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# Boreal organic-rich sediments of Oceanic Anoxic Event 2: dinoflagellate cysts, anoxia and an intensified hydrological cycle

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Diverse palynological assemblages have been recovered from Cenomanian-Turonian boundary (CTB) successions in the central North Sea and onshore NE England that contain organic-rich deposits characteristic of Oceanic Anoxic Event 2 (OAE2). The stratigraphic extent of the event is evidenced by a marked positive excursion in $\delta^{13}C_{org}$ profiles. Palynomorphs are absent in the chalks immediately underlying the onset of the positive isotope excursion. Pulses of abundant spores and pollen are associated with the appearance of organic-walled dinoflagellate cysts (dinocysts) in marlier but organic-lean sediments characterizing the early stages of the event. Dinocyst assemblages are indicative of an outer neritic environment, with high abundances of *Spiniferites* spp. and the presence species such as *Pterodinium cornutum*. Black shales are confined to the later stages of the CTB interval and the peak of the $\delta^{13}C_{org}$ excursion. These are characterized by abundant *Cyclonephelium*, which has been reported to be representative of anoxic conditions, but also reduced salinity and lower nutrient environments. Changes of the assemblage from open water species to that of species associated with lower salinity/shallower water environments is coeval with a trend to more negative $\delta^{18}O$ values, indicative of increasing water temperature. It is postulated that intensification the hydrological cycle during latest Cenomanian global warming and eustatic sea-level rise, increased the flow of freshwater into the oceans and modified ocean circulation patterns, transporting shallower water species out into open water.