
Field relations and petrology of the Trafalgar plutonic suite, northeastern Meguma terrane, central Nova Scotia

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For this study, field data, samples, and petrological data from previous studies are used in combination with new field observations and petrological data to provide new insights into the tectonic setting, origin, and evolution of the Trafalgar plutonic suite. This suite intruded metasedimentary rocks of the Goldenville and Halifax groups at about 374 Ma, based on published U-Pb (zircon) and ⁴⁰Ar/³⁹Ar mica ages. The host rocks were regionally deformed and metamorphosed to greenschist facies during the mid-Devonian. Both plutons and their host rocks were deformed in a major mylonite zone along the northeastern margin of the study area.

The Trafalgar plutonic suite consists of 19 separate plutons composed of 8 different lithologies ranging from quartz diorite and tonalite to monzogranite and syenogranite. Based on cross-cutting relations, quartz diorite and tonalite are the oldest units and they occur only in the western part of the suite. They were intruded by medium- to coarse-grained granodiorite of the Twin Lakes pluton. Subsequently, muscovite-biotite granodiorite to monzogranite, characterized by the presence of microcline megacrysts, intruded the suite. The eastern part of the suite is dominated by large plutons composed of medium- to coarse-grained equigranular muscovite-biotite monzogranite. A small body (South Brook Pluton) in the central part of the suite is similar but contains a higher proportion of large quartz grains. In the largest pluton (Long John Lake), small mappable bodies of distinctive fine- to medium-grained monzogranite with K-feldspar and quartz phenocrysts are present. The youngest component is fine- to medium-grained muscovite monzogranite to syenogranite, which intruded the larger monzogranite plutons. A separate small body of fine-grained equigranular muscovite-biotite monzogranite east of Rocky Lake is of uncertain age.

All of the plutons are peraluminous, and SiO₂ contents range from 47 to 77%. Overall, CaO, MgO, Fe₂O₃^T, TiO₂, and MnO show positive correlation with SiO₂ and Na₂O and K₂O show negative correlation. Most trace elements in granodiorite, monzogranite, and syenogranite samples of all textural varieties also show negative correlations with SiO₂;

however, some scatter occurs, especially in the Twin Lakes and Lower Rocky Lake plutons. The quartz diorite and tonalite samples show no correlation with SiO₂ and wide scatter in trace elements. Discrimination diagrams indicate that the plutons formed in a syn-collisional and/or volcanic-arc setting. Most of the plutons are chemically similar to other granitoid plutons of the Meguma terrane except for the tonalitic and quartz dioritic plutons that have lower SiO₂ than other tonalitic plutons such as Barrington Passage.