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Oceanic euxinia and destruction of land vegetation during the Frasnian/Famennian boundary mass extinction

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We analyzed the organic geochemistry, d34SCAS, d34Ssulfide, d13Ccarb, and pyrite diameter from three shallow sea sections in Belgium and South China including the Frasnian/Famennian (F/F) boundary. The results showed a correlation between organic geochemical redox indicators (dibenzothiophenes and 2,3,6-trimethylarylisoprenoids), sulfur and carbon isotope ratios, pyrite diameter, and an organic geochemical indicator of land vegetation destruction (dibenzofurans). We report here these new findings on redox changes and destruction of land vegetation during the Frasnian/Famennian (F/F) boundary mass extinction. We show coincident increases in d34SCAS, d34Ssulfide, d13Ccarb, dibenzothiophenes, 2,3,6-trimethylarylisoprenoids, and dibenzofurans and a coincident decrease in pyrite diameter at or near the F/F boundary in low latitude shallow-seas. These coincidental changes show the development of oceanic euxinia and destruction of land vegetation at this time. These correlations indicate that H2S accumulated in the ocean and input of euxinic waters to the oxic surface waters that most marine organisms inhabit, would have caused marine extinctions at the F/F boundary. Destruction of land vegetation may be related to the shallow-sea euxinia.

Keywords: sulfur isotope, carbon isotope, sedimentary organic molecules, Frasnian-Famennian boundary