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The Cretaceous / Tertiary boundary in the Gurnigel Flysch (Switzerland) (1989)

by ERIC DE KAENEL, KATHARINA VON SALIS PERCH-NIELSEN, MMATTHIAS LINDINGER

Dieser Aufsatz (erschienen in: *Eclogae geol. Helv.* 82/2: 555-581 1989) befasst sich mit dem ersten in der Schweiz entdeckten vollständigen Kreide/Tertiär-Profil. Gleichzeitig ist es das erste Flyschprofil welches diese Grenze aufzeigt.

Um die Bedeutung dieser Arbeit zu dokumentieren erhielten wir die Erlaubnis, Kap. 8 dieses Artikels vollständig zu zitieren:

8. Discussion and conclusions

In our investigations of the Martisgraben section we have found some features typical for many marine K/T boundaries:

- the uppermost Maastrichtian *Micula prinsii* and the lowermost Danian *Markalius inversus* NP 1 Zones,
- the Boundary Clay,
- a peak in iridium of 1.53 ppb (enrichment 5 ×) in the Boundary Clay,
- the presence of goethitic spherules considered to represent diagenetically altered pyrite in the Boundary Clay.

Other characteristics were found to differ from those found in other sections.

These include:

- an enrichment in Ir in the Boundary Layers of nearly 5 ppb. The Boundary Clay, entirely lying within hemipelagic deposits, has a peak of 1.53 ppb in Ir (enrichment 5 ×). The maximum peak of nearly 5 ppb Ir (enrichment 16 ×) was found 5 mm above the K/T boundary,
- the smaller than normal negative shift in $\delta^{13}\text{C}$ across the boundary (1‰) and the immediate shift back into positive values (2.7‰). This might be due to the fact that the calcite measured is not mainly of calcareous plankton origin but is mainly detrital,
- the general decline in $\delta^{18}\text{O}$ and the characteristic increase in $\delta^{18}\text{O}$ isotopic ratios across the K/T boundary are difficult to interpret in terms of a cooling of the water temperatures. Diagenetic overprint seems to be obvious and causes perturbations in the oxygen isotopic signals,
- the increase in TOC noted by LINDINGER (1987) in the Boundary Clay of the Caravaca section and by KELLER & LINDINGER (in press) at El Kef was not found in the Boundary Clay. A relative increase in TOC some 1.3 cm above the K/T boundary could be equivalent with the TOC peak at other shallow-water K/T boundaries. This can be interpreted as meaning that the organic carbon entering the hydrosphere and representing the mass mortality of the phyto- and zooplankton and land debris at the K/T boundary reaches the depth of deposition of this site later, after the deposition of the Boundary Clay. This interpretation, however, is highly speculative,
- a drop in carbonate content to values below 10%. This is a relatively high CaCO_3 content for the K/T Boundary Clay which is normally devoid of calcite or includes only 1 or 2% of it in other sections. This, again, is believed to be a result of the fact that, at our site, the calcite is essentially detrital and was transported to the site by turbidity currents and not as part of fecal pellets containing coccoliths or as settling of planktic foraminifera,
- the minimum in transported quartz (19%) is relatively high compared with other K/T boundary sections but explainable if the high amount of turbiditic detritus of the sediments is considered,
- no discordance (erosion surface due to sea level fall) has been observed. No disruption in the sedimentation occurred across the K/T boundary.

The Martisgraben is the first complete K/T boundary section in Switzerland and the first flysch section containing this boundary known to date. Although this section may not be considered an ideal K/T boundary site, it is concluded that the event at the end of the Cretaceous Period was sudden and global as documented in this deep-sea section.

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