Halokinetic Sequence Stratigraphy and Structural Geometry of the Eocene Fluvial Carroza Formation Along the La Popa Salt Weld, La Popa Basin, Mexico

Andrie, Joseph [1]; Giles, Katherine [1] (1) New Mexico State University, Las Cruces, NM.

This study uses field observations, measured sections, and geologic mapping to define and characterize non-marine halokinetic sequences within the Eocene Carroza Formation and determine controls on changes in sediment accumulation rate versus diapiric salt rise rate. This research has important implications for petroleum exploration in that salt structures and strata deposited adjacent to them are a major focus of hydrocarbon exploration but are often poorly imaged on seismic data sets. This study provides one of the rare outcrop analogs for fluvial sedimentation along a salt structure.

The Eocene Carroza Formation in La Popa Basin, Mexico, records one of the few exposures on earth of salt-sediment interaction in a fluvial depositional system. The Carroza Formation was deposited along the 25 kilometer long La Popa salt wall, which has since been evacuated of salt and is now a subvertical secondary salt weld. The Carroza contains halokinetic sequences, where beds become steep to overturned within a few hundred m of the La Popa salt weld, and display angular unconformities between stratal packages that become conformable/disconformable with distance from the weld. The style of halokinetic drape folding along the weld changes up-section from broad, wedge-shaped geometries to tightly-folded, hook-shaped geometries. This change in geometry is a result of changes in sediment accumulation rate versus diapiric salt rise rate of the La Popa salt wall. In the lower Carroza, the wedge-shaped geometries reflect periods of relatively high sediment accumulation versus diapiric salt rise rate, where the river system that deposited the Carroza was able to meander freely across the basin, periodically over the diapir. This resulted in thin, isolated channel sands that periodically punctuated overbank and fine-grained floodplain deposits. In the upper Carroza, the hook-shaped geometries reflect periods of relatively low sediment accumulation versus diapiric salt rise rate, where the river system was confined to the halokinetic drape fold syncline near edge of the topographically high salt wall. This resulted in thick multistory sand channel complexes, extensive overbank and floodplain deposits, mature paleosol growth on top of the salt wall, and alluvial fan conglomerates containing diapir-derived detritus that may have been toe-cut by the river.