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Mass extinctions, recovery and resilience

Photic zone euxinia in North East England following the end-Triassic mass extinction

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Pulsed CO_2 degassing from the giant flood basalt eruptions of the Central Atlantic Magmatic Province (CAMP) is thought to have triggered the end-Triassic mass extinction (ETE) ∼201.6 million years ago. This rapid atmospheric pCO_2-driven global warming is linked to positive feedbacks via weathering, oversupply of nutrients, anoxia and sulphate reduction, culminating in at least regional H2S poisoning of the water column (e.g., euxinia) that acted to restrict the habitable zone to a narrow mid-water refuge.

As part of our study of a transect across the Channel between modern day England and Germany, we present a multiproxy dataset from analysis of a 6 m section of a drillcore from Felixkirk, located on the western margin of the Cleveland Basin, NE England. Throughout the latest Triassic and early Jurassic, the Cleveland Basin comprised a swathe of low-lying islands surrounded by a warm, shallow epicontinental sea, making it susceptible to adverse climatic effects (e.g., dramatic sea level change, etc.).

We use lipid biomarkers, bulk δ^{13}Corg data and published palynological data to reconstruct a continuous high-resolution record of environmental conditions across the ETE, marked in the Felixkirk sediments by an abrupt, large magnitude negative carbon isotope excursion. We show that fossil derivatives of the pigment isorenieratene (derived from green sulphur bacteria Chlorobiaceae) in conjunction with a suite of redox-sensitive biomarkers indicate widespread photic zone euxinia following a dramatic relative sea level fall coincident with the extinction event.