Structural Characterization of the Puma Diapir, Gulf of Mexico

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Abstract

The Gulf of Mexico Basin has been a significant target for oil and gas since the 1990s and continues today as a leading exploration target. This super basin is home to an estimated 200 BBOE, with current production totaling 60 BBOE for both USA and Mexico. Even though the overall depositional evolution of the Gulf of Mexico Basin has allowed for the key elements for petroleum accumulations to be met, a complex structural framework is present. This framework results from the asymmetric spreading of the North American Plate from the Yucatan Block crating the Gulf of Mexico Basin we see today, coupled with Jurassic Louann Salt deposits precipitated throughout the basin. The subsequent increasing sedimentary load created complex gravity-induced tectonic structures, resulting in the Louann Salt forming various salt stocks and canopies.

This research aims to characterize the structure surrounding the Puma Diapir, located in the southeastern region of the Green Canyon protraction area. The seismic dataset is a multiclient 3D depth survey from Western-Geco that combines wide azimuth acquisition (WAZ) and full azimuth acquisition (FAZ) datasets to produce a final image. The base and top of the salt in our study area is carefully mapped using the Kingdom Suite software. These structure maps are used as a visual aid in accessing the structural framework of the salt dome. Within the Puma Diapir, there appears to be three salt feeders into the canopy. Above the allochthonous salt sheet, we find secondary bucket-style minibasins, where the strata is sinking into the underlying salt feeders. The area consists of a variety of rollover faults, normal faults, and reactive salt structures. Above the salt dome, shallow extension faulting are the result of the rising body. Overall, the Puma Diapir shows classic yet complex structural features associated with salt movement.