



Behaviour of fluid mobile elements during subduction and exhumation of abyssal peridotites: Example of serpentinites from Cuba and Dominican Republic

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Seawater interaction with abyssal peridotites at the sea floor is an important process for chemical exchange between lithospheric mantle and ocean at slow-spreading ridge. Serpentinites from oceanic lithosphere are known to represent an important sink for fluid mobile element, notably boron. In parallel we know extreme enrichment in fluid mobile element (As, Sb, B, U, Li) in high-pressure serpentine minerals (antigorite) coming from part of mantle wedge hydrated by slab's fluids released (Himalaya, Deschamps et al., in prep.). In order to constrain geochemical behaviour of fluid mobile element hosted by serpentine during subduction processes, we examined abyssal serpentinites coming from the accretionary wedge of Greater Caribbean (Cuba and Dominican Republic). They represent subducted Atlantic oceanic lithosphere, which have experienced low to high- metamorphism (greenschist to eclogite facies), before being exhumed. These rocks are an opportunity to understand the chemical mobility of fluid mobile element during prograde metamorphism occurring along subduction surface.

Here we present bulk-rock and in-situ composition of serpentinites and their primary and alteration-related phase obtained on (LA-)HR-ICP-MS. Except for a few cumulates, serpentinites have depleted compositions in agreement with a refractory mantle, but also strong enrichment in U, Pb, Th, Sr, and other fluid mobile element (e.g., U up to 10xPM) indicating extensive fluid-rock interaction. In-situ composition allows the distinction of two groups of serpentine. Group 1 is characterized by relatively flat and depleted REE patterns ($Yb \approx 0.5 \times \text{Chondrite}$) reflecting formation after olivine, while group 2 formed after pyroxene is characterized by slightly higher HREE content ($Yb \approx 1 \times \text{Chondrite}$) but light LREE depleted patterns and displays higher content in Sc, V, Ti and Co. Both groups are strongly enriched in B (up to 120 ppm), and reach values already observed in serpentinites from mantle wedge (Himalaya, Deschamps et al., in prep.). Other fluid mobile elements such As (up to 6.85 ppm), Sb (up to 0.84 ppm), Li (up to 2 ppm) or U (up to 0.62 ppm) present strong enrichment in serpentine from both groups (0.1 up to 50 times primitive mantle values). The occurrence of amphibole having REE signature close to oceanic amphiboles, in cumulates, are in favour of an hydration event, leading to the observed strong mobile element enrichment, at the ridge.

Compositions of the oceanic derived samples - especially in fluid mobile elements - are relatively close to the abyssal peridotites from MARK Zone (Andreani et al., 2008), without evidence of mobility for trace element during prograde and retrograde metamorphism. It confirms that the observed enrichment result from sea-water/peridotites interactions at the ridge. Also it suggests that mobile element stored into serpentine minerals become immobile during subduction processes. Major consequence of this observation is that serpentine minerals (chrysotile and lizardite) are a good sink for mobile element (As, Sb and B) into subduction zones, until their dehydration.