Structure and stratigraphy of offshore western Cape Breton Island from seismic reflection mapping

Paul Durling and Tom Martel
Corridor Resources Inc., #301, 5475 Spring Garden Rd, Halifax, NS, B3J 3T2. <pdurling@corridor.ns.ca>

A large sedimentary basin containing over 12 km of Carboniferous and Permian strata underlies the southern Gulf of St. Lawrence. The rocks in the basin consist mainly of red and grey, non-marine, clastic rocks with abundant coal. A thick marine evaporite interval was deposited near the bottom of the sedimentary basin fill, but has since been remobilized to form numerous salt structures.

An extensive grid of seismic reflection data was acquired in the southern Gulf of St. Lawrence from the late 1960s through to the early 1980s. These data were commonly low fold (6–12), not migrated, and by today's standards, had very basic processing. Such data were satisfactory for flat-lying strata, but are grossly inadequate for areas of complex structure such as the area offshore from western Cape Breton Island. A modern seismic program was conducted in the aforementioned area in December, 2003. The survey was acquired with a low-powered source and a 6000 m streamer, resulting in high quality 120 fold data. The data were processed to pre-stack time migration and provide much improved images of the area. Whereas the older seismic data in the area portrayed salt structures as near vertical columns of salt, the new data shows detached salts and vertical salt welds, analogous to some Gulf of Mexico structures.

A number of petroleum exploration wells have been drilled in the Maritimes Basin that show strong indications of natural gas, including the East Point E-49 well that tested natural gas at a flow rate of 5.5 million cubic feet per day. Gas bearing sands from the East Point discovery were mapped on the new seismic data within a closed area called the Cheticamp Prospect. The prospect is located about 20 km southeast of the East Point discovery. The prospect consists of an anticline between two salt structures and encloses an area of roughly 20 km^2. If successful, such a structure could contain a significant amount of natural gas.