GEOLOGY AND $^{40}AR/^{39}AR$ GEOCHRONOLOGY OF THE COASTAL COMPLEX NEAR TROUT RIVER AND LARK HARBOUR, WESTERN NEWFOUNDLAND

by

Bruce D. Idleman

A Dissertation

Submitted to the State University of New York at Albany

in Partial Fulfillment of

the Requirements for the Degree of

Doctor of Philosophy

College of Science and Mathematics

Department of Geological Sciences

1990

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The dissertation submitted by

Bruce D. Idleman

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has been read by the undersigned. It is hereby recommended for acceptance to the Faculty of the University in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Abstract

The Coastal Complex is an assemblage of variably deformed and metamorphosed ophiolitic rocks exposed along the western side of the Bay of Islands ophiolite in western Newfoundland. The complex consists of several isolated massifs that lie above and in thrust contact with sedimentary rocks of the Humber Arm Supergroup. Mapping of the massifs south of Trout River and northwest of Lark Harbour has shown them to be tightly folded on a regional scale. The folds are upright, north to northeast trending, and doubly plunging over distances of several kilometers. They affect both the basal thrust and the overlying ophiolitic rocks. The oldest rocks in the two massifs are gabbros and peridotites, some of which contain an early penetrative foliation and an associated stretching lineation (D_1) formed under upper amphibolite to granulite-facies metamorphic conditions. They are intruded by large tabular bodies of trondhjemite that postdate the D_1 fabrics in the mafic and ultramafic rocks. Final cooling of the plutonic terrain below about 500°C occurred by 490 Ma, as revealed by $^{40}Ar/^{39}Ar$ ages obtained from magmatic hornblende. The plutonic rocks are cut in places by gently dipping ductile shear zones (D_2) several hundred meters wide and 5 kilometers or more in preserved length. The shear zones rocks are mafic and rare ultramafic mylonites formed under greenschist to upper amphibolite-facies metamorphic conditions. They are constrained by $^{40}Ar/^{39}Ar$ dating of metamorphic hornblende to have formed between 460 and 475 Ma, synchronous with the obduction of the western Newfoundland ophiolites. Numerous dikes and other hypabyssal intrusive bodies of diabase and microgabbro were emplaced into the complex during this event. Some of these bodies were strongly affected by the D_2 deformation, while others are undeformed and crosscut the shear zone fabrics. The complex is capped by a bimodal suite of volcanic rocks, which nonconformably overlie the plutonic and metamorphic units and postdate the development of the D_2 shear zones. Field relationships and geochronological data from the two field areas suggest that the Coastal Complex represents an imbricate stack of ophiolitic thrust slices assembled along the leading edge of the Bay of Islands ophiolite during its obduction.

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