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The end-Triassic mass extinction: new isotope constraints from Italy

Aviv Bachan (1), Bas van de Schootbrugge (2), Jens Fiebig (3), and Jonathan Payne (4)

(1) School of Earth Sciences, Stanford University, Stanford, USA (avivbd@stanford.edu), (2) Institute of Earth Sciences, JW Goethe University Frankfurt, Frankfurt am Main, Germany (van.de.Schootbrugge@em.uni-frankfurt.de), (3) Institute of Earth Sciences, JW Goethe University Frankfurt, Frankfurt am Main, Germany (Jens.Fiebig@em.uni-frankfurt.de), (4) School of Earth Sciences, Stanford University, Stanford, USA (jlpayne@stanford.edu)

The end-Triassic mass extinction was one of the "Big Five" mass extinctions to have punctuated the rising trend of diversity throughout the Phanerozoic. Eruption of the Central Atlantic Magmatic Province (CAMP) has been suggested as the driver of the extinction based on correspondence between radiometric dates from basalts and the paleontologically defined boundary. A sharp negative excursion in δ^{13}C found within the boundary beds worldwide has been interpreted as the fingerprint of isotopically depleted CO_2 emission from CAMP basalts. More recently, evidence of a prolonged positive excursion above the boundary has emerged, which may result from a period of high pCO_2 driving up global temperatures and increasing the burial of organic carbon.

However, the degree to which the positive excursion reflects global carbon cycle behavior remains poorly understood because it is known from only a few localities. Here we show that the large positive δ^{13}C excursion (up to +6‰) at the base of the Jurassic can be found in multiple locations in the Lombardy Basin in the Southern Alps, and in the Southern Apennines. Furthermore, we are able to show that the excursion does not result from a facies controls on δ^{13}C as the shallow and deep-water facies show similar isotope values. A comparison with other previously published extended carbon isotope curves shows that the pattern of observed changes in Italy is broadly similar to other localities globally, suggesting that they were most likely driven by global processes. We hypothesize that ocean anoxia resulting from global warming and elevated nutrient supply favored increased burial of organic carbon and caused the protracted positive excursion in δ^{13}C.