Variation of kerogen assemblages and $\delta^{13}C_{Kerogen}$ in Lower Toarcian successions of the southern Tethyan margin

Bruno Rodrigues[1], Ricardo L. Silva[2,1], João Graciano Mendonça Filho[3], Luís V. Duarte[1], Matías Reolid[4], Driss Sadki[5]

[1] MARE – Marine and Environmental Sciences Centre, Faculdade de Ciências e Tecnologia, Universidade de Coimbra, Departamento de Ciências da Terra, Coimbra, Portugal
[2] Department of Geology, School of Natural Sciences, Trinity College Dublin, The University of Dublin, Dublin, Ireland
[3] Departamento de Geologia, Instituto de Geociências, Centro de Ciências Matemáticas e da Natureza, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
[4] Departamento de Geología and CEACT, Universidad de Jaén, Jaén, Spain
[5] Moulay Ismaïl University, Faculty of Science, Meknes, Morocco

Corresponding Author:
Bruno Rodrigues[1]
Rua Sílvio Lima, Pólo II da Universidade de Coimbra, Coimbra, 3030-790, Portugal
Email address: brunohteixeira@gmail.com

Abstract

The early Toarcian Oceanic Anoxic Event (T-OAE) is associated with an "excess" of C^{12} in the atmospheric and ocean carbon reservoirs and widespread occurrence of organic-rich facies around the globe (e.g. Hesselbo et al., 2007; Jenkyns, 2010). The T-OAE is recorded as a pronounced negative carbon isotopic excursion (CIE) in carbonates, fossil wood, and kerogens at the base of the Serpentinum (=Falciferum=Levisoni) Chronozone, positioned within a broad $\delta^{13}C$ positive trend initiated at the base of the Lower Toarcian. Contrasts in deposition and preservation of OM between the northern and southern Tethyan margins are observed during the T-OAE. Several sections of the northern Tethyan margin are enriched in OM, whereas in the southern Tethyan margin, organic-rich facies are spatially and temporally restricted and have lower TOC (e.g. Jenkyns, 2010). This dichotomy reflects differentiated depositional and environmental conditions between the two margins, controlled by the interplay of local, regional, and global constraints (distinct palaeogeographical location, OM type and source, palaeoceanography, climate, tectonics, etc.).

This study investigates the variation of kerogen assemblages and $\delta^{13}C_{Kerogen}$ in the Upper Pliensbachian–Lower Toarcian interval along the southern Tethyan margin, i.e. Lusitanian Basin (Portugal), Betic Cordillera (Spain), and Middle Atlas (Morocco). The objective is to contribute to the understanding of the paleoenvironmental variables and dynamics that influenced deposition and preservation of OM during the Late Pliensbachian–Early Toarcian in the Tethyan region.

Preliminary analysis revealed that Upper Pliensbachian–Lower Toarcian kerogen assemblages from the Lusitanian, Betic Cordillera and Middle Atlas basins are dominated by terrestrial particles (phytoclasts and sporomorphs) and have relatively more positive $\delta^{13}C$ values when compared with correlative North-European sections. In the Lusitanian Basin and Betic Cordillera, the T-OAE negative CIE is observed in the $\delta^{13}C_{Kerogen}$ record and is accompanied by an increase in terrestrial palynomorphs, non-opaque phytoclasts (NOP), and cuticle fragments. These increases are in line with the posited intensification of continental weathering, acceleration of the hydrological cycle, and increased export of terrestrial OM into marine environments during the T-OAE (e.g. Jenkyns, 2010).

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