



Early Triassic nutrient crises limited marine productivity

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The Early Triassic represents a prolonged period of ecologic recovery following the latest Permian mass extinction. Factors that delayed biotic recovery are under debate and partly revolve around impacts of volcanic induced global warming on primary marine productivity. We examined N isotope records from the Festningen section, Spitsbergen, to study changes in nutrient availability through the Early to Middle Triassic along the northern margin of Pangea. Results show progressive shift from high to low nitrogen isotope values throughout the Griesbachian, that we interpret to reflect reduction in N availability, and in response increased atmospheric N₂ fixation. This nutrient limitation occurred throughout the remainder of the Early Triassic and in conjunction with decreased organic matter in the sediments as well as declines in paleoproductivity proxies, suggesting stressed primary productivity along northern Pangea during that time. There was a return to a highly productive continental margin in Middle Triassic time coincident with final cooling of global oceans. Results are consistent with other studies from northern and western Pangea and thus show regional nutrient limitations occurred in what should have been a major zone of marine primary productivity. We suggest this was driven by Siberian Traps induced global warming, creating high ocean temperatures that depressed the marine nutricline below the zone of upwelling. As such not only did the Siberian Trap LIP likely cause the worst mass extinction of the Phanerozoic, but also impacted marine productivity for the subsequent several million years, limiting the recovery of life.