

## **Laurentian Basin – A Strike Slip / Extensional Conjugate Depocentre to the Moroccan Margin**

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The Laurentian Basin, which covers an area of approximately 60,000 square km between the island of Newfoundland and province of Nova Scotia on the Atlantic coast of Canada, lies at the intersection of the extensional Scotian Margin and the extensional – strike slip domain of the Southern Grand Banks. A thick (up to 20 km) Mesozoic – Cenozoic succession downlaps onto oceanic crust to the south and onlaps the pre-rift Paleozoic sediments on the basin's northern flank. A study (MacLean and Wade, 1992) of the area's petroleum potential, based on a regional seismic grid, by the Geological Survey of Canada resulted in a resource estimate of 8-9 tcf of recoverable gas and 600-700 million barrels recoverable oil at an average expectation. Despite its recognized potential the basin has thus far seen little exploration because of a jurisdiction moratorium that was only recently lifted. Current licensees have acquired 3D seismic over selected parts of the basin and are expected to drill within the next couple of years.

The basin's evolution began with the Mesozoic rifting of the Paleozoic substrate that underlies much of the Grand Banks and Scotian Shelf and extends north-westward into the Gulf of St. Lawrence. As the initial Triassic rift that separated the Scotian Shelf from the Moroccan margin failed to split the crust of the Grand Banks, sea-floor spreading to the south of the Laurentian Basin had to be accommodated by strike slip movement along the Newfoundland Fracture Zone. Although the oceanic rift system ultimately stepped to the east of the Grand Banks the seaways opened up by the initial Scotian- Moroccan rift lead to the creation of the Grand Banks basins and their deepening during mid Jurassic.

This paper revisits the Laurentian basin with the use of a modern pre-stack time migrated GSC seismic grid which is supplemented by recent data from Geophysical Services Inc., Western Geco, and GX Technology, along with public domain potential field data. Elements of geoscientific interest include the way in which the combined extensional and strike slip dynamics are expressed in the structure and stratigraphy of the basin. The fact that the basin also lies at the confluence of the Paleozoic Avalon-Meguma suture zone and the Newfoundland Fracture Zone of Mesozoic provides the additional opportunity to examine how the Scotian-Moroccan rifting was influenced by the pre-existing crustal fabric.

This under-explored basin contains only one well, which has not yet been released to the public but is reported to have intersected hundreds of meters of high quality sandstone reservoirs. The seismic data was tied to wells in adjacent basins on the Scotian Shelf and Southern Grand Banks to help decipher its stratigraphic and structural evolution. In this regard the basin can be subdivided into tectono-stratigraphic packages which can be correlated along strike to the surrounding basins – including within the deep water depocentres. This study also investigates the basin's petroleum systems including the possibility of Mesozoic reservoirs being sourced by Paleozoic source rocks. Gasprone Mesozoic source rocks should exist within the pro-delta shales and interbedded marine shales of the Middle Jurassic to Early Cretaceous successions, similar to the source rock of the Sable Subbasin gas fields.