Diagenetic Effect on Ba isotope composition of barites in from the Tarim Basin, NW China

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Because of the stable chemical properties, sedimentary barites can record the primary productivity of paleo-oceans. Recently, barite Ba isotopes provide a novel method to explore the biogeochemistry of Ba in the ocean and to improve its applicability as a proxy for environmental studies. However, the poor preservation of barite under the sulfate-deficient anoxic conditions complicates the implications for a paleoceanographic record [1]. Therefore, it is important to understand the effect of diagenesis on Ba isotope compositions of barite. In order to constrain the Ba isotopic behaviour in anoxic environment, here we measure Ba isotopes of diagenetic barites which deposit in the black shale intervals of the Lower Cambrian Yurtus Formation in Tarim Basin, NW China. These samples are characterized by various barite concretions (7-18cm long) and bands (≤20cm thick), which mainly consist of coarse-grained anhedral to euhedral barite crystals with minor dolomites and pyrites.

Our preliminary results show obvious variation in $\delta^{138/134}$Ba from -0.02‰ to 0.50‰ and the average $\delta^{138/134}$Ba value is about 0.11‰. A roughly positive correlation between $\delta^{138/134}$Ba and $^{87}Sr/^{86}Sr$ (0.7083 to 0.7090) reveals that $\delta^{138/134}$Ba can be enhanced by diageneses. The slight variation in $^{87}Sr/^{86}Sr$ ratios reveals that the penecontemporaneous seawater may weakly interact with the host fine-grained siliciclastic sediments. The significantly elevated δ^{34}S values (56.8–76.4‰ CDT) suggest that the barite may have experienced prolonged strong bacterial sulfate reduction without necessary renewal [2]. If the diagenetic effect is corrected using multiple geochemical parameters, Ba isotope composition of barite may have great potential for paleo-oceanographic studies.

[1] McManus et al., GCA, 1998, 62(21), 3453-3473. [2] Zhou et al., PR, 2015, 263, 79-87.