Petroleum systems and risk elements of the offshore Atlantic Canada

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Source rock is a fundamental component of petroleum systems; coupled with reservoir distribution they are the two key risk elements in many basins offshore Eastern Canada. Significant issues in recent hydrocarbon exploration on this margin were accurate definition of the main source rock intervals and detection of reservoir rock. Existing models of deepwater sedimentation have underestimated the links between shelf and slope sedimentation, the roles of sea level, salt tectonism, and canyon formation, as controls on sediment transport pathways. Mass failure and along-slope sediment transport are also significant processes in passive continental margin development. The consequence of these sedimentary processes is the inherent complexities of shelf to slope sedimentation patterns and movement of potential reservoir rock to greater depths than previously anticipated.

Hydrocarbon exploration offshore Nova Scotia began in 1959, but the Scotian Basin remains unexplored with very few exploration wells (127 of 207), most concentrated in the Sable Subbasin. Exploration and production of gas and condensate focused on the (1) rollover anticlinal plays of the Mesozoic Sable delta, and (2) the carbonate platform. But the source and timing of hydrocarbon generation and migration pathways of these discrete petroleum systems are not fully understood. In comparison, the petroleum systems of the Newfoundland offshore margin are better understood with over 1.3 billion barrels produced from one major source rock interval, the Kimmeridgian Egret Mb. of the Rankin Fm. However, the extensive Jurassic source rocks cropping out on the Western European and African conjugate margins suggest that exploration for hydrocarbons can test alternative (and new) play concepts, improving chances of success.

The Basin and Reservoir Research Lab is a dedicated facility for petroleum geoscience research and training within the Department of Earth Sciences at Dalhousie University. Ongoing research has translation benefits to the offshore oil and gas sector through new insights developed from our studies of the petroleum systems, offshore eastern Canada.

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