An in-situ investigation of chalcophile and siderophile element cycling in subduction zones: Insights from high-pressure ultramafic rocks from Alpine Corsica

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This study presents the first *in situ* trace element analysis of sulphide and oxide grains in high-pressure serpentinites to the authors' best knowledge. Trace element data of chalcophile and siderophile elements (CSE), including PGE, were obtained using LA-ICP-MS. The results provide an insight into the distribution of CSE during the subduction and exhumation of mantle lithosphere.

Grains selected for analysis include >50 μm magnetite, Cr-spinel, pentlandite and heazlewoodite. Most oxides and sulphides contain low PGE concentrations with the majority of analyses below detection limits. However, Ru contents in all sulphide grains were significantly above detection limits at 3.6–8.1 ppm. Other PGE have maximum concentrations as follows; 0.17 ppm Pt, 0.48 ppm Rh, 0.16 ppm Os, 0.27 Pd, with Ir and Os below detection limits. A few sulphide grains were found to be relatively enriched in IPGE (Os, Ir and Ru). IPGE were abundant in both a heazlewoodite and Cr-spinel grain that are in equilibrium with each other in a sample distal to metasediments and metamafic rocks. A pentlandite grain in a matrix of antigoritite within a sample proximal to calcareous schist and ophicalcite is also relatively enriched in IPGE. The heazlewoodite, Cr-spinel and pentlandite grains all contain inclusions of antigorite and it is inferred that these grains grew during the initial stages of retrogression, suggesting the transfer of IPGE by high-pressure fluids. Os is deemed mobile under reducing conditions [1], which are indicated by Ni-Fe alloys in veins and magnetite found in association with heazlewoodite grains. Additionally, the pentlandite grain enriched in IPGE is also enriched in Ag, As and Au (1.65 ppm, 8800 ppm, 0.18 ppm, respectively), suggesting fluids associated with IPGE transfer may also transport these elements.

[1] González-Jiménez *et al.,* 2012. *Geology,* **40** (2012), 659-662.