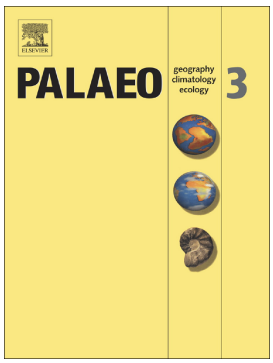

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PII: S0031-0182(18)30265-7
DOI: doi:10.1016/j.palaeo.2018.07.006
Reference: PALAEO 8858

To appear in: *Palaeogeography, Palaeoclimatology, Palaeoecology*

Received date: 24 March 2018
Revised date: 5 July 2018
Accepted date: 9 July 2018

Please cite this article as: Luis O'Dogherty, Roque Aguado, Peter O. Baumgartner, Markus Bill, Špela Goričan, José Sandoval, Leandro Sequeiros , Carbon-isotope stratigraphy and pelagic biofacies of the middle–upper Jurassic transition in the Tethys–Central Atlantic connection. Palaeo (2018), doi:10.1016/j.palaeo.2018.07.006

Carbon-isotope stratigraphy and pelagic biofacies of the Middle–Upper Jurassic transition in the Tethys–Central Atlantic connection

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Abstract

A bulk carbon-isotope stratigraphy, based on high-resolution sampling of five stratigraphic ammonite-dated sections from pelagic swells of the Subbetic basin (External Zones of the Betic Cordillera, southern Spain) is presented. The studied sections are characterized by Callovian–Oxfordian stratigraphic successions located in the South Iberian palaeomargin, a key area connecting the Central Atlantic to the Tethys oceans. The rocks are mainly nodular limestones with common extreme condensation (*rosso ammonitico* facies). Discontinuities with hiatuses of variable duration, submarine "hardgrounds", Fe-Mn ooids, limonite crusts, and neptunian dykes are observed around the Callovian/Oxfordian boundary. The stratigraphic record, although very time-averaged, allows for a consistent and accurate ammonite chronostratigraphy. The carbon isotopes of marine carbonates show a marked trend towards high $\delta^{13}C$ values from Lower Oxfordian to the Middle Oxfordian (~4.3 ‰, near the Plicatilis/Transversarium boundary). The isotopic values stand between 2.7–3.0 ‰ at the Upper Oxfordian (Bifurcatus and Hypselum Zones) and lowermost Kimmeridgian (Bimammatum Zone); afterward $\delta^{13}C$ values decrease and reach a relative minimum (~2.3–2.5 ‰) in the Lower Kimmeridgian (Bimammatum/Planula boundary). Finally, isotopic values increase again (~2.6–2.7 ‰) in the lower Kimmeridgian (mid part of the Planula Zone). Comparison of carbon-isotope stratigraphy between Subbetic and other Tethyan areas shows similar trends. The replacement of thin-shelled bivalves by planktonic foraminifers and radiolarians that took place in the Callovian/Oxfordian boundary can be associated to the widening of the trans-Pangaean seaway . This, in turn, triggered the global warming which increased nutrients concentration in upper water column due to intensified nutrient input by river plumes. These phenomena are concomitant with the major Oxfordian $\delta^{13}C$ positive excursion and with a transgressive cycle.

Keywords: ammonites; Oxfordian; planktonic foraminifers; southern Spain; thin-shelled bivalves; radiolarians

1. Introduction