DEFORMATION OF INTERBEDDED SALT LAYERS DURING DETACHED AND BASEMENT-INVOLVED EXTENSION: INSIGHTS FROM SCALED EXPERIMENTAL MODELS

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ABSTRACT

Many petroliferous, salt-rich basins (i.e., offshore Brazil and Canada, onshore Netherlands) contain halite interbedded with stronger rocks (i.e., other evaporites, shales, carbonates, or igneous rocks) which influence the salt behavior and deformation patterns within these basins. For example, my study of the Mesozoic Argo salt of the Orpheus rift basin, offshore Canada, suggests that interbedded halite-and-shale units behaved more brittlely than massive halite units. Most previous analog modeling studies have used a single, uniform layer of silicone polymer to represent salt. In my proposed modeling study, I will simulate interbedded salt with alternating layers of silicone polymer and dry sand and/or wet clay. My goal is to investigate and evaluate the geometries, mechanics, and kinematics of deformation associated with interbedded salt in extensional settings. The proposed models will systematically test how the relative thickness and distribution of the silicone polymer and interbedded stronger layers affect spatial and temporal deformation patterns for both detached and basement-involved extension. The results of this study will contribute to a better understanding of deformation behavior associated with salt, particularly complex interbedded salt layers. I will apply the modeling results to the deformation observed in Orpheus rift basin, offshore Canada, using a dense grid of 2D seismic-reflection data. Geoscientists exploring for hydrocarbons can directly use the results of this study to constrain their structural interpretations, thus better defining hydrocarbon maturation, migration, and entrapment in salt-rich basins.

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