

## Deformation history and evolution of the Bay St. George subbasin

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Bay St. George subbasin, part of the larger Maritimes Basin of Atlantic Canada, straddles both onshore and offshore areas of SW Newfoundland. Recent onshore discoveries show that a viable petroleum system exists in the basin, though its extent is poorly known, and the tectonic history of the basin is not well understood. A better understanding of the basin history is a prerequisite for further hydrocarbon exploration.

The most recent systematic geological mapping onshore is by Knight (1983). Since this time, a substantial body of new published data have improved knowledge of the stratigraphy (e.g. Utting & Giles 2008, Utting et al. 2010), and geophysics (e.g. Hall et al. 1992). In addition, a grid of 2D seismic data from the offshore are in the public domain, and a variety of proprietary seismic profiles have been shot onland.

More recently, a swath bathymetry data set has been collected by the Marine Institute at Memorial University, and the Geological Survey of Canada (Fig. 1). These data reveal a pattern of curvilinear sea-floor features that can be tied to 2D seismic profiles that image the late Paleozoic strata below. The data are complemented by recently released aeromagnetic data (Fig. 2; Dumont & Jones 2013) that also image curvilinear anomalies. The pattern of sea-floor features, and the geometries imaged in the seismic data, closely resemble those imaged in the Cumberland subbasin of Nova Scotia) which has a long history of hydrocarbon exploration, and where the structure and evolution of the basin was dominated by salt expulsion tectonics (Waldron et al. in press 2013).

We propose to map selected portions of the on-shore Bay St. George subbasin, and to tie the new onshore and offshore data to develop a structural model for the basin, in the process testing the hypothesis of Knight (1983) that the evolution of the basin was dominated by strike-slip tectonics.

This project will deliver annual reports on onshore-offshore correlation, on the distribution of rock units in the basin, and on its tectonic evolution. Final reports will consist of 4-5 papers, suitable for publication in refereed scientific journals, which will make up the PhD student thesis (probably M. Snyder). All data will be supplied as an electronic database at project conclusion.

- 1) Integrate the offshore and onshore data sets in a coherent model for the basin fill. Offshore data include 2D seismic profiles, aeromagnetic maps, and swath bathymetry maps (collaboration with NLDNR; MUN; Geological Survey of Canada)
- 2) Carry out detailed field mapping in areas of particular significance and/or uncertainty.
- 3) Determine the roles of thrusting, strike-slip motion, and evaporite tectonics in basin history;
- 4) Compare the basin with hydrocarbon-producing basins elsewhere in Atlantic Canada.

The project will run from September 2013 to August 2017

### References

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Fig. 1. Existing and proposed swath bathymetry data in Bay St. George subbasin (R. Gillespie, personal communication, 2013). Box outlines Fig. 2.

[Unpublished data]



Fig. 2

Fig. 2. Recently published second vertical derivative aeromagnetic map of part of Bay St. George subbasin and adjoining areas (Dumont & Jones 2013)

