

Time lag between organic carbon burial and mid-Cretaceous OAEs on the Arabian plate – coincidence or interrelation?

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The pelagic carbonate succession of the Shilaif intra-shelf basin in the United Arab Emirates represents a bio- and chemostratigraphically well-calibrated record throughout the mid-Cretaceous greenhouse climate. It shows great potential to study marine palaeoenvironmental and depositional changes at equatorial palaeo-latitudes during the global carbon-cycle perturbations associated with the late Albian OAE 1d and the Cenomanian-Turonian OAE 2 and allows for new perspectives on local, regional and global environmental processes that control marine organic matter enrichment at these times. Here we present an integrated geochemical ($\delta^{13}\text{C}$, XRF analysis, organic matter characterisation), sedimentological (microfacies), and statistical (time series analysis) dataset from the Shilaif intra-shelf basin, across the late Albian and the Cenomanian-Turonian boundary. The carbon isotope record of the late Albian OAE 1d incorporates a positive shift in $\delta^{13}\text{C}_{\text{carb}}$ coeval with a negative shift in $\delta^{13}\text{C}_{\text{org}}$. The deposition of organic-rich carbonates clearly predated the excursion and an abrupt termination of cyclic siliciclastic input suggests sea level rise coevally with global carbon cycle change at this time. The positive excursion in $\delta^{13}\text{C}_{\text{org}}$ and $\delta^{13}\text{C}_{\text{carb}}$ at the Cenomanian-Turonian OAE 2 in the studied succession is marked by relatively organic-lean deposits, but is predated by the deposition of laminated organic-rich carbonates. The episodic increase of siliciclastic element concentrations indicates a relative sea level drop concurring with OAE 2, with the sedimentary record suggesting high-frequency detrital input coupled with high productivity.

The results for the palaeoequatorial intra-shelf basin expressions of OAE 1d and OAE 2 show that organic carbon burial occurred stratigraphically below the associated carbon isotope excursions and highlight different causes leading to its termination.