Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.10932

Shallow and deep ocean Fe cycling and redox evolution across the Pliensbachian-Toarcian

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The early Toarcian Oceanic Anoxic Event (T-OAE; ~183 Ma) (Jenkyns, 1988) was one of the most significant environmental perturbations of the Mesozoic, characterized by a pronounced carbon cycle perturbation, widespread deposition of organic-rich sediments and seawater deoxygenation, as well as a minor mass extinction. Similar climate and environmental perturbations likely occurred across the Pliensbachian-Toarcian (Pl-To) boundary. However, the extent and significance of deoxygenation from the late Pliensbachian to early Toarcian is unclear due to the lack of records, especially deep-water archives outside of Europe. We have collected high-resolution Fe-speciation and trace element concentration data across deep and shallow water Panthalassic Ocean sections spanning from the late Pliensbachian to early Toarcian. Fe-speciation and trace element data from the deep-water site indicate that anoxic/ferruginous conditions characterized the open Panthalassic Ocean from the late Pliensbachian to the end of the T-OAE. This site shows evidence for potentially euxinic pore waters near the Pl-To boundary, and euxinic bottom water across the T-OAE, with a transition towards more oxygenated conditions after the T-OAE. Fe-speciation data from the shallow water site also ostensibly suggest anoxic/ferruginous conditions across the T-OAE, but trace element and sedimentological data indicate oxygenated to possibly suboxic conditions. This ambiguity can be attributed to the upwelling of waters from the deep ocean, which brought ferruginous water to the shelf, whereupon Fe^{2+} was oxidized in oxic shallow waters and deposited largely *in situ*.