



## A climate perturbation at the Middle –Late Jurassic Transition? Evaluating the isotopic evidence

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The Jurassic greenhouse is punctuated by short cooling intervals with at times postulated polar ice-sheet development. For example, oxygen isotope records of belemnite rostra and fish teeth from the Russian Platform, eastern France and western Switzerland have been interpreted to reveal a prominent decrease in seawater temperature during the Late Callovian–Early Oxfordian. This is in part the basis for a proposed an ice age at the Middle-Late Jurassic Transition. In contrast relatively constant oxygen isotope records and therefore seawater temperatures and carbon isotope values characterized by significant scatter but showing more positive values during the middle and late Callovian have been reported from elsewhere. The aim of this research has been to determine a stable isotope stratigraphy (from belemnites and oysters) principally from the Callovian-Oxfordian interval (from southern England) and integrate these data with existing data to assess the pattern of carbon and oxygen isotopic change. Our marine macrofossil record reveals isotopic patterns that are generally comparable with other European basins. Carbon isotopic trends are consistent with bulk carbonate carbon isotope records displaying systematic fluctuations, the largest of which (Middle Callovian, Calloviense/Jason Zones to Early Oxfordian, Mariae Zone) corresponds to previously identified phases of environmental perturbation. Such a trend may have resulted from enhanced burial and preservation of organic matter, leaving the seawater more positive in terms of carbon. Cooling post-dates this positive carbon isotope excursion. Inferred cooling, derived from our oxygen isotope data from southern England, occurs within the Late Callovian and Oxfordian (Athleta to Mariae zones). Enhanced carbon burial and atmospheric carbon dioxide draw down may have induced cooling. In this study the analysis of a single region (southern England) allows some constraints on potential variable that may influence isotope records.