

Neoproterozoic basement-cover relationships and the tectono-magmatic record of the Avalon Zone on the Hermitage peninsula and environs, Newfoundland

S.J. O'Brien¹, R.D. Tucker² and C.F. O'Driscoll¹

¹Newfoundland Department of Mines and Energy, P.O. Box 8700, St. John's, Newfoundland A1B 4J6, Canada

²Department of Earth and Planetary Sciences, Washington University, St. Louis, Missouri, USA

Field relationships and precise U/Pb ages reveal a protracted and episodic Neoproterozoic history for the Avalon Zone (s.s.) in southern Newfoundland and aid in demonstrating the composite nature of the Gondwanan margin of the Newfoundland Appalachians prior to the Paleozoic. On the Hermitage Peninsula, between the Hermitage Bay and East Bay faults, strata previously viewed as components of a single, conformable lithostratigraphic unit yield widely differing ages and exhibit either depositional or intrusive relationships with three Neoproterozoic plutonic suites, each of different age. Concordant U/Pb analyses were determined for the major rock suites, implying that crustal contamination, as indicated by the presence of inherited zircon, was successfully avoided during sample selection. The oldest dated pluton, a 673 ± 3 Ma granite of the Furby's Cove Intrusive Suite (FCIS), has intruded the 682 ± 3 Ma, arc-like Tickle Point Formation (TPF). The 626 ± 3 Ma, volcano-sedimentary Connaigre Bay Group (CBG) rests with profound unconformity upon the FCIS, unaffected by ductile shear zones in the subCBG basement. The 621 ± 3 Ma, calc-alkaline Simmons Brook Intrusive Suite (SBIS) intrudes the CBG as well as mafic gneisses and mylonites - the latter posttectonically. The SBIS was deformed with its country

rocks prior to emplacement of the 567 ± 3 Ma Grole Intrusive Suite (GIS) across the sub-CBG unconformity. Elsewhere on the peninsula, 567 ± 3 Ma diorites were locally emplaced into syn-magmatic shear zones and in some cases caused migmatization of adjacent country rocks. A near-complete Late Neoproterozoic stratigraphic record occurs in the Long Harbour Group (LHG), the base and top of which are dated at 568 ± 5 Ma and 552 ± 3 Ma, respectively. The younger LHG age represents the maximum age for the Proterozoic-Paleozoic boundary, the global stratotype for which is designated in the overlying Chapel Island Formation. The LHG, which may be cover to the *ca.* 620 Ma and older rocks west of the East Bay Fault, is time- and in part, litho-stratigraphic equivalent of much of the classic Ediacaran-bearing and younger Neoproterozoic succession of the Avalon Peninsula. ϵ_{Hf} values of the zircon aliquots used for age determination range from -5.5 to 10.2, implying that all suites formed from magmas that were variously enriched with evolved $^{176}\text{Hf}/^{177}\text{Hf}$. For most suites, the source of the evolved Hf may be modeled as slightly older sialic crust, but for the case of the SBIS, a middle Proterozoic crustal contaminant is clearly indicated.