

Hammerdown Basalt, Springdale Peninsula, Newfoundland: Lithostratigraphic unit or lithotectonic collage?

Brian H. O'Brien¹ and Greg R. Dunning² - 1. *Geological Survey of Newfoundland and Labrador, Department of Natural Resources, PO Box 8700, St. John's, Newfoundland and Labrador A1B 4J6, Canada* ¶ 2. *Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador A1B 3X5, Canada*

The Hammerdown Basalt separates two of the oldest tectonic constituents of the peri-Laurentian Western Notre Dame Bay volcanic belt. It forms a narrow map unit situated near the regional boundary between the Ordovician Catchers Pond Group and the Cambrian Lushs Bight Group on the southwestern part of the Springdale Peninsula.

Picrobasalt, basalt, basaltic andesite, and andesite flows in the southwestern part of the Hammerdown Basalt comprise base metal-enriched suites of tholeiitic and subordinate calc-alkalic rocks. Such strata may be correlated with the mid-ocean ridge basalt, back-arc basin basalt, and transitional arc tholeiite seen in the lowermost Indian Brook Formation of the Catchers Pond Group. They are probably also the partial equivalent of the sequence of basaltic andesite, (normal and low-Ti) island arc tholeiite, and dacitic crystal tuff that typifies the overlying Long Pond Formation. Such marine lavas comprise the depositional substrate of the felsic pyroclastic strata that dominate the middle and upper part of the Catchers Pond Group.

A precise 477.3 ± 1.3 Ma U-Pb crystallization age of a quartz–feldspar tuff from the middle Long Pond Formation indicates that some of the earliest felsic eruptions in the Catchers Pond Group occurred near the base of the Floian stage of the Early Ordovician. Magmatic zircons from a limestone-bearing crystal tuff below the uppermost formation of Catchers Pond Group give a new U-Pb age of 475 ± 1.4 Ma. Early Arenig bioclastic carbonates (post-477 Ma), the earliest Middle Arenig tuff (ca. 475 Ma) and the youngest undated strata of the Catchers Pond Group are preserved in stratigraphic order within a tectonic window below the sole thrust of the Hammerdown Basalt.

The late Tremadocian – early Floian volcanic strata of the Indian Brook and Long Pond formations, including the imbricate slices present in the Hammerdown belt, also occur in the hanging wall plate of the sole thrust. Inversion of the Catchers Pond basin-fill was governed by a northeast-dipping, foliation-parallel thrust zone that had developed prior to the intrusion of a quartz–feldspar porphyry sheet dated at 474 ± 1.6 Ma. The southwest-directed fault movements effected an allochthonous slice of the Lush Bight Group and the tectonically dismembered Early Ordovician strata immediately underlying these Cambrian basement rocks. Rapid orogen-parallel displacement was probably related to the Taconic II accretion documented in the metamorphic hinterland.

The unit mapped as Hammerdown Basalt therefore represents an arcuate tectonic collage of several Cambrian and Early Ordovician lithostratigraphic units. The Hammerdown imbricate thrust stack is deformed by an upright train of dome-and-basin fold structures that are responsible for exposure of the Indian Brook and Long Pond formations of the Catchers Pond Group in their type area near the Indian River.