

Neodymium isotopic evidence for interaction of mantle and crustal components in the genesis of A-type granite suites in Labrador

Andrew Kerr

*Geological Survey Branch, Newfoundland Department of Mines and Energy, P.O. Box 8700,
St. John's, Newfoundland A1B 4J6, Canada*

and

Brian J. Fryer

Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X5, Canada

Petrogenetic models for so-called "A-type" or "within-plate" or "anorogenic" granite suites include derivation from enriched mantle sources, metasomatism of "normal" granites, and anatexis of lower-crustal rocks that may have been depleted via previous melt extraction. Nd isotopic data from a much wider population of granitoid rocks have been interpreted by some to reflect mixing of new, mantle-derived material and sialic crust; however, very few Nd isotopic data have to date been reported from A-type suites.

In this contribution, we report Nd isotopic data from two post-orogenic, A-type, granite suites in the Early Proterozoic Makkovik Province of north-central Labrador. ϵNd values (relative to CHUR) for the ca. 1720 Ma old Strawberry Intrusive Suite lie between values expected for depleted mantle and calculated for local basement rocks at this time. This relationship holds for an array of intrusions that crosses

the inferred boundary between a ca. 3000 Ma old Archean Craton and adjoining Early Proterozoic crust that is no older than 2000 Ma. The ϵNd of granite plutons changes from -7 to +5 across this fundamental boundary, but there is no discernable shift in their elemental geochemistry. The ca. 1800 Ma (or 1720 Ma?) old Lanceground Intrusive Suite, located at the eastern edge of the Archean block, shows similar behaviour, and has ϵNd of 0 to -3.

The Nd isotopic data from both crustal blocks are consistent with mixing of mantle-derived magmas and local crustal rocks to produce A-type parental magmas. Calculations suggest that, in some cases, "new" material may actually have dominated over recycled older crust. The data argue against the prevalent "residual source" model, and suggest that A-type suites are part of a continuum, rather than discrete grouping indicative of a specific source material.