Stratigraphy of the lower Danian in the Danish Basin: Perspectives from calcareous nannofossils and stable isotopes

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The Danian Stage is characterized primarily by ecological recovery from the mass extinction at the Cretaceous/Paleogene boundary (K/Pg), as well as several enigmatic climatic events such as the Dan-C2 hyperthermal event and other potential short environmental perturbations from Deccan volcanism. However, the Danian Stage remains poorly studied in the Boreal Realm. In this study, two Danian sections in the Danish Basin (onshore Denmark) are examined: Nye Kløv (NW Jylland) and the recently drilled BH-01 core (north of Næstved, Sjælland). Isotopic records from both localities allowed application of an age model via carbon isotope stratigraphy.

For the Danian of the Nye Kløv section, calcareous nannofossil quantitative abundance was integrated with previously established isotopic and biotic records. For the BH-01 core, new nannofossil biostratigraphy and carbon and oxygen isotope records on bulk carbonate were obtained. Correlation of the nannofossil recovery pattern and carbon isotope records at Nye Kløv revealed a delayed recovery of the assemblages, with the increase of emergent species possibly linked to the early Danian Dan-C2 hyperthermal event. The new nannofossil biostratigraphy of the BH-01 core links the lower Danian deposits at the classic locality of Stevns Klint to the middle Danian limestones at Faxe Quarry, eastern Sjælland. This study, incorporating the absolute abundance of reworked Cretaceous species, Cretaceous survivor taxa, and Danian emergent species, indicates a probable full recovery of the nannoplankton assemblages within 1 Myr following the K/Pg boundary in the Danish Basin.