
Coupling of salt dynamics and sedimentary basin evolution on passive margins: implications for offshore Nova Scotia hydrocarbon exploration

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The high economic risk in hydrocarbon exploration on the Scotian Slope, offshore Nova Scotia, is caused in part by the complex salt structures that have developed in this area. This study applies physical experiments with optical monitoring to develop new concepts for the interpretation of geological and geophysical data, and provide information for the hydrocarbon exploration in this area. The scaled analogue models, which use sand and silicon putty as sediments and salt, respectively, simulate gravity driven deformation on passive margins with mobile substratum. High-resolution optical monitoring techniques, with Particle Imaging Velocimetry (PIV) enable one to quantify the complete 3D deformation and surface flow in the experiments. A series of experiments is conducted to study the effects of (a) varying slope angle, (b) lateral variation of salt layer, (c) variations in thickness of salt layer, and (d) sediment propagation and aggradation on systems commonly observed on passive continental margins. The results of these experiments will provide insights in structural evolution of sedimentary basins over a mobile substratum and will improve the structural and seismic interpretation of the Scotian Slope salt diapir province.