V31B-4756 Mantle-crust differentiation of chalcophile elements in the oceanic lithosphere

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The chalcophile elements, as associated with sulfides, are believed mainly from the study of ophiolites to be generally enriched in the upper mantle, but depleted by magmatic processes in the lower and upper ocean crust. However, studies of some orogenic lherzolites suggest a copper depletion of peridotites in relation to the primitive mantle, suggesting that a portion of the sulfides is melted during decompression and incorporated into the ascending magmas. The rarity of abyssal peridotites and the high degree of their alteration have not allowed these results to be verified *in situ* in the oceans.

Here, we present the first complete study of chalcophile elements based on a suite of rocks from an oceanic core complex (OCC), the Kane Megamullion at 22°30'N at the Mid-Atlantic Ridge. OCCs provide large exposures of mantle and lower crustal rocks on the seafloor on detachment fault footwalls at slow and ultraslow spreading ridges. The Kane Megamullion is one of the best sampled OCCs in the world, with 1342 rocks from 28 dredge sites and 14 dives. We have made XRF, TD-MS and INAA analyses of 129 representative peridotites, gabbroic rocks, diabases and basalts.

Our results suggest a depletion of some peridotites in relation to the primitive mantle (28 ppm Cu). Dunites, troctolites and olivine gabbros are relatively enriched in chalcophile elements. The amount of sulfides decreases gradually with progressive differentiation, reaching a minimum in gabbronorites and diabases. The highest bulk abundance of chalcophile elements in our sample suite was observed in dunites (up to ~ 300 ppm Cu in several samples) and a contact zone between residual peridotite and a mafic vein (294 ppm Cu). Plagioclase-bearing harzburgites, generally formed by late-stage melt impregnation in the mantle, are typically more enriched in Cu than unimpregnated residual peridotites. For these reasons, our initial results indicate sulfide melting during mantle melting, and their local precipitation in the mantle lithosphere due to late-stage melt impregnation.

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