Black Shale Deposition on the Northwest African Shelf During the Cenomanian/Turonian Oceanic Anoxic Event: Climate Coupling and Global Organic Carbon Burial

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High-resolution geochemical records from a depth transect through the Cenomanian/Turonian (C/T) Tarfaya Basin (NW African shelf) reveal high-amplitude fluctuations in accumulation rates of organic carbon (OC), redox-sensitive and sulphide-forming trace metals, and biomarkers indicative of photic zone euxinia. These fluctuations are in general coeval and thus imply a strong relationship of OC burial and water column redox conditions. The pacing and regularity of the records and the absence of a prominent continental signature suggest a dynamic depositional setting linked to orbital and higher frequency forcing. Determining the dominant frequency depends on the definition of the OAE2 and its duration. We propose that eccentricity is the main forcing factor at Tarfaya that controlled fluctuations in wind-driven upwelling of nutrient-rich, oxygen-depleted intermediate waters from the adjacent Atlantic and the periodic development of photic zone and bottom water euxinia on the mid-Cretaceous NW-African Shelf. Accumulation records clearly identify the basin centre as the primary site of sediment deposition with highest temporal variability and an up to six-fold increase in OC burial from ~2 g/m2Â·yr prior to the OAE2 to ~12 g/m2Â·yr during the OAE2. Photic zone and bottom water euxinia alternated with periods of greater oxygenation of the water column in response to climate forcing. Mass balance calculations imply that ~2% of the overall global excess OC burial associated with the OAE2 was deposited in the Tarfaya Basin, an area that represented only ~0.05% of the total global C/T ocean floor. In fact, the lateral extent of similar black shales along the African continental margin indicates that this part of the ocean contributed significantly to the global increase in organic carbon burial during the OAE2.