Abstract, 2011 Joint Annual Meeting of the Geological Association of Canada-Mineralogical Association of Canada

Partitioning of PGE between silicate melt and residual mantle peridotites in the Bay of Islands Ophiolite, Newfoundland.

Stern, F.G., Department of Earth Sciences, University of Ottawa, Ottawa, ON, Canada K1N 6N5, <u>fster095@uottawa.ca</u>

Hattori, K.H., Department of Earth Sciences, University of Ottawa, Ottawa, ON, Canada K1N 6N5

Bédard, J.H., Geological Survey of Canada, Québec, QC, Canada G1K 9A9.

Representative harzburgite and dunite samples from the basal part of the North Arm Mountain Massif in the Bay of Islands Ophiolite were examined to determine the behaviour of the platinum group elements (PGE) during partial melting and metasomatism by the melt in the mantle.

The Massif represents an Early Ordovician ophiolite, showing the residual mantle peridotites and overlying ultramafic cumulates. The residual mantle part is predominantly harzburgite containing layers and veins of dunite and pyroxenite, and the overlying ultramafic cumulate rocks contain dunite of boninitic magmas.

The harzburgites are composed of OI (Fo=89.3-91.7, NiO= 0.29 - 0.40% wt), Opx (Mg#=85.6-92.1) and minor spinel (Cr#=0.3-0.7, Mg# =0.44-0.70, Fe#=0.02- 0.06). The abundance of minerals varies slightly within hand specimens and thin sections. Harzburgite contains Ni (>1637ppm), Cr (>2000ppm) and MgO (>39wt%) in bulk rocks. Dunite is composed of OI (Fo=83.9 - 90.0, NiO=0.13-0.38wt%) with minor Cr-spinel (Cr # =0.31 - 0.49, Mg#0.39-0.67, Fe#=0.02-0.09). Minor Opx (Mg#=85.5-92.6) and/or Cpx (Mg#=85.7-96.7) occurs in several samples. The NiO contents in olivine show a positive correlation with Fo values both in harzburgite and dunite. Bulk rock compositions of dunite show high Ni (>2640 ppm), Cr (>2600 ppm) and MgO (>42.4 wt%). Sulphide contents are low in both types of rocks, showing a broad correlation between Cu and S; 24-133ppm S and 1.2-15ppm Cu in harzburgite and 33-894ppm S and 2-170 ppm Cu in dunite. Pyrrhotite is the maior sulphide in dunite samples. Harzburgite samples contain the total PGE ranging from 20.5 to 40.4 ppb. They have high Ir-type PGEs showing a negatively sloped primitive-mantle normalized pattern ([Ir+Os]_N/[Pt+Pd]_N=0.6-2.5). The contents of Ir-type PGEs in dunite are low showing a positively sloped normalized pattern ([Ir+Os]_N/[Pt+Pd]_N=0.03-1.4) with the total PGE ranging from 16.8 to 115ppb.

Our PGE data are consistent with experimental results showing that Ir-type PGEs remain in residues during partial melting whereas the Pd-type PGEs are incompatible (i.e., Brenan *et al.* 2005). The high contents of Ni in olivine and the lack of correlation between PGE and S contents, suggest that sulphides are not a major carrier for PGEs. Samples with high contents of S show localized occurrences of S, suggesting sulphides of the secondary origin.

Assuming that dunite represents solidified melt, the bulk distribution coefficients for PGEs between residual mantle peridotite and partial melt are D_{Os} (32.2)> D_{Ir} (10.3)> D_{Ru} (7.71)> D_{Pt} (0.92)> D_{Rh} (0.38)> D_{Pd} (0.17).