Boron isotope systematics of forearc serpentinites: A case study from the California Coast Ranges

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Recently, Martin et al. (2016) characterized two contrasting origins of serpentinite in central Guatemala. They proposed an idea that the tectonic origin of serpentinites can be discriminated based on boron isotopic signature. In order to test the result by Martin et al. (2016), various serpentinites from the Franciscan Complex of Northern California were investigated using in-situ spot analytical technique that had newly developed by Kimura et al. (2016). The investigated twenty serpentinites include sheared serpentinite, massive serpentinite (or serpentinized peridotite), and serpentine veins cutting fresh peridotite. The occurrences of these serpentinites are classified into serpentinite lenses within Franciscan metagreywacke, blueschist-bearing serpentinite diapir, massive serpentinized peridotite body, extremely fresh peridotite body, and various serpentinites along the San Andreas Fault. We have tested both mineralogical variations (lizardite/chrysotile vs antigorite) and textural variations (pseudomorph vs non-pseudomorph). We also made a mineralogical assessment on relict mantle minerals in serpentinites. Our study found a large variation of boron isotope (δ^{11}B) ranging from -12.0 to +24.4‰ and boron concentrations (B=3.0-239 μg/g). Our observations together with geological context support Martin et al. (2016)’s observation in central Guatemala; in other words, boron isotope is useful for tectonic discrimination of serpentinites. In this abstract, we will introduce petrologic and geochemical diversity of forearc serpentinites in California Coast Ranges, and we also present a new insight of isotope correlations among various aspects.

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