

TECTONO-STRATIGRAPHIC EVOLUTION OF SALT STRUCTURES AND DEPO-CENTER MIGRATION IN THE ABENAKI SUB-BASIN AND ITS DEEPWATER EXTENSION, OFFSHORE NOVA SCOTIA

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Despite extensive exploration activity on the Scotian Margin, the latest round of drilling has yielded disappointing results. An in-depth analysis of the interplay between salt tectonic processes and sediment input is required to better understand the regional tectono-stratigraphic framework of the Scotian Basin and its individual sub-basins. We are using scaled analogue experiments to simulate coupled salt tectonic processes and depo-center migration in the Abenaki sub-basin and its deepwater extension. Experiments simulate the salt tectonics history from the early post-rift stage to the allochthonous salt nappe formation on the modern margin. The experiments are constrained by sedimentation patterns and rates, original salt basin thickness, and basement morphology deduced from the GXT Novaspan survey and public-domain 2D seismic reflection data.

Seismic interpretation results of the Abenaki sub-basin show a complex salt basement morphology, which includes a mid-basin high implying variable salt thickness in the early post-rift salt basin. Experiment results suggest that the complex basement morphology and variable salt thickness had a strong effect on the initial salt mobilization and early post-rift depo-centers, and that it controlled the pattern of sediment transport from the Jurassic to the Cretaceous. During the Cretaceous, seaward salt extrusion in the deepwater slope of the Abenaki sub-basin created an allochthonous salt nappe system with new mini-basins developing on this secondary source level. Mechanically constrained salt tectonic concepts and seismic interpretation templates deduced from the experiments will aid further seismic interpretation of the Abenaki sub-basin. These concepts will also give insight into how basement morphology influenced salt structure development, and how sedimentation rates and patterns affect depositional styles. This integrated approach will contribute to our understanding on the evolution of the Abenaki sub-basin and how its evolution relates to the timing of adjacent sub-basins on the Scotian Margin.