
**Regional implications of the structural geology and tectonics
at Chignecto Bay, Nova Scotia**

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The Minas fault zone, a Paleozoic Appalachian terrane boundary, is an excellent example of a long lived zone of intense deformation of low metamorphic grade and significant displacement. Current interpretations indicate dominant dextral transpression during the Acadian orogeny as Meguma docked against the Avalon terrane. This transpressive fault zone was later reactivated and acted as the locus for the opening of the Fundy and Minas basins during the initial fragmentation of Pangea in the Triassic.

Chignecto Bay offers excellent along and across strike exposure of the Minas fault zone; from this a detailed tectonic history can be obtained. The principal rock unit is the Greville River Formation, the distal facies of a single alluvial fan-fluviatile-lacustrine unit of the Late Devonian–Early Carboniferous Horton Group. Four folding episodes have been identified; first generation folds are tight and isoclinal, second generation folds are open and recumbent, third generation folds are upright, NW vergent with shallow fold axis. Transposition is a dominant deformation mechanism. The final folding episode produced large-scale warps with dextral vergence which have an axial plane oblique to the fault trace. This sequence of folding suggests that there has been a progression in regional tectonics from early contractional deformation across the fault zone to one of dextral shear along the fault.

Early Mesozoic NW transtensional reactivation of the fault zone produced the Minas and Fundy basins which are filled by the Fundy Group syn-rift sedimentary deposits and basalts. Adjacent to the fault is a zone of intense deformation in which transtensional displacement is localized. This area is dominated by sinistral and normal faulting resulting in calcite veining and brittle microstructures.

The Wolfville Formation is in fault contact with the Greville River Formation and is characterized by normal and sinistral strike slip faults. This is anticipated in a transtensional regime. Fold orientations are consistent with dextral displacement, which may be a late stage response of the now passive Fundy and Minas basins to the continued spreading offshore as the Atlantic opens.

The relative westerly position of Chignecto with respect to the direction of collision between Avalon and Meguma produces an east–west variation in deformation intensity and styles. This can account for some of the differences in the structures observed at Chignecto and Greville Bay. Chignecto Bay offers insight into the early folding history of the Greville River Formation, which contrasts with the exposure at Greville Bay where cyclical transposition has obliterated the early folding sequence. Clearly Chignecto offers the opportunity to increase our knowledge of the tectonic evolution of the Minas and Fundy basins.