

Imprint of Deccan volcanism and changes in pelagic carbonate production across the Cretaceous – Paleogene boundary section of Nye Kløv (N. Denmark)

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Although less emblematic than the Stevns Klint section, the Cretaceous-Paleogene boundary (K-PgB) section of Nye Kløv (N. Denmark) has been the subject of few past contributions but lacked integration of geochemical and micropaleontological investigations. This section shows however a much better preservation of calcareous microfossils than at Stevns Klint, and none of the hardgrounds documented in the Maastrichtian of this latter section. High-resolution geochemical analysis coupled with paleontological data unravel a detailed scenario of environmental changes across the mass extinction in the Boreal realm. Bulk carbonate carbon and oxygen isotopes, elemental data from XRF, XRD mineralogical data, mercury content and rock-EVAL analysis provide a robust paleoenvironmental framework. In the late Maastrichtian, the Kjølby Gaard marl represents an event of particular importance, characterized by depleted values in oxygen isotopes, by a brief episode of colonization of the Chalk sea by tropical nannofossil taxa and by a significant mercury anomaly. These data suggest a strong imprint of a latest Maastrichtian volcanic episode associated with a brief hyperthermal event. Correlation of the Maastrichtian interval to an expanded, astronomically calibrated section in central Jutland allows for dating this event at just 60 kyr prior to the deposition of the boundary clay and constrains late Maastrichtian sediment accumulation rates to around 11.5 cm/kyr. We suggest that the Kjølby Gaard marl event correlates with a similar short warming and transient mercury anomaly previously delineated just below the K-PgB in central Tunisia but absent in reference South Atlantic deep-sea sites. In the Danian, remarkable precession and short-eccentricity cycles are recorded in oxygen isotopes, allowing for an astronomical calibration of the signal and constraining sediment accumulation rates to an average of 2 cm/kyr. Hence, we record up to a 6-fold decrease in pelagic carbonate production in the earliest Danian of the Chalk sea as an effect of the mass extinction. Finally, two early Danian mercury anomalies are highlighted, one of which is related to a well-delineated Dan-C2 event in the bulk carbon isotope curve. All together, these new data reascertain the likely role of Deccan