochronology Group, Department of Geosciences, University of Bremen, 28359 Bremen, Germany

(4) Geobiology Group, Department of Earth, Atmospheric and Planetary Sciences, MIT, Cambridge MA 02139, USA

sepulved@uni-bremen.de / Fax: 56-421-21865715 / Phone: 56-421-21865742

The Cretaceous-Tertiary Boundary (KTB) is the most recent of the mass extinction events recorded on earth history and marked the end of the Mesozoic era. This event was accompanied with a disturbance of the global carbon cycle due to the disruption of photosynthesis and the biological pump in the world oceans. Although the recovery of the carbon cycle to “pre-boundary” conditions has been estimated to have lasted 4 Ma, we still poorly understand the resurgence of primary pro duction and the role of prokaryotic organisms (without fossil record) as primary producers during this period.

Using a high-resolution geochemical and molecular approach, we studied the recovery of marine productivity and the paleoenvironmental conditions in a coastal-shallow, high-latitude environment after the bolide impact at the KTB. Samples were obtained from an expanded section (40 cm) of the “Fish-Clay” at Stevns Klint, Denmark. The KTB was characterized by a negative carbon isotopic excursion of 0.5‰ and a sharp

decrease in the $CaCO_3$ content. The first few centimetres of the "Fish Clay" exhibited a quick recovery of δ^{13}C, high TOC content, and low δ^{15}N, most likely indicating the deposition of autochthonous organic carbon and a low utilization of nutrients accompanied by a low fractionation of nitrogen. This pattern was disrupted about 6 cm above the boundary where TOC decreased sharply, accompanied by a continuous increase in $CaCO_3$ content and an enrichment of δ^{15}N up-section, indicating an increased utilization of nitrogen by primary producers. Our biomarker data showed a predominance of bacterial markers (hopanes) during the deposition of the first 7 cm of the "Fish Clay", indicating the presence of a prokaryotic-dominated ecosystem. The contribution of eukaryotic biomarkers (steranes) increased slowly after a minimum at the KTB and reached maximum throughout the top of the "Fish Clay". Taking into account previous calculations of the deposition of the KTB clay (10 ± 2 x 10^3 years), we will discuss this rapid ecological turnover between prokaryotic and eukaryotic organisms after the KTB and the possible role of coastal areas on the recovery of primary production in the world oceans.