"Passive" margin sedimentation and reservoir distribution along the Scotian margin

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A significant issue in recent hydrocarbon exploration in the deep water on the Scotian margin is the detection of reservoir rock. Existing models of deep water sedimentation have underestimated the linkages between shelf and slope sedimentation and the various roles of sea level, salt tectonism, and canyon formation as sediment transport pathways, mass failure and along-slope sediment transport processes in passive continental margin development. The overall consequence of these sedimentary processes is movement of potential reservoir rock to different locations and to greater depths than previ-

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ously anticipated. The objectives of this study are to understand the complexities of shelf to slope sedimentation patterns using Neogene to Recent analogues in offshore Nova Scotia. Deciphering forcing functions, sediment pathways, and depositional processes are expected to improve exploration models for passive clastic margins. Investigation and analysis of these processes demonstrate that reservoir-grade sediments can be reworked, relocated, and transported to great water depths, and thus offer significant challenges to reservoir detection along the Scotian margin. A thorough understanding of the interplay and complexity of these processes is necessary to apply effective exploration models on passive margins.

Initial results suggest the following points. (1) Along the Scotian margin, canyons and mass-transport processes provide mechanisms for slope bypass and delivery to the rise and abyssal plain. Mechanisms of canyon incision are uncertain and may be related to deglaciation and eustatic sea level change, or in some cases relative sea level changes initiated by tectonic inversion. (2) Mass transport processes result in removal of stratigraphic section and transport of significant amounts of sediment downslope. (3) Some canyon and channels and their associated levee systems may contain reservoir quality sediments and provide conduits for downdip reservoir potential. (4) The presence of salt greatly complicates the margin. Mobile salt may provide significant trapping mechanisms and minibasin formation with sediment ponding, but may also complicate sediment pathways, destroy stratigraphic continuity, and cause mass failures through removal of lower slope buttress support. (5) Updip deltas and shelf margin deltas provide a source for downslope transport and sediment loading can contribute to mobilization of underlying salt. (6) Significant deep-water margin erosion occurred at certain periods, apparently related to development of strong along-slope bottom currents. This erosion may have led to undercutting of the base of slope, initiating sediment mass failure. These same currents produced large (10's km in wavelength) bedforms which may have reservoir potential and may force capture of down-slope sedimentation, perhaps generating local reservoir rock potential.