

tigations over the last five years indicate, however, that this region also encompasses compositionally similar plutonic rocks from a Paleoproterozoic episode of magmatism. These two superficially comparable “bimodal” groups of anorthositic and granitic rocks share one geographic area, yet are temporally divorced by nearly 800 million years.

The first evidence that Paleoproterozoic plutonic rocks had heretofore been erroneously included within the NPS was presented in the early 1990s – isotopic data from several granitic intrusions indicated crystallization ages greater than 2000 Ma. Prior to 1996, however, the full compositional spectrum and any wider distribution of the Paleoproterozoic rocks were unknown. In 1996 and 1997 the Geological Survey of Newfoundland and Labrador undertook a regional mapping program south of Okak Bay. One of the program’s objectives was to subdivide the northern part of the NPS into its internal components as an aid to mineral exploration. The field work provided the first concrete indications that anorthositic, granitic, and dioritic rocks older than those of the NPS are well preserved in this part of Labrador. These older rocks were tentatively assigned a Paleoproterozoic age, and they could be separated from the lithologically similar NPS by applying a set of field criteria. The older rocks have (i) high-temperature hydration, (ii) swarms of synplutonic and post-crystallization metamorphosed basic dykes, (iii) deformed pink aplitic dykes, (iv) a penetrative foliation and associated upper greenschist-facies regional metamorphic overprint, and (v) a relatively high regional aeromagnetic signature. Subsequent geochronological investigations confirmed the field partitioning of Paleoproterozoic and Mesoproterozoic rocks, and provided absolute ages for several of the older and younger intrusions. The field characteristics and the isotopic ages clearly necessitate a stratigraphic separation of the two rock groups, and the Paleoproterozoic intrusions are now referred to as the Arnanunat Plutonic Suite (APS). The geological mapping and allied geochronology delineated numerous plutons in the Okak Bay area, and indicated that both the APS and the NPS were constructed through pulses of felsic and basic magmatism.

The age determinations from several components within the APS between Nain and Okak Bay have shown that the plutons and their basic dyke swarms represent magmatism between ca. 2140 Ma and ca. 2020 Ma. This Paleoproterozoic magmatism is confined to the Nain Province side of the ca. 1860 Ma collisional suture. Most intrusions are aligned parallel to the southeast-trending regional grain of the enclosing Archean gneisses, indicative of a pre-existing structural control on magma emplacement. The deformation and greenschist-facies metamorphism imposed on the APS was generated during the Nain-Churchill collision. NPS intrusions post-date the 1860 Ma collision, straddle the Nain - Churchill suture, have ages of 1330 Ma and 1320 Ma in the Okak Bay area, show no preferred regional trend, and are generally unaltered because no subsequent regional tectonism has been imposed on them. Anorthositic rocks of both the APS and the NPS south of Okak Bay host Ni-Cu sulphide prospects.

The APS is distributed along a 150 km, NW-trending belt

Anorthositic, granitic and dioritic intrusions of the Nain-Okak Bay area, Labrador: two geographically coincident, but temporally separated plutonic suites

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A large area of anorthositic and granitic rocks sits astride the 1860 Ma collisional suture between the Archean Nain Province and the Paleoproterozoic Churchill Province in the vicinity of Okak Bay in northern coastal Labrador. All such rocks have historically been considered to be part of the Mesoproterozoic Nain Plutonic Suite (NPS). Field and geochronological inves-

in which the intrusions become younger from north to south. This pattern may attest to the migration path of the Archean crust relative to an underlying (plume-related?) heat source or to a southward-propagating rift that was formed during the Paleoproterozoic fragmentation of the North Atlantic Archean craton. The NPS, advocated to have developed within a Mesoproterozoic intracontinental doming and rifting setting, is regionally oriented along the Nain - Churchill collisional suture, and also shows an overall age decrease from north to south but likewise from west to east. The juxtaposition of two nearly identical suites of anorthositic and granitic intrusive rocks within the same geographic region, but separated in time by some 800 million years, raises intriguing questions about the crust and mantle links that give rise to such repetitive "bimodal" magmatism.