

Variations in marine biological pump during the end-Devonian Hangenberg mass extinction

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The global Hangenberg Biotic Crisis (also known as the end-Devonian mass extinction) near the Devonian-Carboniferous boundary (DCB) represents one of the most significant biodiversity decreases in the Phanerozoic and a critical transition from greenhouse to icehouse climate in Earth's history. The expansion of oceanic anoxia and climatic cooling have been proposed to be the main triggers of the Hangenberg event, which is closely linked to marine primary productivity caused by nutrient delivery from enhanced continental weathering.

In recent years, barium isotopes ($\delta^{138}\text{Ba}$) have been used as a valid tracer of marine primary productivity and oceanic anoxia, and shallow-marine carbonates have been suggested to be reliable archives of ancient seawater $\delta^{138}\text{Ba}$ signal. In this study, three widely spaced DCB sections in South China, deposited on nearshore platform (Malanian), offshore platform (Longmenshan), and isolated platform (Bangshangtun) settings, were selected to investigate the biogeochemical cycle of barium during the Hangenberg event. The $\delta^{138}\text{Ba}$ profiles observed from study sections show coeval major excursions, indicating a global perturbation in the Ba cycling. Our new dataset provides direct evidence for changes in marine primary productivity and an insight into understanding complicated feedbacks between the marine biological pump, ocean environment and climate during the end-Devonian mass extinction.