

Geochronology of the Port Mouton Pluton, Meguma Zone, southwest Nova Scotia: a U-Pb and $^{40}\text{Ar}/^{39}\text{Ar}$ study

Raymond Fallon¹, Peter H. Reynolds¹, D. Barrie Clarke¹ and Larry M. Heaman²

¹*Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3H 3J5, Canada*

²*Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton, Alberta T6G 2E3, Canada*

The Port Mouton Pluton (PMP) is distinguished from other Late Devonian peraluminous granitoid intrusions in the Meguma Zone of southwestern Nova Scotia by its lithological heterogeneity, extensive physical and chemical interaction with country rocks, clear evidence for mingling and mixing with mafic magmas, and abundant pegmatites. Previous $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology indicated a complex post-intrusion history for this part of the Meguma Zone, with the majority of age determinations < 350 Ma. These ages probably represent resetting of isotopic systems by fluids associated with shear zones. Here we report new U-Pb data for the PMP that constrain its crystallization age. New $^{40}\text{Ar}/^{39}\text{Ar}$ incremental heating data for muscovite, coupled with the first reported laser work (total fusion and spot analysis) from the peripheral plutons, provide further insights into the post-intrusive history of the PMP and surrounding Meguma Zone.

Two monazite analyses from a tonalite yield identical ages of 373 ± 4 Ma and 374 ± 2 Ma. Monazite from undeformed granodiorite and monzogranite yield similar ages of 373 ± 2 Ma and 374 ± 1 Ma respectively. We consider the minimum

crystallization age of all intrusive phases to be 374 ± 1 Ma. Muscovite from undeformed samples generally yield higher spectral ages than undeformed samples. Muscovite from the undeformed monzogranite yields a flat $^{40}\text{Ar}/^{39}\text{Ar}$ spectrum with a preliminary age of 365 Ma. Three total fusion ages from this sample agree well with the spectral data. Muscovites from the remaining samples yield $^{40}\text{Ar}/^{39}\text{Ar}$ age spectra characterized by slight age gradients over the range ca. 355 to 360 Ma. Muscovite from undeformed granodiorite and pegmatite have preliminary total fusion ages greater than or equal to their respective maximum spectral ages, some approaching the U-Pb crystallization age. Muscovites from deformed monzogranite have preliminary total fusion ages that overlap the range of spectral ages. Some laser spot ages appear comparable to the U-Pb crystallization age, but some appear older possibly reflecting isotopic fractionation during laser heating. Total fusion ages of carefully selected muscovite grains may provide the most reliable estimate of the time of cooling to the muscovite closure temperature.