Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.10582

Dynamic, redox-promoted P cycling during the termination of OAE2

MS. CHIARA KREWER[1], SIMON W. POULTON[2], CHRISTIAN MAERZ[1], ROBERT J NEWTON[2], BENJAMIN J. W. MILLS[1] AND THOMAS WAGNER[3]

[1]School of Earth and Environment, University of Leeds
[2]University of Leeds
[3]The Lyell Centre, Heriot Watt University

Presenting Author: eecfk@leeds.ac.uk

Organic-rich sediments deposited during Cretaceous oceanic anoxic event 2 (OAE2, ~94 million years ago) record major perturbations to biogeochemical cycling (e.g., Fe, S and C) on a global scale. Located on the shelf in the semi-restricted proto-North Atlantic, the subtropical Tarfaya basin was prone to anoxia both before the onset and after the end of OAE2, as documented by multiple, independent redox proxies. At Tarfaya, the *onset* of OAE2 was accompanied by cyclic, orbitally-driven redox changes between ferruginous and euxinic water column conditions. Due to extensive phosphorus recycling from the sediments back to the water column, primary productivity was enhanced, leading to extensive burial of organic carbon [1]. To understand the drivers behind the *termination* of OAE2, we have performed a high resolution study spanning the recovery phase, utilising a combination of redox-proxies (Fe-speciation, redox sensitive trace elements) and nutrient cycling (P-speciation). Our Fe speciation results point to prevailing anoxia during the recovery phase, with rapid, repetitive changes between euxinic and ferruginous conditions emphasising a highly dynamic, unstable depositional environment. Redox sensitive trace metals (U, V and Mo) support these observations, and also document intensive drawdown from seawater during euxinic intervals. Furthermore, enrichment factors observed in this study are greater than those reported during the onset of OAE2 [2] , indicating a replenishment of the seawater trace metal reservoir as the global ocean recovered from widespread anoxia during the termination of OAE2. The rapid redox fluctuations are further reflected by changes in phosphorus cycling, with intervals of extensive P drawdown aiding the recovery from water column anoxia.

[1] Poulton, SW et al. (2015). A continental-weathering control on orbitally driven redox-nutrient cycling during Cretaceous Oceanic Anoxic Event 2. *Geology.* 43, pp.963-966

[2] Goldberg, T et al. (2016). Molybdenum drawdown during Cretaceous Oceanic Anoxic Event 2. *Earth and Planetary Science Letters.* 440, pp.81-91