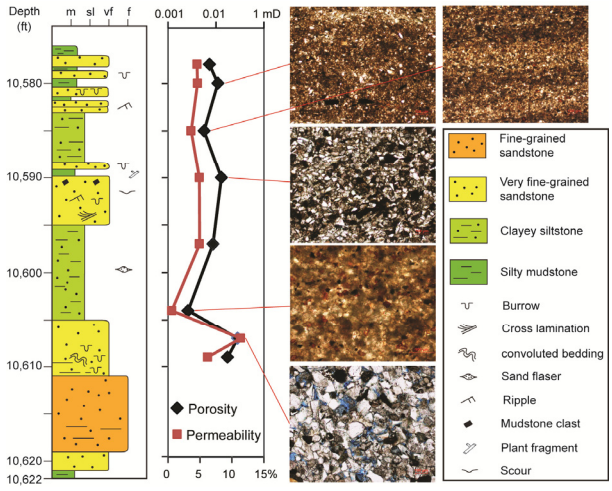
Reliable Capacity Estimation: Confining Systems

Project Description

Sealing capacity is an important component of overall capacity estimation. Mudrock units in two Lower Miocene cores were evaluated as to mineralogy, petrography, pore distribution, and fabric alignment. A potential top seal unit, *Amphistegina* B, was regionally correlated, and net isopach values were determined. In addition, fault seal was determined to be a critical component of ultimate CO_2 sequestration capacity.



Description and data from OCS-G-4708#1 core; depths 10,577 to 10,622 ft

Accomplishments

- Small-scale sealing properties of Lower Miocene mudstone were analyzed using various methods. Sealing capacity was estimated and compared among different lithologies.
- Analyzed core samples show desirable trapping ability for CO_2 storage. Identified controlling factors of sealing capacity.
- Mapped the *Amphistegina* B unit using conventional 3D seismic data and wireline well logs. The unit has thickness on the order of hundreds of feet in the Texas State Waters area.
- A workflow was established to calibrate membrane fault-seal capacity.

Impacts

- Tested a series core-based method for evaluation of mudstone sealing capacity.
- Identified a number of sealing capacity control factors.
- Established relationships between petrography/ mineralogy and capillary entry pressure.
- Mapped a confining unit; the distribution and thickness of the Lower Miocene *Amphistegina* B unit suggests that it can provide a regional seal for geosequestration.
- Fault-seal analysis in the Texas coastal Miocene section concurs with published global fault-seal databases, and stratigraphically equivalent top-seal capacity can be expected to be an order of magnitude higher than fault-seal capacity.
- Determined that treating faults as no-flow boundaries (fill-to-spill modeling) is not accurate and fault rock properties must be used in modeling long-term CO_2 sequestration capacity.

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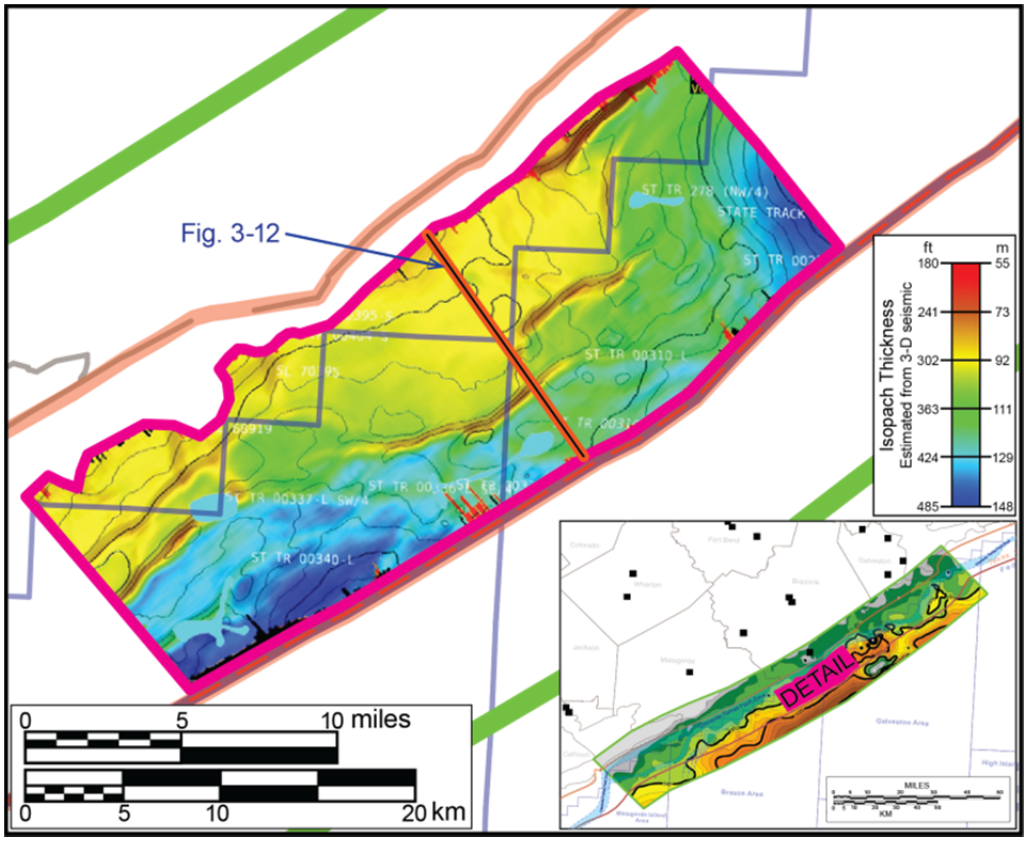
Methods

- Small-scale methods included X-ray diffraction, thin-section light microscopy, scanning electron microscopy on ion-milled surfaces, high-resolution X-ray texture goniometry, and mercury intrusion capillary pressure test.
- The static shale gouge ratio (SGR) calculated column height workflow is put forth as an empirical methodology to estimate risk in fault-bound traps and predict realistic, pre-injection CO_2 capacities.



***Amphistegina* B unit isochron map; upper Texas coast State Waters and adjacent areas.**

Selected Citation

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