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Active anaerobic respiration in an anoxic ocean prior to the end-Guadalupian (Permian) extinction

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We present nitrogen and sulfur isotope (d15N and d34S) records of Guadalupian-Lopingian (Middle-Upper Permian) shelf-carbonates in northern Sichuan, China, to examine oceanographic changes around the end-Guadalupian extinction. d15N values of organic matter are remarkably high in the topmost part of the Guadalupian Maokou Formation, suggesting active denitrification in the Capitanian (Late Guadalupian) ocean. On the other hand, distinctly low and constant d34S values of pyrites in the topmost Maokou Formation suggest vigorous sulfate reduction in the water column. Active anaerobic respiration is in accordance with the emergence of oxygen-depleted waters and with the occurrence of anomalous carbonate precipitates on the relatively deep disphotic slope/basin in northwestern South China. Enhanced sulfate reduction in the water column implies that a sulfidic condition may have developed on the continental margin, at least locally, prior to the extinction. The emergence of a sulfidic water mass is supported by the abundant occurrence of small framboidal pyrites and by the extremely high proportions of pyrite Fe to highly reactive Fe (FeP/FeHR) in the rocks shown by 57Fe Mossbauer spectroscopic analysis. A development of a sulfidic water mass on the disphotic slope/basin may have influenced on the end-Guadalupian extinction through upwelling of the harmful waters along the continental margin.