

Geology of the St. Mary's Basin, Nova Scotia

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The St. Mary's Basin, central mainland Nova Scotia, is underlain by a latest Devonian-early Carboniferous (Tournaisian) intra-continental fluvial to lacustrine basin-fill sequence of clastic sedimentary rocks that are assigned to the Horton Group. The basin occupies the boundary between

the Meguma and Avalon Composite terranes. The contact with the Avalon Terrane is tectonic, but along the southern flank of the basin Horton Group rocks unconformably overlie the Meguma Terrane, implying that a portion of the basin is underlain by Meguma basement. Facies relationships indicate deposition

along the southern flank of the basin was influenced by coeval faulting. In the southwestern portion of the basin, the rocks are overlain, presumably unconformably, by the Windsor Group. Most Horton Group units defined in the eastern portion of the basin can be mapped westwards where they form part of a thick sequence with that generally strikes northeast to east-northeast, faces southeast, coarsens upward, thickens towards the southeastern basin of the margin and contain clasts of Meguma derivation. However, in the northwest portion of the basin, the clastic rocks have a mixed Avalonian-Meguma provenance confirming the status of the Horton Group as a post-Acadian overstep sequence. The details of this area are still unclear and are the focus of ongoing mapping.

The character of the basin-fill rocks does not vary with proximity to the Chedabucto fault, suggesting that this fault does not constitute the original margin of the basin, and that an unknown portion of the basin has been tectonically removed

and may be found north of the fault. Although it can be demonstrated that least some of the basin-fill rocks overlie a basement composed of Meguma Terrane rocks, the existence of Avalonian basement rocks cannot be confirmed. Strike-slip motion along the Cobequid-Chedabucto fault system has resulted in heterogeneous deformation characterized by a variety of dextral kinematic indicators. In the western basin, the zone of intense deformation transects the basin in an northeast-southwest direction, where it produces a relatively intense, narrow (*ca.* 2 km) zone characterized by small-scale and regional tight to isoclinal folds, associated faults in the hinges of these folds and locally developed mylonitic fabrics. In the eastern basin, deformation is relatively mild. Regional factors suggest that this deformation reflects Late Paleozoic dextral relative motion between Avalonian and Meguma terranes, and between Laurentia and Gondwana.