

## **Canada's Atlantic Coast: Global analogies identify common geological elements and basin architectural variations for significant play opportunities**

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The hydrocarbon settings of the Scotian Shelf and the Grand Banks of Newfoundland have been compared to the Gulf of Mexico and to the North Sea respectively in terms of their future potential. The comparisons are valid in the regard that the geological elements comprising these basins are similar. However the architectural arrangement of these elements imparts unique characteristics to each basin. Play development requires appreciation of the manner in which these basins differ as well as awareness of the style of hydrocarbon entrapment in each basin.

The basic elements as identified from the Gulf of Mexico (GOM) are, from land to sea: Platform, Growth faults, Growth faults and Salt diapirs, Diapirs and Minibasins. In the GOM each of these elements is well developed over large areas such that they can be readily distinguished. These same elements in the Scotian Shelf area are much more compressed in extent. The scale of the Scotian Shelf is significantly smaller than the GOM.

The Platform setting in the Gulf Coast is totally on land, thereby simplifying the exploration process and maintaining costs at a relatively low level. The same setting on the Scotian Shelf is totally offshore, thereby resulting in a significant increase in exploration costs. Seismic in both areas is look-alike but deeper structure appears to play a significantly stronger role in the Scotian Shelf. Whereas play opportunities abound on the Scotian Platform, detailed 3-D seismic will be required to reduce costs. The Platform to Growth Fault transition in the GOM coincides with the margin of the Jurassic-Cretaceous carbonate shelf, as is the case in the Scotian Shelf area. The Growth fault setting in the GOM is gradational to the salt diapir occurrences, being partially on land, and partially offshore. The edge of the present continental shelf marks the transition to the Salt diapirs and Minibasins setting. In the Scotian Shelf the Growth faults and Salt diapirs occur in a relatively narrow zone, and the minibasins occur in waterdepths greater than 2000 feet. The Scotian Sub-basin delta is the focus of the Growth fault setting.

Comparisons of these settings based on their seismic character demonstrates many similarities between the basins, a fact which will guide future exploration.

The Grand Banks of Newfoundland are characterized by rifted grabens with axial orientations and associated horsts, unlike the single shelf to basin transition seen in the Scotian Shelf. The Grand Banks are about 1/6th the size of the North Sea. In addition there is a shift in time between the stratigraphic sequences of

the two basins. The Jeanne d'Arc Basin is the best understood of the Grand Banks grabens due to the extensive exploration that has occurred there. Future drilling will improve our understanding of the associated grabens adjacent to the Jeanne d'Arc and will lead to new exploration targets. The elements identified in the GOM and Scotian Shelf are also present in the Grand Banks. The Platform setting is poorly defined at this stage but the Jurassic carbonate margin can be identified and can be correlated with its deeper water equivalents in the basin. Growth faults define the Trans-basin Fault Zone and coincide in part with the carbonate margin. Salt diapirs occur in the structurally deeper parts of the basin and display a more dominant linear character in contrast to the "pinnacle-type" diapirs of the GOM and Scotian Shelf. Such morphology may be a function of the influence of the linearity of the Grand banks grabens. Individual diapirs occur as well.

These basins no longer hold the reputation of being a social welfare programme for the Maritime and Newfoundland governments. Attitudes have changed. Hibernia has already produced greater than 100 million barrels since first oil in 1997. Major land sales have solidified the attitude that there is work worth doing. We are now comfortable with the expectation that the future of Canada's East Coast basins is very bright. Labrador's offshore future waits on the sidelines.