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The carbon and oxygen isotope excursion of the Late Neoproterozoic to Early Cambrian Taozichong Formation in Qingzhen City, Guizhou Province, Southwest China: Implication for phosphorite formation

Yang, R.¹, Mao, T.¹ and Gao, J.¹

¹College of Resources and Environmental Engineering, Guizhou University, Guiyang 550025, China

Taozichong Formation is a phosphate-bearing sedimentary sequence of the Late Neoproterozoic to Early Cambrian period in Qingzhen, Guizhou Province. Carbon and oxygen isotopic compositions of carbonate rocks in this sequence are analysed and compared with other symsedimentary carbon isotope profiles of the same time interval^[1]. The results showed three negative anomalies of carbon isotopes in the Taozichong Formation (Fig.1①②③), indicating a significant temporal change in palaeo-oceanographical environment, in which there happened two times of intensive carbon isotope variation, corresponding to creature extinction^[2].

The first and second $\delta^{13}\text{C}$ negative drifts appear in bioclastic phosphorite beds. The cause of these negative carbon isotope drifts may link to the rising ocean current characterized by phosphate-enriched and ^{13}C -depleted water masses that entered the shallow platform and caused the eutrophication of shallow water environment (rich in P), as well as flourish creatures and a series of biological-biochemical functions^[3], and finally leading to the formation of phosphorite. Since these phosphorites also show a geochemical characteristic of hydrothermal origin, it is also likely that the rising ocean current may also contain a component of hot water exhaled into the deep ocean floor, which will cause the deposited phosphorite bring the geochemical fingerprints of hot water sediments in the deep ocean. The third negative carbon isotope drift event is also associated with the rising of anoxic ocean current with a component of hydrothermal fluid at the bottom of the ocean.

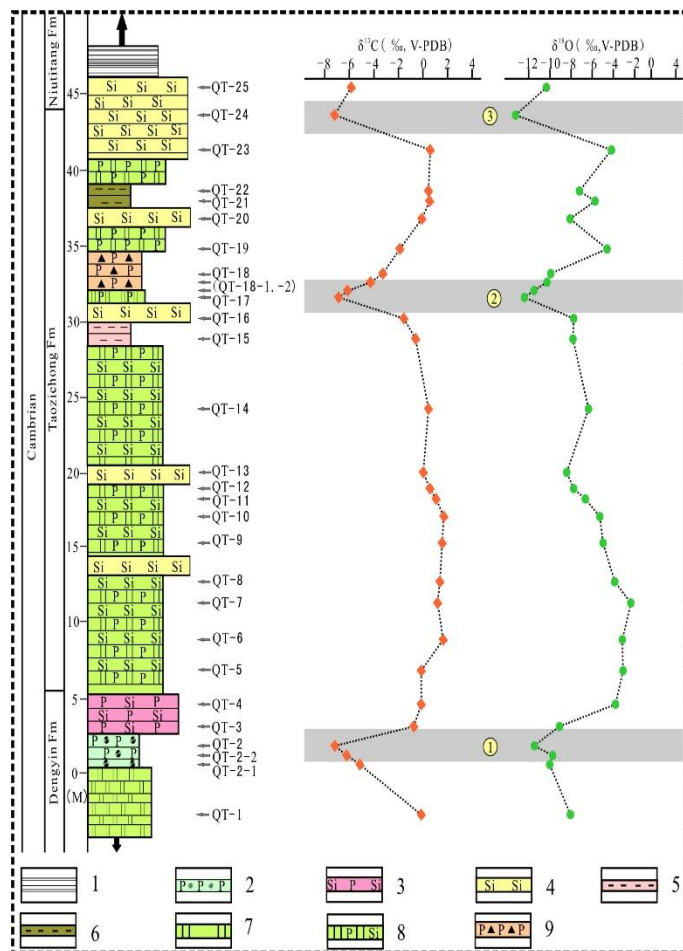


Figure 1: The carbon and oxygen isotope excursion for the Taozichong Formation in Qingzhen City, Guizhou Province

1. Black shale; 2. bioclastic phospholite; 3. siliceous phospholite; 4. silicalite; 5. foliated clay stone; 6. brown weathered crust; 7. dolostone; 8. siliceous dolostone containing phosphorus; 9. breccious phosphorite.

References:

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- [2] Yang R et al. (2004) *Progress in Natural Science* 14(10): 898-904
- [3] Chen Jiyan et al.(2012) *Journal of Rare Earths* 31(1): 101-111

