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Triassic-Jurassic marine anoxia in response to massive carbon release from CAMP?

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The end-Triassic mass extinction [$\sim$201.3 Ma], marked by marine and terrestrial ecosystem collapse and global marine biodiversity loss, coincides with the onset of extensive volcanic activity and emplacement of the Central Atlantic Magmatic Province (CAMP). Massive and rapid greenhouse gas release from surface basalts, subsurface organic rich strata and ocean-floor clathrate-hydrates had a profound impact on the global exogenic carbon cycle and it dramatically increased atmospheric pCO_2 values. Although Permian-Triassic [$\sim$252 Ma] and early Toarcian [$\sim$183 Ma] volcanic carbon release is thought to have initiated global ocean anoxic events, ocean redox changes at the end-Triassic mass extinction are poorly constrained. Marine anoxia is only suggested by organic-rich, finely laminated sediment deposition in marginal marine basins.

We studied the biostratigraphically well-constrained Triassic-Jurassic marine sedimentary record from St. Audrie's Bay (UK), which is astronomically calibrated to the continental geomagnetic polarity time-scale (GPTS) of the continental Newark basin. This marine geological archive is marked by precession paced black-shale deposition, similar to Neogene Mediterranean sapropels. We studied redox-sensitive trace element concentrations (e.g. Mo, U, V, Cu, Ni), iron-speciation (FeHR/FeT, FePY/FeHR) and δ34S-pyrite through the end-Triassic mass extinction and subsequent 3 million years of the lower Jurassic. We observe direct stratigraphic correlation between CAMP flood basalt emplacement, strong atmospheric pCO_2 increase and development of marine anoxia. This now allows evaluation of mechanistic relations between massive greenhouse gas emissions initiated by CAMP volcanism, subsequent environmental change and upper Triassic and lower Jurassic biotic response.