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Sedimentary organic matter in Upper Pliensbachian–Lower Toarcian successions of the External Subbetic (Betic Cordillera, SE Spain)

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Organic matter (OM) content in marine environments depends on the interplay between a large number of mechanisms and complex feedback interactions. In many locations around the globe, the Early Toarcian oceanic anoxic event (T-OAE) is characterised by OM-rich sediments and several carbon isotope excursions (CIE), recorded in fossil wood, marine carbonates and OM (e.g. Jenkyns et al., 2010).
Although anoxia seems to have been a major control in the occurrence of T-OAE associated OM-rich facies, the role of oceanic productivity and sediment dilution is still poorly understood. In the Southiberian Paleomargin represented in the Betic Cordillera (South of Spain), Lower Toarcian sections have indications of at least dysoxia during the T-OAE interval and are poor in OM (Rodríguez-Tovar and Reolid, 2013, Reolid et al., 2014). It was suggested that in this area, OM content was mainly controlled by the input of continentally (or terrestrially) derived OM, with variation of marine productivity and redox conditions at the sea floor (Rodríguez-Tovar and Reolid, 2013, Reolid et al., 2014). The holistic interpretation of lithology, sedimentological features, sedimentary OM, and geochemistry of these successions in the Mediterranean/western Tethyan paleogeographical domain allows a better understanding of the sedimentary, paleobiological, and paleooceanic dynamics before, during, and after the T-OAE in the Southiberian Paleomargin.
A detailed study focusing on the characterization of sedimentary OM was conducted for the first time in 31 fine grained marly samples from Upper Pliensbachian–Lower Toarcian interval of two sections, La Cerradura and Fuente Vidriera. Analyses include total organic carbon (TOC), % total sulphur (TS), % $CaCO_3$, carbon isotopes in OM (δ^{13}CTOC), biomarkers and prepared for palynofacies according to standard procedures.
Results confirm that the studied sections are poor in OM, with TOC reaching up to 0.46 wt.% in La Cerradura section. δ^{13}CTOC values reveal the negative CIE associated with the T-OAE at the base of Serpentinum Zone. Palynofacies assemblages from these sections include all the main kerogen groups: Phytoclast, Amorphous, Palynomorph, and Zooclast. Most of the studied samples are characterised by high amounts of terrestrial OM, with a high abundance of phytoclasts and some sporomorphs and tetrads, particularly at the base of Serpentinum Zone and coinciding with the T-OAE. Biomarkers analysis agrees with the palynofacies trends with the presence of abundant long-chain n-alkanes, C20 tricyclic terpane, and C24 tetracyclic terpane demonstrating the dominance of continental OM, particularly, during the Serpentinum Zone. These trends are also confirmed by steranes, with greater dominance of C29 regular sterane, a compound derived from higher plants.
Based on the obtained results, we demonstrated that the T-OAE in the Southiberian Paleomargin is materialized by low accumulation and preservation of OM with a significant terrestrial contribution. Similar characteristics are observed in other locations of the Iberian margin.

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