

Molecular biomarker evidence for continental shelf euxinia in the Late Permian Paleo-Tethys Ocean

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South China has always been a key area for studying the paleo-reconstruction of the Late Permian Paleo-Tethys Ocean and the co-evolution of life and environment. Dalong Formation is the latest Permian stratigraphic unit, which is widely distributed in South China and characterized by the development of black organic- and siliceous-rich rocks. It is generally believed that it was formed under anoxic to euxinic conditions. However, there has been controversy about the understanding of its paleo-environment, especially about the identification and genetic mechanisms of the sulfidic water-column. Here, the Shangsi section in Guangyuan, Sichuan, one of the few important sections suitable for molecular organic geochemical research in South China, is studied to reveal the bio-environmental geochemical processes during the deposition of Dalong Fm. The Dalong Fm can be divided into lower, middle and upper intervals, according to lithology. Of which the upper and the lower are organic-lean gray siliceous limestone, and the middle is organic-rich black medium-thin siliceous rock or siliceous limestone. The results show that the middle interval has the characteristics of low ratio of pristane to phytane, high relative content of benzothiophene and dibenzothiophene compounds, medium relative content of aryl-isoprenoid hydrocarbons, and high ratio of hopane to sterane. These data provide robust evidence for that the middle interval was deposited in euxinic environment, where the photic zone euxinia triggered the proliferation of Chlorobiaceae. It is suggested that the most likely paleo-environment for the Dalong black organic- and siliceous-rich rocks is the continental shelf depression under the upwelling zone, and the water depth may be 100m – 200m. Based on the regional stratigraphic correlation, it is believed that the anoxic – sulfidic conditions may have widely been occurred in the shelf and slope environments in South China and sustained for a long time (ca. 1 – 4 Ma^[1]) during the Late Permian, and its impact on the evolution of marine organisms and the end-Permian mass extinction is worthy of further study.

References

- [1] Mundil R. et al. (2004) *Science* 305, 1760–1763.