Multi-proxy evidence for global cooling during Oceanic Anoxic Event 2: the Plenus Cold Event

L.K. O'CONNOR[1], S.A. ROBINSON[1], S.J. BATENBURG[1], H.C. JENKYNS[1], B.D.A. NAAFS[2], R.D. PANCOST[2], & JWB RAE[3]

[1] Department of Earth Sciences, University of Oxford, South Parks Road, Oxford, UK
[2] Organic Chemsitry Unit, University of Bristol, Cantock's Close, Bristol, UK
[3] Department of Earth and Environmental Sciences, University of St. Andrews, Fife, UK

Oceanic Anoxic Event 2 (OAE2, ~94 Ma) was a period of extreme global warmth and represents one of the most extreme carbon cycle perturbations of the last 100 Myr [1]. The early stages of OAE2 are marked by a widespread episode of transient cooling and bottom water oxygenation known as the Plenus Cold Event. Originally recognised as a cooling event by the extreme southward migration of boreal fauna [2], a drop in temperature is supported by an excursion in $\delta^{18}O$ and TEX_{86} records from NW Europe and the North Atlantic [3,4,5]. The Plenus Cold Event is coincident with a marked decrease in pCO_2 [3] as well as a Nd-isotope excursion [6], indicative of changes in deep ocean circulation. However, these records are from a variety of separate localities and their temporal relation needs to be assessed critically.

Here we present preliminary results from an integrated study, in which we apply a range of geochemical proxy techniques on samples from the Plenus Marls cropping out in southern England. These diagenetically immature, organic-lean nannofossil-rich chalks were deposited in an epicontinental pelagic setting and are ideal for palaeoclimatic reconstructions. Our high-resolution, multi-proxy reconstruction of the Plenus Cold Event will give greater insight into the timing and rate of change in sea-surface temperature, palaeo-pH, pCO_2, as well as watermass behaviour across the event. The new data allow a detailed deconstruction of global feedback mechanisms operating during times of extreme global warmth.

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