



## **Stable isotope analyses of belemnites from the Pliensbachian-Toarcian boundary: implications for salinity variation within the Tethys Ocean**

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Carbon and oxygen isotope data derived from belemnites are presented. These data are from published and new records derived from the Pliensbachian-Toarcian boundary (equivalent to the Margaritatus to Tenuicostatum Zones, i.e. immediately prior to the Toarcian oceanic anoxic event) from a number of sites across the Tethys Ocean including Raasay and Dorset, UK, the Lusitanian Basin, Portugal, the Basque-Cantabrian Basin, Spain and the Middle Atlas, Morocco. The belemnite oxygen isotope data presented here shows the most positive values at the lowest latitude site (Morocco) and most negative values at the highest latitude site (Raasay). Given that the opposite trend would be expected from a normal temperature profile (i.e. warm subtropics and cooler temperate regions), suggests that temperature is not the dominant control on belemnite oxygen isotope values. Reference to the carbon isotope data may well help explain the oxygen isotope trends. The carbon isotope data show the most positive values for Raasay and most negative values from the low latitude Morocco site suggesting spatial heterogeneity in the carbon isotopic composition of dissolved inorganic carbon in the Early Jurassic ocean. A proposed mechanism to explain the observed trends is that higher latitude waters were less saline during this time interval compared to lower latitudes. Increased fresh water supply to the basin may have promoted the development of anoxic conditions through haline stratification of the water column, although notably the interval examined is prior the Toarcian oceanic anoxic event.