Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.5841

Geochemical approach to constrain bottom-water oxygenation during the Toarcian Oceanic Anoxic Event (T-OAE) at the Northern Iberian Palaeomargin

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Warm temperatures resulting from high levels of atmospheric greenhouse gases during the Mesozoic led to organic-rich black shales deposition in turn reflecting major changes in seawater oxygenation. In particular, the Toarcian Oceanic Anoxic Event (T-OAE) is marked by a major biological crisis involving the extinction of many marine groups, and geochemical disturbances, including a characteristic negative isotopic excursion (CIE) in T-OAE sediments. In order to reconstruct palaeoenvironmental conditions during the T-OAE, two sections have been selected from the Lower Jurassic in the Asturian Basin (northern Spain): Lastres and Rodiles. Outcropping sediments are characterized by alternations of marl and limestone levels, with intercalated organic matter-rich black shales, dated at the boundary between the *Tenuicostatum* and *Serpentinum* zones, thus associated with the T-OAE. Previous sedimentological and ichnological bed-by-bed analysis allowed to recognize the relative diverse and abundant ichnoassemblages before and after the T-OAE, and the scarcity or absence of trace fossils during this event, which is represented by laminated organic-rich black shales and intercalated marls. Geochemical proxies have been here used to reconstruct bottom- and pore-water conditions and sediment diagenesis as well as detrital input during the T-OAE in this basin. These proxies have served to constrain the hydrodynamic features of the basin (*e.g.*, restricted conditions or upwelling) and to determining the redox thresholds for several elements and proxies (*e.g.*, V, U, Mo, TOC, DOP or C_{org}/P), as well as the origin of the organic matter, which corresponds mainly to Type II kerogen. Obtained data have also revealed changes in eolian and fluvial input to the basin and the evolution of redox conditions. Anoxia was sparsely reached, only during deposition of some black shales and dark marls, while most of the used proxies (such as DOP_T and Mo and U enriched factors) indicate dominant oxic to suboxic conditions during this event. Mo and TOC values support a restricted basin with high redox variability.