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Mass extinctions, recovery and resilience

Paleoenvironmental and paleoecological trends leading up to the end-Triassic mass extinction event: story of two sites from northeastern Panthalassa.

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Conditions leading up to the end-Triassic mass extinction (ETE) event during the Rhaetian are not well understood. This study investigates pre-extinction intervals at two sites, Ferguson Hill, Nevada and Williston Lake, British Columbia. The Ferguson Hill section records the initial negative carbon isotope excursion (INIE) of 1.7 ‰ occurring worldwide in association with the ETE. A precursor carbon isotope excursion (PCIE) of 1.6 ‰ is identified 7 m below the extinction interval at this site. Lack of macrofaunal bioclasts within bulk samples as well as thin sections is coincident with precursor and INIE intervals illustrating negative effect of carbon shifts on benthic metazoa. An identical PCIE is documented in Austria, UK and Germany by Ruhl and Kurschner (2011) suggesting that observed shifts in the carbon cycle occurred globally. Petrographic investigation reveals an elevated amount of sulphide pseudomorphs (goethite framboids after pyrite) within the PCIE interval followed by episodic re-occurrence up the section and by steady increase starting 2m below the extinction interval. The presence of sulphide pseudomorphs suggests episodic dysoxic conditions within the sediment and potentially within the water column preceding the ETE. Three sites at Williston Lake record phosphorite deposits in the interval immediately preceding the ETE. Fluctuating redox conditions play a crucial role in phosphogenesis therefore providing direct biosedimentary evidence that episodic shelf euxinia at Williston Lake existed leading up to the ETE. Both sites record stressed conditions before the global environmental collapse which possibly were precursors for reduced environmental stability during initial CAMP volcanism in northeastern Panthalassa.