Interpretation of Deepwater Cenozoic Stratigraphy, Erosion Systems and Salt Tectonics of the Central Scotian Slope Offshore Nova Scotia

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The Cenozoic stratigraphy of the central Scotian Slope, part of the Mesozoic-Cenozoic Scotian Basin, is studied to understand influences of sea level change, salt tectonics and shelf-crossing glaciations on sedimentation patterns in a passive continental margin setting of the northern hemisphere. Interpretations are based on a recent 38 X 38 kilometer 3-D seismic data survey, extended by the study of regional 2-D multichannel seismic reflection, and correlated to biostratigraphic data and geophysical logs to provide new insights into the depositional history of this region. In the study area, Cenozoic strata have been dissected by deeply (500 m) eroded canyon systems during the Pleistocene. Broad inter-canyon regions also bear incomplete stratigraphic successions. These regions provide an opportunity to study the effects of erosional systems and salt tectonics on sedimentation patterns and stratigraphic development through the Cenozoic.

Cenozoic strata of the slope are subdivided into five large scale successions that are placed in a sequence stratigraphic framework by correlation of 7 key reflectors to the outer shelf. Paleo-channel erosion during lowstand sea-level deposited turbidite submarine fans, and formed lowstand wedge accumulations in the Middle Eocene, middle Oligocene and late Middle Miocene. Channel flow during these time periods was preferentially into salt withdrawal basins. During periods of highstand sea-level in the Early Eocene, Early Oligocene and Early Miocene, shelf margin progradation occurred on the outer shelf, and sedimentation on the slope was then minimized. The Cenozoic stratigraphy reveals a complex variety of extensional halokinetic structures recognized as periods of stratigraphic uplift, onlap, erosion and faulting that were most active in the Early Eocene, the Late Oligocene and the Late Miocene. Sea-level control was a critical factor controlling sedimentation on the slope, whereas paleoceanography, paleo-channel flow and salt tectonics affected the mode of deposition. Understanding these depositional/structural systems, sedimentation patterns along with timing of salt movement is critical to deepwater reservoir exploration.