Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.15876

Recycling of hydrous materials in the source of continental basalts

YANQING LI[1], HIROSHI KITAGAWA[2] AND CHANGQIAN MA[3]

[1]International Center for Isotope Effects Research, School of Earth Sciences and Engineering, Nanjing University
[2]PML, Institute for Planetary Materials, Okayama University
[3]School of Earth Sciences, China University of Geosciences

Presenting Author: yqlicug@163.com

Subduction of the oceanic lithosphere is a major mechanism that transfers water from Earth's surface to the mantle. However, if the hydrous portions in the subducted slab could survive the intensive dehydration processes that occurred during subduction and move downward into the deep mantle is uncertain. Since the isotope composition of Li and B only have measurable fractionations during the fluid-rock interactions near the Earth's surface, their isotope signatures can be used to identify hydrous signal in deep mantle. Cenozoic basalts from Southeast China have typical oceanic island basalt-like trace element patterns and enriched mantle-type Sr–Nd–Pb isotope composition, and they have been considered to originate from the deep mantle, probably the mantle transition zone. Here we discovered notably large variations in the Li–B isotope composition of the Southeast China basalts. The δ^7Li and δ^{11}B values were positively correlated with each other in alkaline basalts and tholeiites, indicating the existence of two crustal end-members: 1) subducted abyssal serpentinite, which has a high δ^{11}B value of up to +2.4‰ but with depleted amounts of fluid-mobile elements such as Pb and Rb; and 2) recycled sediments, which has low δ^{11}B (down to −14.3‰) and δ^7Li (+1.7‰) values, high Th/Nb and B/Nb ratios, and a high Pb concentration. Therefore, we concluded that abyssal serpentinite and recycled sediments are two major hydrous inputs from crust to the deep mantle.