Trace element characteristics of fluids derived from lherzolite serpentinization

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Serpentinization occurs widely on the seafloor and in the slowly spreading mid-ocean ridges and subduction zones. It is potentially significant for the origin and evolution of life during the early history of the Earth [1-2]. In subduction zones, fluids released from the descending plate usually hydrate the mantle wedge, resulting in eruption of serpentinite mud volcanoes, activities of pore fluids and even the forearc or subarc magmatism. Determination on the compositional characteristics of fluids derived from peridotite serpentinization in subduction zones is necessary to better understanding on element migration and recycling on Earth.

A series of diamond-trap experiments under the conditions of 250 ºC and 800 bar were conduct using 0.5 mol/L NaCl solution and unaltered spinel-bearing lherzolite powder with various initial grain sizes of < 75μm, 75-150μm and 180-250μm. Run time changes from 15 to 38 days. Experimental results confirmed the effects of initial grain size and run time on trace element concentrations and ratios of fluids derived from spinel-bearing lherzolite serpentinization. Concerned Sr/Y ratios of fluids vary from 6.4 to 14.2, Rb/Sr ratios from 0.2 to 0.8, Nb/Ta ratios from 2.8 to 8.7, while Ba/La ratios significantly change from 0.9 to 97. Obviously, higher Sr/Y ratios and lower Ba/La and Nb/Ta ratios of fluids is corresponding to larger initial grain size of lherzolite powder. By contrast, with run time increasing, Nb/Ta and Rb/Sr and Ba/La ratios in fluids become greater, but Sr/Y ratios decrease.

[1] Huang et al. (2016) *Scitific Report*. **6**, doi:10.1038/srep33821.
[2] Huang et al. (2015) *Sci*. *China* ***58***, 2165-2174.