

Re-Os isotopes as a tracer and dating technique for black shales and ocean anoxic events

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Oceanic anoxic events took place many times in the Earth history, which usually produced large amounts of black shale deposition. The study on genesis and exact age of these oceanic anoxic events has become one of the frontier research areas in palaeoceanography. The study of oceanic anoxic events can help us to better understand palaeo-ocean environment change, earth system evolution, effect of other Earth-spheres to biosphere, as well as ore genesis and oil formation and its environment. Hence, in recent years the study of oceanic anoxic events has focused on many aspects such as palaeoceanography, palaeo-climatology, palaeo-geography, palaeotology, tectonic, geology and geochemistry. Among these studies, exact dating of the oceanic anoxic events is one of the key tasks, and if the applied isotope system can, at the same time, provide information on palaeo-ocean environmental change, it will enhance our understanding on the genesis of the oceanic anoxic events. Re-Os isotope system is such a recently developed new geochemical technique, which can serve these purposes perfectly. The organic-rich black shales are most suitable for Re-Os isotope dating, and can produce very precise geological age. Furthermore, using Os isotope data of marine sediments, we can obtain information on paleo-seawater Os isotopic compositions and their evolution during geological time. In South China, multi-periods of oceanic anoxic events occurred from Neoproterozoic to Cambrian, and huge thickness of black shales precipitated. Therefore, using Re-Os isotope method, not only we can determine the time of such events, but also paleo-oceanic environment can be traced effectively.

Acknowledgements

This study is supported by NSFC grants (40372059, 40221301, 40172041).