# Zn isotopes from carbonates as a tracer for nutrient dynamics during OAE-2

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Black organic-rich shales deposited during Cenomanian–Turonian boundary time (Late Cretaceous: ~94 Ma) have been linked to volcanic activity as an initial forcing function that resulted in significant global geochemical and palaeoclimatic change. One of the feedbacks linking volcanism and black-shale deposition was likely the rapid production of marine organic matter stimulated by accelerated nutrient supply, either from hydrothermal input, and/or indirectly by silicate weathering induced by global warming. Assessing the importance of the nutrient-productivity-carbon burial feedback requires proxies for surface-ocean nutrient utilization, and Zn isotopes have the potential to provide such information, because their ratio in surface waters seems to be largely controlled by the uptake of isotopically light Zn into phytoplankton. Hence, if the Zn-isotope composition of past surface waters is recorded in marine sediments, it may provide insight into the nutrient dynamics of past oceans.

Here we present Zn-isotope data from Upper Cretaceous pelagic and platform-carbonate successions in England and Italy, where the Cenomanian-Turonian boundary has been identified by biostratigraphy and chemostratigraphy. Zn isotopes from these sections, together with other geochemical parameters, help to assess the role of changing nutrient dynamics in driving the expansion of low-oxygen marine environments. $\delta^{66}Zn_{IRMM\text{-}3702}$ values vary between 0.3 and 1.4 ‰ and show similar stratigraphic trends in both locations. These patterns suggest perturbations to the Zn-cycle during OAE-2, which may be related to changing nutrient dynamics.