



The Cenomanian – Turonian of the Wunstorf section – (North Germany): global stratigraphic reference section and new orbital time scale for Oceanic Anoxic Event 2

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With 11 figures and 1 table

Abstract. The Cenomanian–Turonian Boundary Event (CTBE) is reflected by one of the most extreme carbon cycle perturbations in Earth's history and is characterized by the widespread occurrence of sediments indicating oxygen deficiency in oceanic waters (Oceanic Anoxic Event 2 = OAE 2). At Wunstorf (northern Germany) the CTBE is represented by a 26.5 m thick sedimentary succession consisting of rhythmically bedded laminated black shales, dark organic-rich marls and marly limestones yielding abundant micro- and macrofossils, making the locality particularly well suited to serve as an international standard reference section for the CTBE. In 2006 a newly drilled continuous core recovered 76 m of middle Cenomanian to middle Turonian sediments. A high-resolution carbonate $\delta^{13}\text{C}$ curve derived from core samples resolves all known features of the positive $\delta^{13}\text{C}$ anomaly of OAE 2 with high accuracy. Throughout the middle Cenomanian – middle Turonian succession, the $\delta^{13}\text{C}$ curve shows numerous small-scaled positive excursions, which appear to be cyclic. High-resolution borehole geophysics and XRF core scanning were performed to generate two time series of gamma-ray data and Ti concentrations for the CTBE black shale succession. Hierarchical bundling of sedimentary cycles as well as spectral analysis and Gaussian filtering of dominant frequencies reveal cycle frequency ratios characteristic for short eccentricity modulated precession (100 kyr, 21 kyr). This new orbital time scale provides a time estimate of 430–445 kyr for the duration of OAE 2 and refines the existing orbital age models developed at localities in the English Chalk, the Western Interior Basin and the Tarfaya Basin. Based on the new age model and high-resolution carbon isotope correlation, our data allow for the first time a precise basin-wide reconstruction of the palaeoceanographic modifications within the European shelf sea during OAE 2.

Key words. Carbon isotope stratigraphy, OAE 2, CTBE, Cretaceous, orbital time scale

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