

# Euxinic Ocean during the Late Devonian Mass Extinction Inferred from Organic Compounds

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There were five mass extinctions of Earth life during the past 500 million years. The second crisis of the “big five” mass extinctions occurred near the Frasnian/Famennian (F/F) boundary in the Late Devonian. This extinction impacted mainly oceanic regime and resulted in 21% of families and 50% of genera among oceanic life being wiped out (Sepkoski, 1986). In particular, brachiopods, trilobites, conodonts, tabulate corals, and stromatoporoids have been severely affected and suffered high extinction rates (McGhee, 1996, 1989; Stanley, 1987). Previously, anoxic sea-water condition was considered as the candidate responsible for the F/F mass extinction simply because of the widespread black shale near the boundary worldwide (House, 1985). Both stable carbon and sulfur isotopic signals and trace metal element features indicate that the F/F mass extinction was probably caused by the development of oceanic anoxia (Riquier et al., 2006; Joachimski et al., 2001). However, little has

been published on organic geochemical signals across the F/F mass extinction interval. Thus, the purpose of this study is to examine oceanic redox condition spanning the F/F boundary based on organic geochemical analysis incorporating with stable carbon isotope ratio and bioturbation levels from two geographically apart localities, Belgium and China, respectively.

A positive shift of  $\delta^{13}\text{C}_{\text{carb}}$  across the F/F boundary and high values of  $\delta^{13}\text{C}_{\text{carb}}$  in the lower Famennian strata are detected at the F/F boundary sections in Belgium and China, respectively. Contents of organic matter components dibenzothiophenes and 2,3,6-trimethylaryl isoprenoids show peaks near the F/F boundary at these two studied sections. High values of  $\delta^{13}\text{C}_{\text{carb}}$ , dibenzothiophenes and 2,3,6-trimethylaryl isoprenoids detected from these two geographically apart sections indicate a global spread event of anoxic or euxinic seawater, which should account for the F/F biotic crisis.

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