

Movement History of the Cobequid Fault Zone, Cobequid Highlands, Northern Nova Scotia

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The Cobequid Fault Zone (CFZ) is a complex linear feature defined by numerous, generally E-W faults that cross northern Nova Scotia between Cape Chignecto and northeast of Truro. In this sense the Cobequid Highlands massif, which is bounded,

broken and cut by the E-W faults, is part of this large fault zone. The CFZ is the Carboniferous and Mesozoic manifestation of movement between the Avalon Composite Terrane and the Meguma Terrane that began in Devonian or earlier time as the

Minas Geofracture. From the Late Devonian to the Late Carboniferous, movement on the CFZ: (1) deformed rocks in some fault blocks, (2) isolated rock units, (3) influenced sedimentation, (4) facilitated the extrusion of three to six kilometres of bi-modal volcanic rocks (Fountain Lake Group), and (5) acted as a locus for Devonian and Carboniferous plutonism. Sedimentation was episodic and mainly influenced by relative vertical movements on the CFZ. The Fountain Lake volcanics are found across the Highlands in fault controlled outcrops. Flow directions and slices of volcanic rock in the CFZ indicate that the volcanic rocks covered much of the area south of the Highlands. Emplacement of plutons was part of an intrusive process in shear zones analogous to examples in the South Armorican Shear Zone of Brittany. The transcurrent movement was episodic and appears to be mainly confined to the Early Carboniferous, although additional movements took place during Late Carboniferous and Triassic-Jurassic times, coupled with vertical movement. The result of the Namurian movement was the isolation and deformation of a large block of (?) Early Carboniferous siltstone/wacke (Greville River Formation) and smaller blocks of Fountain Lake Group rhyolites, Hadrynian aged Jeffers Group mafic volcanics and Windsor Group limestones and sediments. The mylonitization and truncation of several Early Carboniferous-aged plutons by active faults and the subsequent emplacement and deformation of the Pleasant Hills Pluton date this episode of transcurrent

movement at c. 330 Ma. The estimated composite horizontal movement is 80 to 120 km minimum for Namurian time; younger movements are not as well documented. By Westphalian A time most of the faults along the northern side of the CFZ had been overstepped by sedimentation and movement was concentrated on the southern side of the Cobequid Highlands. Continued horizontal motion on the CFZ during the latter part of the Carboniferous has complexly deformed the Middle Carboniferous-aged Cape Chignecto Pluton. At this location the CFZ changes its orientation from E-W to WSW; what was mostly horizontal movement on the E-W CFZ became more transpressive with the accompanying development of thrusts and low-angle shear zones. The Pluton has large areas with near horizontal mylonites that are not found elsewhere in the same-aged rocks. This episode began in (?) Westphalian time and continued until the cessation of thrusting in the Saint John, New Brunswick region (late Westphalian). The southern part of the CFZ, mainly south of the Highlands, became active again during rifting in Middle Triassic time. Dip-slip movement continued intermittently between Triassic and Early Jurassic time along the locus of the Minas Geofracture. Some horizontal motion appears to have deformed Late Triassic sediments along the Cobequid Fault. The CFZ was an active boundary between the two terranes for a long period of time and represents an impressive record of movement.