# HIGH ORDER STRATIGRAPHIC FRAMEWORK OF INTRASLOPE GROWTH FAULTED SUBBASINS NEAR OFFSHORE MATAGORDA BAY, TX

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## ABSTRACT

Carbon capture and storage (CCS) is currently one of the leading atmospheric emission mitigation technologies. To have meaningful impact on the atmosphere $CO_2$ concentrations, megatons ($10^6$) of $CO_2$ must be removed from the carbon cycle permanently. This requires a subsurface geologic storage sites that are both volumetrically significant and secure over geologic time-scales. The northern Gulf of Mexico (GOM) has the ability to serve as a major location for CCS. Miocene strandplain systems in the GOM are an ideal stratigraphy for such storage due to their proximity to emissions sources, quality sand reservoirs, and depth relative to overpressure.

This study focuses on a suite of strike parallel subbasins within the Lower Miocene offshore Matagorda Bay, TX. Each subbasin has potential to serve as a future carbon sequestration site. Accurate mapping of subbasins' stratigraphy is necessary to understand the variable thickness and associated risk of reservoir-sealing shale intervals, recognizing that injection beneath thicker, more uniformly distributed shales is more favorable. These intervals must be mapped at high resolution ($4^{th}$ order cyclicity) to understand the individual components in assessment and risk analysis.

This research generates a novel dip-steered seismic volume which is leveraged to improve seismic attribute calculations and mapping at the $4^{th}$ order. The dip-steered seismic volume records the seismic dip in the inline and crossline direction of seismic features at the intersection of every inline, crossline, and seismic sample. This volume is used to generate a model of dense, 3D, auto-tracked horizons across each subbasin. The models better connect high resolution, but sparse, well log data and low resolution, but continuous, seismic data. Thickness distributions and shale interval maps generated from the models aid in risk assessment. Based on the resulting shale thicknesses, the suite of subbasins should be further considered as future storage sites.


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