

The Margaree pluton, Aspy terrane, Cape Breton Island, Nova Scotia, Canada: evidence for Late Devonian terrane convergence

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The Margaree pluton extends for 40 km along the axis of the Ganderian Aspy terrane of northern Cape Breton Island. Generally described as rapakivi-textured megacrystic syenogranite, detailed mapping has shown that the pluton can be subdivided into mappable units of megacrystic biotite ± hornblende syenogranite, medium-grained equigranular biotite syenogranite, and quartz ± orthoclase porphyry, all locally displaying rapakivi texture. The equigranular syenogranite intruded megacrystic syenogranite, and the porphyry occurs as a marginal unit. The units are locally mingled, consistent with similar U–Pb (zircon) ages of 363 ± 1.6 Ma from a megacrystic syenogranite sample, 364.8 ± 1.6 Ma from an equigranular syenogranite sample, and 365.5 ± 3.3 Ma from a quartz - orthoclase porphyry sample. Although the pluton displays wide textural variation, chemical data from 50 samples from throughout the extent of the pluton are similar. SiO₂ is mainly between 68 and 78%. The pluton is calc-alkaline, peraluminous, ferroan and alkalic to calc-alkalic. The rare earth element patterns are virtually identical, with slight enrichment in the LREE (La 20 to 100 times chondritic values), flat HREE, and moderate negative Eu anomalies. The geochemical signature suggests that the pluton is an evolved I-type granite, emplaced in an active continental margin, a surprising result given the Late Devonian age and its location in an area presumed to be experiencing extension and rifting beginning at ca. 375 Ma. Contrary to previous mapping, where most contacts were interpreted as faults, the Margaree pluton intruded all surrounding units, displaying an *en cornue* shape indicative of emplacement preferentially within or at the margins of a major shear or fault zone, in this case the Aspy Fault, a major late structure in the Cape Breton Highlands. The pluton is not cut by the Aspy Fault, thus constraining the last stages of movement to the Late Devonian. The contact relations and age of the Margaree pluton have important implications for the history of the Aspy terrane and its relationship to the now-adjacent Bras d'Or terrane.