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Late Jurassic – earliest Cretaceous Boreal Shelf Anoxic Event (SAE) and its possible causes

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Oceanic anoxic events are attracting much attention due to multiple reasons.
Numerous studies of oceanic anoxic events (OAE) during the last decades have revealed some typical features, applicable for these events. OAEs are characterized by very wide distribution across the both oceanic and shelf basins, they associated with significant disturbances of carbon cycle, and generally are very short-term, lasting some tens to hundreds of the thousand years. Onset of typical OAE is nearly synchronous across different basins, and due to significant excursions of carbon isotope values these events could be also traced through non-marine successions.
However, in addition to 'typical' OAE other intervals of the black shales widespread distribution are known, especially important such interval is the Upper Jurassic – lowermost Cretaceous. It is also recognizable across the multiple basins and subbasins, but plenty of significant differences from typical OAE prevents to recognize it to as 'Late Jurassic anoxic event' (Nozaki et al., 2013) or 'Oxf-Kim OAE' (Trabucho-Alexandre et al., 2012) related to well-known Cretaceous OAEs. This Shelf Anoxic Event (SAE) is characterized by the following set of key features:
1) Although being very widely distributed in Boreal shelves (and also known from the high-latitude sites of the Southern Hemisphere) latest Jurassic to earliest Cretaceous black shales are virtually missing or very rare in low latitude and oceanic sites
2) Onset and termination of this SAE are strongly diachronous within different basins and sometimes inside basins
3) Deposition of finely-laminated black shales and associated anoxic to disoxic environments lasted some millions of year (up to $\sim$ 20 My, se Georgiev et al., 2017)
3) Two different patterns of black shale deposition during this SAE are recognized: a) Subboreal one (type – Kimmeridge Clay Fm), characterized by intercalation of black shales with typical shallow-water clays, mudstones, sands etc, which are lacking any traces of oxygen deficient and b) Boreal one (type – Bazhenovo Fm of the Western Siberia), characterized by massive black shale members of the variable thickness, which were deposited in anoxic to disoxyc environments during the long periods of time
4) SAE is not associated with any significant oscillations in carbon cycle
Black shales deposited during the SAE are characterized by high content of planctonic and nektonic fossils (cephalopods, fishes etc), while benthonic elements are represented by few taxa, which are usually belonging to genera tolerant to low oxygen contents.
Rising temperatures accompanied by increased productivity together with slower ocean circulation are considered among the factors responsible for such prolonged black shale deposition in Arctic (Georgiev et al., 2017). However, additional factors could be invoked for explanation of such an unique SAE. It is very possible that along with changes in oceanic circulation caused by Pangaea breakup, significant changes in plankton ecosystems could be responsible for such a long-lasting high productivity. During the Late Jurassic calcareous nannofossils at the first time became common in high latitudes, and their appearance could be responsible for prolonged disturbance of ecosystem.
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