

THE MARGINAL GABBRO OF THE SEPT ILES INTRUSIVE SUITE (QUEBEC): CONSTRAINTS ON THE PARENT MAGMA COMPOSITION OF THE MAFIC LAYERED INTRUSION

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The composite Sept Iles Intrusive Suite (564 ± 4 Ma: U/Pb on zircon; [1]) is made of 4 distinct intrusions, the largest component being a mafic layered intrusion [2].

An important question in any discussion of the differentiation of layered intrusions is the identification of possible parent magma composition. One way of resolving this question is to look for appropriate chilled samples from the marginal groups. A series of samples have thus been collected in the marginal gabbros outcropping at the northern contact of the Sept Iles Mafic Layered Intrusion with greenvillian gneisses. Petrographic and geochemical data were used to screen these samples for possible crystal accumulation, alteration and metamorphic origin (fine-grained mafic greenvillian gneisses). Several samples appear as good candidates for parent magma composition. They are very fine-grained gabbros (< 0.5 mm) made of plagioclase, Ca-rich clinopyroxene with minor amounts of olivine and orthopyroxene. These gabbros are rich in FeO_t (14.19-16.06 wt.%), TiO_2 (2.91-4.52 wt.%) and have moderate contents of P_2O_5 (0.34-0.42 wt.%). Their REE patterns display slight LREE fractionation ($(\text{La}/\text{Yb})_N = 2.46-6.40$) and no Eu anomalies. These ferrogabbros are very close in composition to chilled and dyke samples from the Skaergaard and the Newark Island Intrusions which have been experimentally studied [3, 4, 5].

The composition of experimentally obtained olivine and plagioclase [3, 5] closely reproduces mineral compositions observed in the Sept Iles Mafic Layered Intrusion [6]. Also, the experimental crystallization sequence is identical to the Stratigraphic succession Sept Iles Mafic Layered Intrusion, indicating that these gabbros represent plausible parent magmas compositions. Liquidus mineral compositions obtained with the PELE Software [7] also support this conclusion.

References:

- [1] Higgins & van Breemen, 1998. *J. Geol.*, 106, 421-431.
- [2] Higgins, 2005. *Lithos*, 83, 199-213.
- [3] Toplis & Carroll, 1995. *J. Petrol.*, 36, 1137-1170.
- [4] Toplis & Carroll, 1996. *J. Petrol.*, 37, 837-858.
- [5] Snyder et al., 1993. *Contr. Min. Petrol.*, 113, 73-86.
- [6] Cimon, 1998. *Min. En. Ress. Quebec.*, 33p.
- [7] Boudreau, 1999. *Comp. Geosc.*, 25, 201-203.