

New geochronological constraints on the timing of emplacement of Ediacaran to Devonian granitoid rocks in the Bras d'Or and Aspy terranes of Cape Breton Island, Nova Scotia, Canada

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Granitoid plutons form more than half of the area of pre-Carboniferous rocks in the Bras D'Or and Aspy terranes of Cape Breton Island, Nova Scotia. Relatively few have well constrained ages, and those ages display a wide range from Ediacaran (ca. 640 Ma) to Devonian (ca. 370 Ma). The ages of many other plutons are uncertain, with existing estimates based mainly on petrological features, and in many cases their relationships to one another are obscure. Better constraints on the age for these plutons are an essential step toward constructing an integrated understanding of their tectonic significance and mineralization potential. As part of the Targeted Geoscience Initiative (TGI-5) in Nova Scotia, samples were selected for dating to include plutons with no age or poorly constrained ages. Selected samples were processed using electro-pulse disaggregation and zircon grains were separated at Overburden Drilling Management in Ottawa, Ontario. Grains for dating were then picked, mounted, and analyzed using laser ablation ICP-MS at the University of New Brunswick.

A major target in the study was the Margaree Pluton, the granitic pluton in the Aspy terrane. It straddles the prominent Aspy Fault, and also appears to "stitch" the Red River and Wilkie Brook shear zones that separate the Grenville-age Blair River terrane from the rest of the highlands. The sample yielded a preliminary concordia age of 363.1 ± 1.6 Ma, interpreted as the main age of crystallization. This age is the youngest plutonic date yet reported from the highlands.

Another significant area of age uncertainty is the southern highlands, where none of the extensive plutons of the former "Leonard MacLeod Brook Complex" had been dated. A Silurian concordia age from the Gillis Brook diorite of 436.4 ± 1.5 Ma combined with recently published similar ages from farther west and north show the presence of a major dioritic event in the Aspy terrane. As more ages are obtained, enhanced understanding of the tectonic history and mineralization potential will emerge, combined with improved correlations with other Ganderian terranes in the northern Appalachian orogen.