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New Paleoenvironmental and Biotic Records from the Triassic-Jurassic Boundary Interval of the Algarve Basin, Portugal

[Kasprak, A. H.](#); [Whiteside, J. H.](#); [Lopes, F. M.](#); [Brusatte, S. L.](#); [Butler, R. J.](#); [Mateus, O.](#)
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Studies of carbonate, bulk organic, and compound-specific stable isotopes of carbon have shown that the Triassic-Jurassic boundary interval (including the end-Triassic mass extinction) displays major, global perturbations to the carbon cycle. These records are instrumental not only in reconstructing environmental change, as they are thought to reflect ecosystem instability and changing atmospheric gas inventories, but, due to their global nature, can be useful tools for stratigraphic correlation. The Algarve Basin, a deformed, extensional basin in the south of Portugal, has potential for yielding insight into the dramatic paleoenvironmental and faunal changes that occurred during the latest Triassic through earliest Jurassic. During this time interval, the basin records an evolution from continental to marginal marine sediments that are interbedded with radioisotopically dated Central Atlantic Magmatic Province (CAMP) basalts, thought to be a major causative agent in the end-Triassic mass extinction. Recent field excavations in the Algarve Basin have documented terrestrial vertebrate remains at multiple horizons, including a rich bone bed densely packed with well-preserved remains of large stereospondyl temnospondyls (skull length up to ~1 meter) positioned close to the Triassic-Jurassic boundary. These stereospondyls may represent some of the latest surviving members of their groups in Europe, and occur in a time interval in which stereospondyl material is scarce and represented primarily by isolated and fragmentary material. Unfortunately, the paleoenvironmental and chronologic framework of the Algarve Basin is not well constrained, despite its importance as a critical record of this time in Earth history. We present a preliminary bulk organic carbon isotope record of early Mesozoic rift-basin sediments from the Algarve Basin. This record exhibits significant variability, but appears to record a trend towards more negative values at the top of the section, though this needs better constraint with further sampling. Although the potential for changes in the source of organic material can be expected to have an effect on the overall signal, the presence of depleted $\delta^{13}\text{C}$ values in proximity to CAMP basalts relative to stratigraphically lower sections points to the potential for identifying key negative excursions associated with Triassic-Jurassic boundary events in the Algarve Basin.

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