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Orbital calibration of the late Campanian carbon isotope event in the North Sea

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A new record of carbon isotopes, nannofossil biostratigraphy, gamma-ray and Fe content variations is presented for the upper Campanian of the Adda-3 core, Danish Central Graben, North Sea. The studied interval provides a revision of previously assigned late Coniacian to early Santonian ages. New biostratigraphic data show a late Campanian age for the 60-m thick studied interval. The Late Campanian Event (LCE) is well-recorded by a 1.5‰ negative excursion in the bulk δ13C, along with two stepwise pre-excursion negative shifts (defining the pre-LCE). The amplitude of the LCE appears higher in the North Sea than in other areas as seen from the correlation to Germany, UK, and France. This correlation allows identification of a new 0.4‰ negative excursion (defined as the conica event). Fe and gamma-ray variations are used to calibrate the record with cyclostratigraphy. Fourteen 405 kyr cycles identified in the upper Campanian of Adda-3 can be correlated to North Germany. The compilation of previous results from North Germany and correlation to Adda-3 indicates that the Boreal upper Campanian spans a total of seventeen 405 cycles, i.e. 6.885 Myr. The duration of the LCE is estimated to be of ca. 1 Myr at Adda-3 and in North Germany.