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西太平洋の島弧・背弧域の海底熱水系における噴出熱水中のリチウム同位体比組成
Li isotopic composition of submarine vent fluids from arc and back-arc hydrothermal systems in the western Pacific

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Submarine hydrothermal systems significant contribute to heat and elemental fluxes to the ocean. Vent fluid geochemistry in mid-ocean-ridge (MOR) hydrothermal systems were well-studied, while studies on vent fluid geochemistry in arc and back-arc systems with various geological characteristics were insufficient, especially in terms of lithium. To reveal control factors on lithium in arc and back-arc hydrothermal systems and lithium isotopic behavior in water-rock interaction at high temperature, we determined Li contents and its isotopic compositions of 11 vent fluids collected from 5 submarine arc/back-arc hydrothermal systems in the western Pacific.

Based on mass balance calculation, Li in vent fluids are dominated by seawater-rock (seawater-sediment) interaction in sediment-starved (sediment-hosted) hydrothermal systems in arc and back-arc basins at equilibrium. Li contents in vent fluids is also influenced by phase-separated processes, by temperature-related portioning of rock Li into fluid phase, and by host rocks and sediments. In contrast, Li isotopic composition in vent fluids is affected by host rocks and sediments, but not by phase-separated processes. These results demonstrate that lithium is a useful tracer for investigating geological processes occurred underground such as a phase separation process and water-rock/water-sediment interaction at high temperature.

キーワード: 海底熱水系, リチウム同位体比, 噴出熱水, 島弧, 背弧海盆
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