Perturbation of the marine sulfur cycle during the Devonian-Carboniferous transition

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Abstract

The Hangenberg Crisis of the Late Devonian was one of the largest biodiversity losses of Phanerozoic, while the underlying cause(s) is still controversial. Deep understanding of the coeval sulfur biogeochemical cycle may shed light on this issue. In this study, the first stratigraphic high-resolution isotopic compositions of carbonate-associated sulfate (CAS) during the Devonian-Carboniferous transition were analyzed in the Long'an section in South China. The $\delta^{34}S_{CAS}$ profile suggests that there was a major perturbation of sulfur cycle in the Middle and Upper *Si. praesulcata* Zone of the Famennian stage, which could be supported by $\delta^{34}S_{CAS}$ values of Qilinzhai section. The sharp shift from +20 ‰ to +13 ‰ of $\delta^{34}S_{CAS}$ data in Long'an section suggest oxidation of hydrogen sulfide, possibly as a consequence of upwelling of sulfidic deep-ocean water masses in response to globally expanded areas of marine anoxia. Thus, the $\delta^{34}S_{CAS}$ variation recorded in South China is consistent with the hypothesis that intense anoxia was the most potential cause of the Hangenberg Crisis.