Barium isotope compositions of Lesser Antilles forearc sediments from DSDP Sites 543 and 144

XIAOYUN NAN[1*], HUIMIN YU[1], FANG HUANG[1], HONGLI ZHU[2], ZHAOFENG ZHANG[2]

[1] School of Earth and Space Sciences, University of Science and Technology of China, Hefei 230026, China

[2] State Key Laboratory of Isotope Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou 510640, China

(*correspondence: nanxiaoy@ustc.edu.cn)

Barium is a highly incompatible element during mantle melting and it is strongly enriched in the crust compared to the mantle. Ba isotopes can be used to trace recycled crustal materials in the mantle. Marine sediments is a Ba-rich reservoir with the average Ba content of 786 ppm[1]. However, Ba isotope compositions of marine sediments are poorly understood[2].

Here, we analyzed Ba isotopes in 40 clay-rich and carbonate-rich sediments from Deep Sea Drilling Project (DSDP) Site 543 and Site 144, respectively, to constrain the Ba isotope signatures of marine sediments. These two sites are located at the Lesser Antilles forearc region, which are used to represent the subducted marine sediments. Ba isotopes were analyzed on a Neptune Plus MC-ICP-MS at the University of Science and Technology of China. The long-term precision of $\delta^{137/134}$Ba is better than 0.04‰ (2SD).

The $\delta^{137/134}$Ba values of the clay-rich sediments from Site 543 are from -0.07‰ to 0.03‰, similar to that of the upper mantle (0.020 ± 0.021‰, 2SE)[3]. In contrast, the $\delta^{137/134}$Ba values of the carbonate-rich sediments from Site 144 vary between -0.01‰ to 0.78‰, which are significantly higher than the mantle. Therefore, recycling of clay-rich and carbonate-rich marine sediments with distinct $\delta^{137/134}$Ba signatures may create Ba isotopic heterogeneity in the mantle. The Ba isotopic signatures would also be represented by the Lesser Antilles arc lavas.

[1] Plank. (2014) Treatise on Geochemistry. **4,** 607-629.
[2] Bridestock et al. (2018) EPSL, **481,** 101-110.
[3] Huang et al. (2015) Goldschmidt abstract.