ANALOGUE MODELLING OF SALT TECTONIC PROCESSES AND DEPOCENTER MIGRATION ON THE SHELF AND DEEPWATER SLOPE, WESTERN LAURENTIAN SUB-BASIN

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The Scotian Basin is situated on the Atlantic continental margin offshore Nova Scotia and is composed of a series of interconnected Mesozoic-Cenozoic sub-basins resulting from the rifting of North America from Africa. Thick deposits of late syn-rift Argo Salt coupled with complex basement morphologies and varied sedimentation patterns along the margin have resulted in a complex and laterally variable basin evolution. Unsatisfactory results from the recent round of hydrocarbon exploration in the deepwater slope demonstrate that a better understanding is required about the link between early post-rift salt mobilization and late post-rift formation of canopies and allochthonous salt nappes, and their relation to depocenter migration. We are using scaled analogue experiments comprised of sand and silicone putty to gain such an understanding by simulating basin evolution and salt tectonic processes constrained by seismic data. First-order model parameters of the western Laurentian sub-basin analogue experiment including sedimentation rates and patterns, basement morphologies, and initial salt thickness were constrained by GXT NovaSpan and public-domain seismic data. Experiment results confirmed appropriate timing and speculation of the evolution of this region with diverse structural processes including; (1) numerous passive downbuilding events throughout basin evolution, (2) extension focused in the Cretaceous forming a ramp flat geometry, and (3) minimal contraction in the upper Cretaceous. The next phase of this project includes modeling the interaction of sediment progradation and salt tectonics between the inter-connected Laurentian, Abenaki and Sable sub-basins. This experiment will evaluate the role of margin parallel sediment transport from the northeast via the Laurentian Channel during the early post rift stage of basin evolution and salt tectonics in the NE Scotian Margin. Insight from both models, when compared to regional seismic data, will contribute to our understanding of the structural evolution of the western Laurentian Sub-basin and determine the influence of margin parallel sedimentation.