A seismic –based CO2-sequestration regional assessment of the Miocene section, Gulf of Mexico, Texas and Louisiana.

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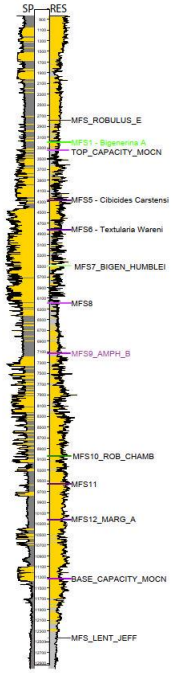
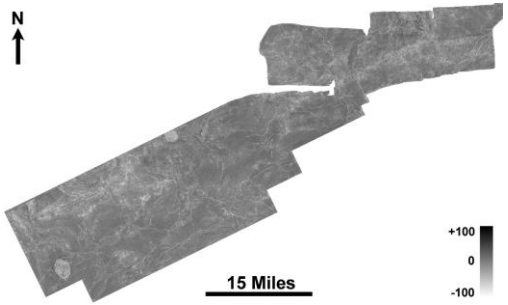
Abstract

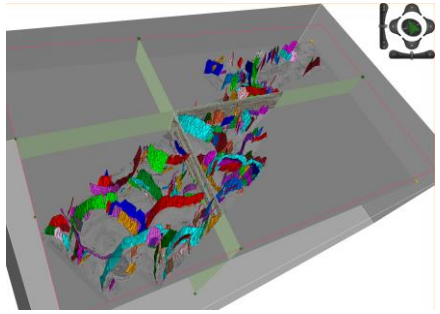
Relying on 3D seismic data, an assessment of the major structural elements of the Offshore Texas and Louisiana Miocene section was initiated to identify prospect subsurface areas for permanent geologic storage of anthropogenic CO_2. Identifying and mapping key fault planes and stratigraphic surfaces in the seismic data helped identify several areas that may be suitable for Carbon Capture and Storage (CCS) projects of scale. Prospective sites that included proximity to anthropogenic sources of CO_2, RMS amplitude intervals which indicate confining zones that greatly retard vertical migration of buoyant CO_2, and structural closures were ranked on a regional scale.

Type Log (GCCC Nomenclature)

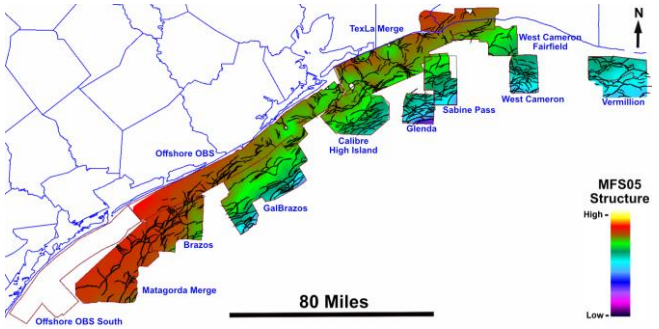


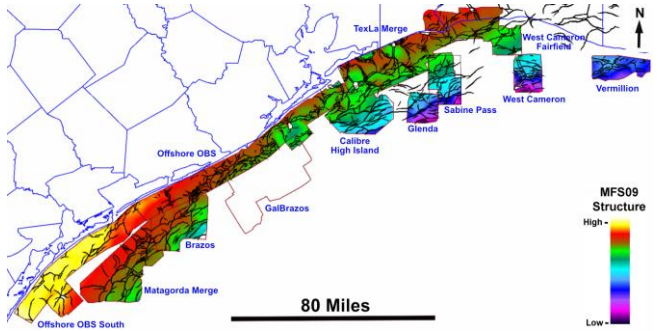


Semblance time slice from TexLa Merge Study. Seismic data owned or controlled by Seismic Exchange, Inc..

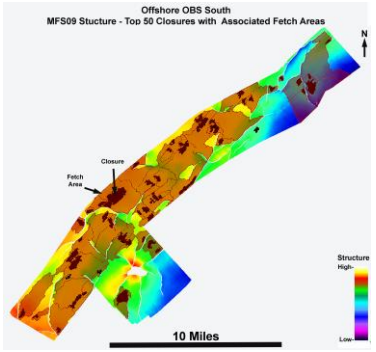


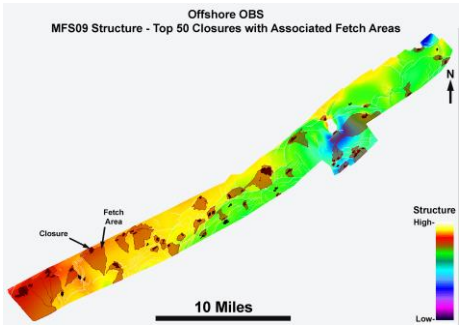
3D perspective of interpreted/correlated fault planes. Seismic data owned or controlled by Seismic Exchange, Inc.. Interpretation is that of the University of Texas at Austin.

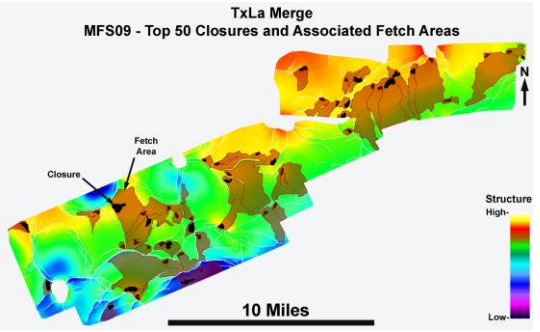




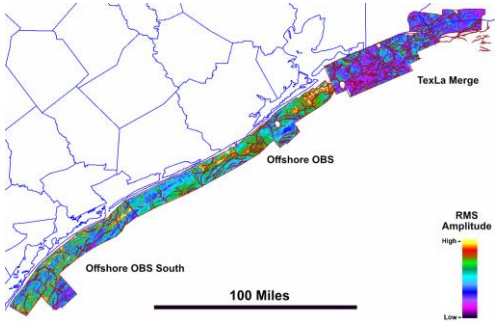
Regional interpretations for the MFS05/MFS09 horizons. Fault polygons are in black.



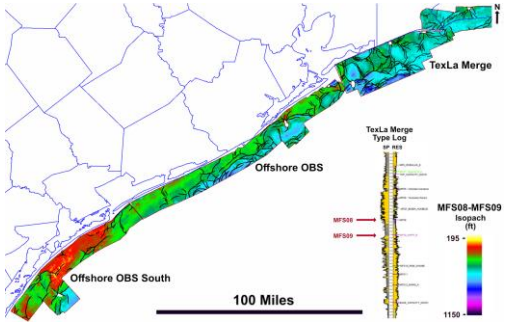




MFS09 structure maps with top 150 closures and associated fetch areas. These highlighted areas provide a regional assessment for potential CCS sites.



RMS amplitudes for the MFS09 to MFS10 interval covering the TexLa Merge, Offshore OBS, and Offshore OBS South 3D surveys. High RMS amplitude values indicate higher porosity zones.



Regional MFS08-MFS09 isochron map.

Summary

We have regionally interpreted in over 7,500 mi^2 of 3D seismic data volumes. Over 750 major fault planes have been interpreted and correlated, and over 2,900 fault polygons from five Maximum Flooding Surfaces (MFS) have been identified and mapped. The MFS time horizons add up to over 22,000 mi^2 of areal coverage in the subsurface, and 13,200 mi^2 converted depth horizons, respectively. In addition, We identified 150 closure/fetch pairs in Texas State Waters that can be further evaluated for potential sequestration sites.

Reference

DeAngelo, M. V., Fifariz, R., Meckel, T., and Treviño, R. H., 2019, A seismic-based CO2-sequestration regional assessment of the Miocene section, northern Gulf of Mexico, Texas and Louisiana: International Journal of Greenhouse Gas Control, v. 81, p. 29-37, http://doi.org/10.1016/j.ijggc.2018.12.009.

Acknowledgments

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