

Offshore Exploration in the Anticosti Basin Gulf of St. Lawrence, Quebec, Canada - A Case Study

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Introduction

An offshore exploration program was carried out on two separate blocks in the Gulf of St. Lawrence between Quebec and Newfoundland, see Figure 1. The exploration method relied upon a regional airborne geochemistry survey to identify areas with a geochemical high, similar to the productive geochemical anomalies in Australia. Once the land was licensed, seismic and potential field methods were used to construct an integrated geologic model.

The exploration target was the productive Ordovician carbonates, which trend from Texas (Ellenberger), through New York (Beekmantown) to southwestern Newfoundland (St. George/Romaine). An airborne geochemistry survey, owned by Sky Hunter Exploration Ltd., (www.skyhunter.ca), measuring hydrocarbon from microseeps, was used to select two exploration blocks. An integrated geologic model was constructed from interpretation of seismic reflection, seismic refraction, and bathymetrics data, together with gravity and magnetics data owned by the GSC.

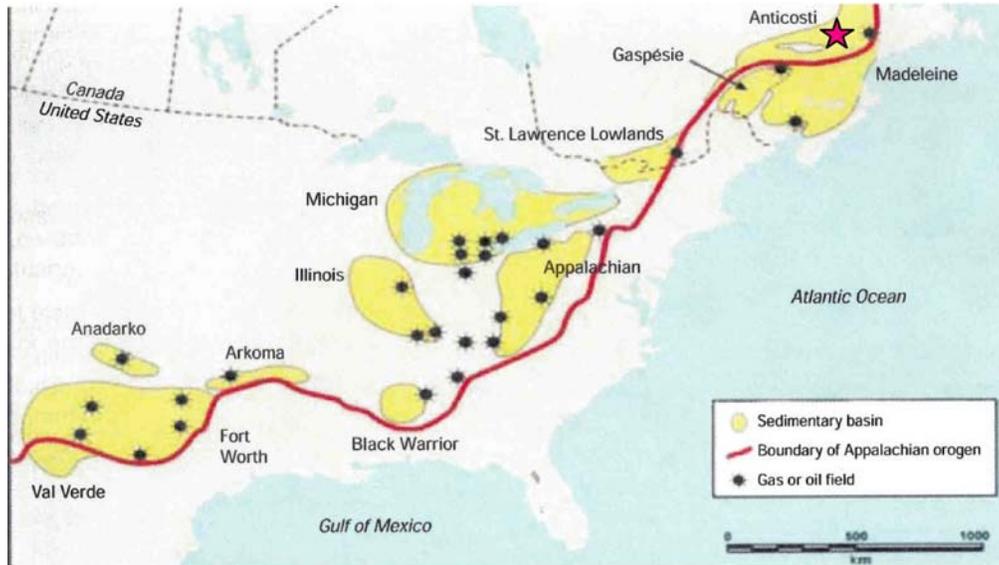


Figure 1. The exploration area in the Anticosti basin lies on trend with production occurring from Texas to New York.

Geochemistry

An airborne geochemical survey was carried out in a north-south direction with line spacing of 2 km. The purpose of the survey was to outline hydrocarbon intensities from microseeps. The interpretation of geochemistry data was used to design a seismic program to determine the stratigraphy and structure associated with the geochemical highs.

Bathymetry

The depth to seabed was plotted and interpreted for morphology and faulting. Faults apparent on the seismic data were correlated with faults identified on the bathymetric data. In the north portion of the survey area, the termination of the Paleozoic was clearly visible by a steep dip to the west, opposite to the regional dip.

Geophysics

A total of 1500 km of 2D reflection seismic data were reprocessed and interpreted. The Trenton limestone and the post-Sauk sequence unconformity (top St. George/Romaine), were mapped. The data were evaluated for alterations in the sub-unconformity carbonates. These seismic amplitude alterations were interpreted to represent porosity in the dolomite.

It was possible to interpret the seismic shot records which showed the direct arrival through the water and refractions from the limestone (Trenton) and the dolomite (St. George/Romaine). The thickness and structure of the Trenton were mapped on a regional basis and in detail across a proposed drill location.

A total of 456 gravity points from the government survey were used to create a regional gravity map. This map was interpreted to show Paleozoic highs and lows. The gravity lows were correlated with the seismic and indicated the thickness of the Paleozoic to be up to 5 km.

The magnetic data from the GSC were interpreted to define basement faulting. The basement faults were considered a significant influence in passing fluids that caused hydrothermal dolomitization.

Evaluation Prior to Drilling

The construction of the geological model relied upon identifying areas where a seismic high correlated with a geochemical high and a magnetic lineament. The interpretation identified three prospective anomalies, one of which covers approximately 50 sq. km, see Figure 2. A controlled-source electro-magnetics (CSEM) survey over each prospective drill location is believed appropriate in order to confirm the presence of hydrocarbons prior to drilling.

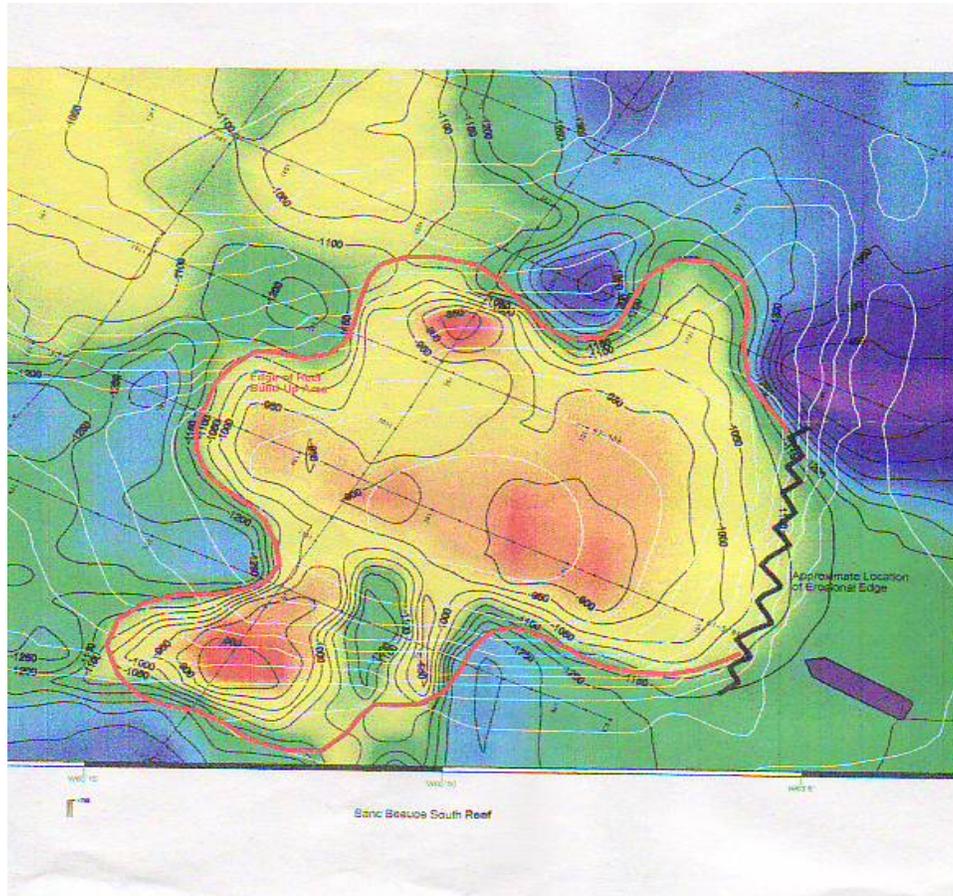


Figure 2. A geochemical high associated with a seismic high, similar to reserves found offshore Australia. Area of outlined in red covers approximately 50 sq km.

References

Seismic Interpretation of Banc Beaugé and Mecatina Areas, Eastern Gulf of St. Lawrence, by Torca Geophysical Consultants, for 9161-7795 Quebec Inc., December 1998.

Interpretation of Gravity, Magnetics and Reprocessed Seismic, Banc Beaugé and Mecatina Areas, by Torca Geophysical Consultants, for 9161-7795 Quebec Inc., December 1999.

Airborne Geochemistry supplied by Sky Hunter Exploration Ltd., www.skyhunter.ca