

Zircon petrochronology of metaplutonic suites in Western Grenville Province

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The petrochronology of accessory phases has refined our understanding on the age significance of U-Pb dates providing new insights on the tempo of metamorphic and magmatic processes. Adopting a petrochronological approach, we aim in this study, by coupling zircon U-Pb isotopic and trace element microanalysis, to constrain better the timing of crystallization and the petrogenetic history of metaplutonic bodies associated with Anorthosite-Mangerite-Charnockite-Granite (AMCG) suites in Western Grenville Province. Specifically, two Post-Ottawan (i.e. 1090 – 1020 Ma) magmatic events at ca. 1070 Ma and 1020 Ma are recorded in oscillatory and sector-zoned zircon cores of meta-granitoids and meta-mangerites, respectively. Zircon grains from both populations exhibit typically magmatic Th/U ratios but other diagnostic compositional features, such as positive Ce and negative Eu anomalies, are recorded only in the older age population. Trace element microanalysis of the dated intragrain domains demonstrates that the slope of the HREE varies between the two populations with the Yb/Gd ratios increasing from the ca. 1020 Ma (Yb/Gd = 5-15) to the ca. 1070 Ma (Yb/Gd = 10-30) population. In comparison, preliminary U-Pb zircon isotopic data from an undeformed, hypersthene-bearing, metasyenite that bounds an anorthositic body yielded an age of 1358.9 ± 3.5 Ma. The latter zircon grains show higher Yb/Gd ratios (Yb/Gd = 30 - 50) possibly indicating a strong control of garnet fractionation in the parental melt source regions of the younger, AMCG-related, metaplutonic units.