

The metamorphic development of the McMillan Flowage Formation, central Cape Breton Island

Mariska terMeer

Department of Geology, Acadia University, Wolfville, Nova Scotia B0P 1X0, Canada

The Cape Breton Highlands form a critical part of the Appalachian orogen. In Cape Breton Island, four tectono-stratigraphic zones, including the Bras d'Or terrane, can be recognised within this system. The Bras d'Or terrane consists of metamorphosed stratified rocks and plutonic suites, representative of an island arc to collisional setting. Pressure estimates of intrusion of dioritic and tonalitic plutons have ranged up to 8 kilobars. The plutons have yielded U-Pb zircon ages between 575 to 556 Ma, which are interpreted to represent ages of intrusion. Titanite ages of 548 ± 2 and 521 ± 2 Ma represent the minimum age of amphibolite-facies metamorphism in the area. Previous studies had postulated metamorphic conditions up to kyanite grade, although no kyanite has been positively identified in the Bras d'Or terrane.

The McMillan Flowage Formation is the largest, most continuous, and most compositionally variable stratified unit

within the Bras d'Or terrane. Metamorphism in the McMillan Flowage Formation ranges from chlorite to sillimanite grade in the central Highlands. Typical maximum P-T assemblages include sillimanite-muscovite-quartz \pm potassium feldspar. TWEEQU determinations of equilibration from pelites show pressure ranging from 2.8 to 4.5 kilobars, and generally increasing towards the south. The temperature ranged between 550 and 620°C with the exception of the Cross Mountain area, near the middle of the McMillan Flowage Formation, where a temperature estimate of less than 500°C was obtained.

The McMillan Flowage Formation therefore consists of low-pressure metamorphic rocks surrounded by high-pressure plutons. This juxtaposition may have occurred as a result of rapid uplift during the time period between the intrusion of the plutons, and the peak of metamorphism.