Physical modelling of the formation and salt tectonics of salt-canopy systems at deepwater continental margins with application to the Jurassic to Early Cretaceous, Abenaki and Sable subbasins, Scotian Margin.

Clarke Campbell, Cody MacDonald, Juergen Adam, Csaba Krezsek, and Djordje Grujic
Department of Earth Sciences, Dalhousie University, Halifax, NS, B3H 4R2 <ctcampbe@dal.ca>

Now that hydrocarbon exploration is moving into the deeper Scotian Slope, e.g. basinward of the Sable and Abenaki subbasins, a better understanding of the formation and controlling factors of the complex allochthonous salt canopy systems of the deepwater Scotian Slope is needed. The purpose of the study is to use physical experiments with high-resolution strain monitoring techniques coupled with structural modelling and seismic interpretation to develop new concepts for the formation of the allochthonous salt canopy systems of the Abenaki and Sable subbasins to improve seismic interpretation in the specific areas targeted in recent hydrocarbon exploration. The physical experiments are dynamically scaled and use sieved silica sand and viscous silicone rubber to simulate brittle deformation of sediments and ductile salt mobilization. The experiments include incremental sedimentation of a sand wedge with shelf to basinward progradation. Gravity-driven deformation occurs in the experiments under their own time and simulates passive margin salt mobilization with model sedimentation rates adjusted to the Jurassic to Cretaceous in the Central Scotian Margin. All experiments are monitored using Particle Imaging Velocimetry (PIV) technology to record surface flow and deformation. The experiment series presented in this study systematically varies the basement morphology beneath the silicone basin to investigate the control of possible basement architectures, formed by the rifting stage in the Scotian Margin, on the initial mobilization of the syn-rift Argo salt and late-stage formation of the huge allochthonous salt canopy system in the deepwater slope seaward of the Sable and Abenaki subbasins.

This study focuses on the formation of the allochthonous deepwater salt systems and how these structures will affect future deformation in the system. The preliminary results show that sedimentation pattern and basement morphology greatly affects early salt mobilization which strongly controls the late stage deformation of the allochthonous system and late stage salt mobilization. The results from these experiments will provide greater insight into the structural evolution of the Scotian Basin and will improve the structural and seismic interpretation of the deep water, Scotian Slope.