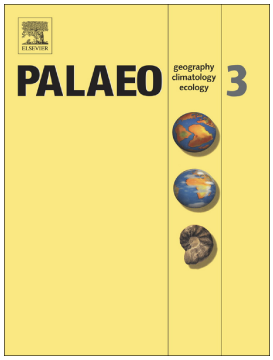

Increased productivity as a primary driver of marine anoxia

Kai Liu, Qinglai Feng, Jun Shen, Maliha Khan, Noah J. Planavsky

PII: S0031-0182(17)30372-3
DOI: doi:10.1016/j.palaeo.2017.11.007
Reference: PALAEO 8509

To appear in: *Palaeogeography, Palaeoclimatology, Palaeoecology*

Received date: 6 April 2017
Revised date: 29 October 2017
Accepted date: 2 November 2017

Please cite this article as: Kai Liu, Qinglai Feng, Jun Shen, Maliha Khan, Noah J. Planavsky , Increased productivity as a primary driver of marine anoxia. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Palaeo(2017), doi:10.1016/j.palaeo.2017.11.007

Increased productivity as a primary driver of marine anoxia

Kai Liu[a], Qinglai Feng[a, b], Jun Shen[a, c*], Maliha Khan[a], Noah J. Planavsky[c]

[a] *State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Wuhan, Hubei, 430074, P.R. China*

[b] *School of Earth Sciences, China University of Geosciences, Wuhan, Hubei, 430074, P.R. China*

[c] *Department Geology and Geophysics, Yale University, New Haven, CT06520-8109, USA*

*Corresponding authors: shenjun_2009@163.com (JS)

Abstract

The relationship between metazoan evolution and ocean-atmosphere oxygen levels have been extensively debated. Similarly, there is no consensus on the factors controlling the evolution of the marine redox landscape. The early Cambrian is a particularly critical time interval to examine, as there is a marked increase in metazoan body plan diversity and increased ecosystem complexity, but few constraints on marine redox conditions during this critical interval. We present an assessment of marine water redox conditions in the early Cambrian from the Luojiacun section in west Hubei Province (the upper Yangtze platform). There are low trace elements enrichments (U, Mo) in the Yanjiahe Formation followed by an abrupt increase in the overlying Shuijingtuo Formation. U-Mo systematics in the most metal enriched samples suggest deposition under a weakly restricted offshore basin, which is consistent with previous studies. There is correlation between excess Ba (Ba_{xs}) and total organic carbon (TOC), suggesting a strong production control on organic matter concentrations. Further, higher Ba excess in the Shuijingtuo Formation than the Yanjiahe Formation indicates dysoxic-oxic conditions in the Yanjiahe Formation are linked to lower productivity, and anoxic conditions in the Shuijingtuo Formation is linked with higher productivity. Although strong productivity controls on Proterozoic and Paleozoic marine redox conditions have been commonly invoked, we provide some of the first empirical evidence for this control on marine redox structure. More broadly, we find that excess barium coupled with redox proxies can be cautiously used to explore preservation versus production controls on organic matter abundances in the Paleozoic.

Keywords: early Cambrian; redox condition; trace element; fauna; paleoceanography