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Ocean circulation as mechanism and Pacific nutrients as fuel for OAE 2

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Oceanic anoxic events (OAEs) were remarkable episodes in the Cretaceous characterised by widespread distribution of organic-rich facies and associated positive carbon isotope excursions. OAE 2 (∼93.6 Ma) is the most extensive and best defined of these episodes and its occurrences are mainly centred on the North Atlantic. While our understanding of OAE 2 has steadily increased since OAEs were first identified in the 1970s, the search for a triggering mechanism for these events is still ongoing.

To investigate the triggering mechanism for OAE 2, we used a global coupled climate model and performed an equilibrium simulation for the Cenomanian/Turonian boundary interval. We investigated the general circulation patterns within the North Atlantic Basin and the nature and dynamics of water exchange with surrounding basins. Comparison of our climate model results with geologic proxy data shows that the triggering mechanism for OAE 2 was the establishment of an estuarine circulation pattern, with nutrient-rich Pacific intermediate-depth water penetrating eastwards into the North Atlantic via the Central American Seaway during the latest Cenomanian sea-level highstand.