

EGU2020-15254

<https://doi.org/10.5194/egusphere-egu2020-15254>

EGU General Assembly 2020

© Author(s) 2023. This work is distributed under the Creative Commons Attribution 4.0 License.



Role of paleogeography in preconditioning the Late Cretaceous Oceanic Event (OAE2) in a full global circulation Earth System model

Alexander Manning, Paul Valdes, Fanny Monteiro, and Jonny Williams

University of Bristol, School of Geographical Sciences, Bristol, United Kingdom of Great Britain and Northern Ireland
(a.manning@bristol.ac.uk)

Ocean anoxic event 2 (OAE2) was a large perturbation in the Earth's ocean carbon system, occurring at approximately 93.5 Ma, and is characterised by widespread black shales deposition in sediment records. This record has been interpreted as evidence of large anoxia in the global ocean for a long period, resulting in large scale extinction of marine life. However, the exact causes of OAE2, and how it initially developed, are not fully understood. We modelled the period leading up to OAE2 using the HadCM3L global climate model with full ocean (HADOCC) and terrestrial carbon cycle (TRIFFID) modules. We compared our results to equivalent simulations using late Cretaceous (Maastrichtian) paleogeographies. This allowed us to analyse the effects of continental configuration on the development to the OAE. Our results show that restricted ocean circulation, caused by the paleobathymetry, is necessary for anoxic conditions to develop but is not sufficient alone. This suggests that continental configuration is highly important in determining the ability of the oceans to develop an OAE and may explain why they only occur during some times during Earth history.