Boron isotopic characterisation of serpentinites from the Atlin terrane, Canadian Cordillera: evidence for preserved oceanic core complexes?

A. BOGATU[1], J.H. BÉDARD[2], L. LABROUSSE[3], C. MARTIN[4], A. TREMBLAY[1], A. ZAGOREVSKI[5]

[1]UQAM, Montréal, QC, Canada (*correspondence : bogatu.adina@gmail.com; tremblay.a@uqam.ca)
[2]GSC, Québec, QC, Canada (jeanh.bedard@canada.ca)
[3]iSTeP, Pr Sorbonne Univ., UPMC Paris 06 (loic.labrousse@upmc.fr)
[4]American Museum of Natural History, New York, NY 10024-5102, USA (cmartin@amnh.org)
[5]GSC, Ottawa, ON, Canada (alex.zagorevski@canada.ca)

Ultramafic massifs from the Atlin (formerly Cache Creek) terrane, northern Canadian Cordillera, display an incomplete ophiolitic sequence as upper crustal rocks generally lie directly on mantle peridotites. Low-angle normal faults characterized by foliated serpentinites, rodingites and cataclasites mark the mantle-crust contact. Serpentinites from this contact at Union Mt. and Squanga Lake were investigated by microscopic petrography and Raman spectroscopy. Raman methods allow phase identification of different serpentine minerals: lizardite-crysotile (0-300°C; <1.0GPa) and antigorite (300-460°C; higher-P). Boron isotopic compositions of serpentine minerals are representative of the fluids that altered the ultramafic rocks. Previous work showed that serpentine hydrated by seawater has δ^{11}B ranging from +40 to +10‰, while serpentine hydrated by slab-derived metamorphic fluids has δ^{11}B ranging from +10 to -6‰ (shallow fluids) or -6 to -20‰ (deep fluids). At least three generations of serpentine minerals from the Atlin terrane were identified and analysed for δ^{11}B: 1) early lizardite-chrysotile with δ^{11}B values of +13 to -1‰; 2) a second generation of antigorite-chrysotile with δ^{11}B values of -2 to - 13‰; and 3) late antigorite flakes with δ^{11}B values of +4‰ to -2‰. Identification of several isotopically distinct serpentine generations support the hypothesis of: (1) early alteration of peridotites (early serpentine with +δ^{11}B) by seawater-derived fluids, possibly associated with exhumation during oceanic core complex formation; (2) possible infiltration of aqueous fluids (2nd generation of serpentine with strongly negative δ^{11}B) during obduction and imbrication of ophiolite nappes; (3) re-exhumation (late antigorite flakes with δ^{11}B straddling 0‰), possibly reflecting late stages of obduction and thrust-stacking.