Paper Number: 4753

A Triassic–Jurassic Carbonate record from the Paleoequator: Chemostratigraphy and Sedimentology of Three Boundary Sections in the Ghalilah Formation Ras Al Khaimah, UAE.

Al-Suwaidi, A.[1], Steuber, T.[1] Yuzhu, G.[1] , and Suarez, M

[1]Petroleum Geoscience Dept., PI-URC, PO BOX 2533, Abu Dhabi, UAE. aalsuwaidi@pi.ac.ae.
[2]Dept. of Geological Sciences, The University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249

The Ghalilah formation, UAE provides a complete and continuous equatorial shallow water carbonate sequence through the Late Triassic to Early Jurassic, here we present new carbon isotope data and sedimentological analysis from three sections in Ras Al Khaimah, UAE. The Triassic–Jurassic (T–J) transition was a time of considerable environmental perturbation and is considered to be one of the six largest extinction events on Earth. This event is associated with large perturbations of the global carbon cycle as recorded in the isotopic composition of organic and marine carbonate carbon [1]. The T–J event is likely related to volcanic CO_2 degassing from the Central Atlantic Magmatic Province [2]. This event has been elsewhere associated with widespread ocean acidification and a major disruption in marine carbonate production in neritic and pelagic environments [3]. During the Triassic, the Arabian Plate occupied an equatorial position in the Proto-tethys and formed an extensive shelf off Gondwana, dominated by carbonate sedimentation. A significant influx of siliciclastic material during the Norian–Rhaetian was possibly the result of increased erosion of the Arabian Shield. However, during the Rhaetian, carbonate production recovered, as recorded in shallow-water limestones with characteristic Late Triassic reefal and lagoonal biota including solitary and branching corals, sphinctozoan and chaetetid sponges and wallowaconchid bivalves [4]. These fossiliferous limestones are followed by a thick sequence of high-energy deposits such as oolites and cross-bedded pack-rudstones with abundant evidence of intraformational reworking. Macrofossils are absent in these deposits. Stable carbon isotopes from bulk carbonate through this interval show the characteristic short-lived negative excursion in the Rhaetian reefal deposits followed by a longer lived negative excursion in the Earliest Hettangian. Based on correlation with published carbon-isotope curves from other sections, the Triassic–Jurassic boundary is placed in the basal ooids, above the level of disappearance of previously abundant marine macrofauna. The presence of oolites in the boundary interval indicates a shallow-marine system supersaturated with respect to calcium carbonate, oolites are also present in Alpine sections at this level [5]. Shoaling of the carbon compensation depth likely resulted in an increase in carbonate saturation in warm shallow water [6] which elsewhere below the shoaled CCD likely resulted in poor preservation of carbonates.

Sedimentological evaluation of the sections shows an increase in the influx of fine-grained clastic material in the Earliest Hettangian likely as a result of an increase in aeolian inputs in the Earliest Jurassic likely reflecting a changing climatic regime.

References:

[1] Hesselbo et al. (2002) Geology 30:251-254.
[2] Blackburn et al. (2013) Science 340:941–945.
[3] Greene et al. (2012) Earth Sci. Rev. 113:72–93.
[4] Maurer et al. (2008) Int. J. of Earth Sci. 97:765–784.

[5] Felber R. et al. (2015) Swiss J. of Geo.
[6] Kump L. et al. (2009) Oceanography, 22:94–107