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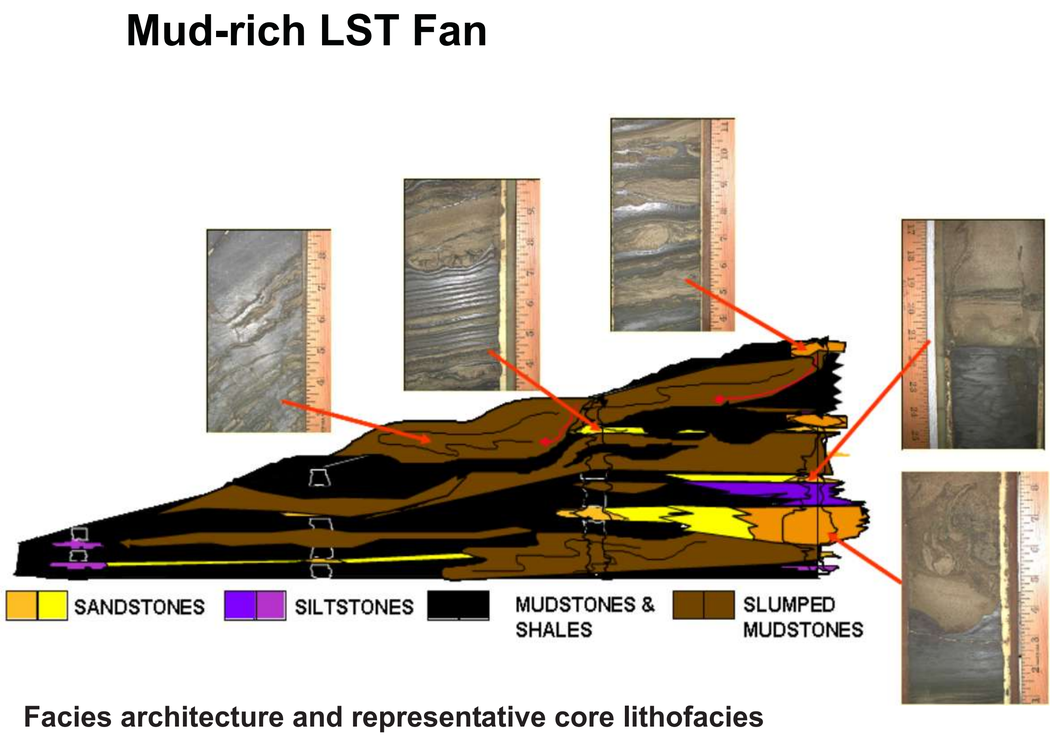
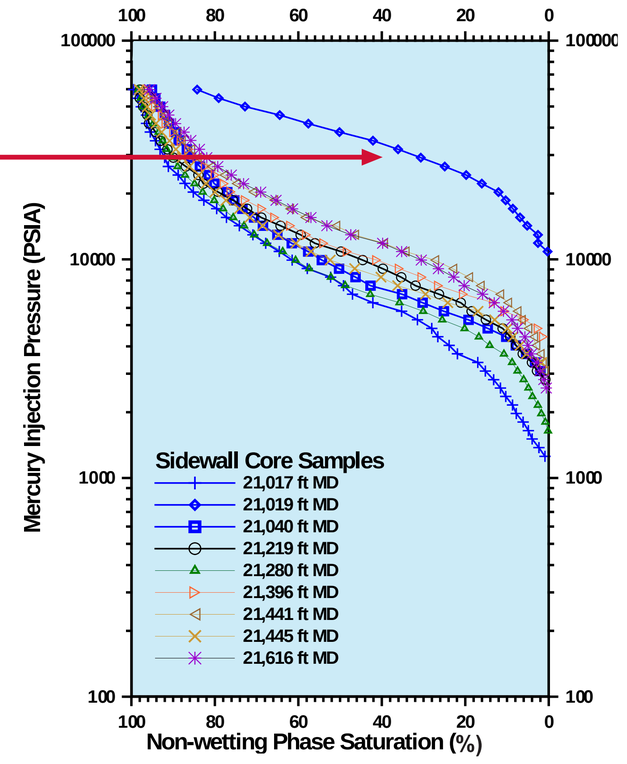
Introduction

Seal capacity (MICP) analyses combined with petrological data reveal a strong correlation between shale facies types and sealing potential. Petrographic study reveals six seal types in sample sets representing deepwater (submarine fan) depositional settings. Each seal type has distinctive fabrics and textures, which appear to exert significant controls on seal character. In general, silt-poor (less than 20%) shales have enhanced sealing capacity. Sealing capacity can also be improved by the presence of well-defined laminar microfabric in clay-rich samples, the presence of organic matter, and authigenic minerals. Microporous mottles and silt laminae tend to degrade the effectiveness of marine shales as top seals.



Facies architecture and representative core lithofacies

Same shales have markedly better seal character.

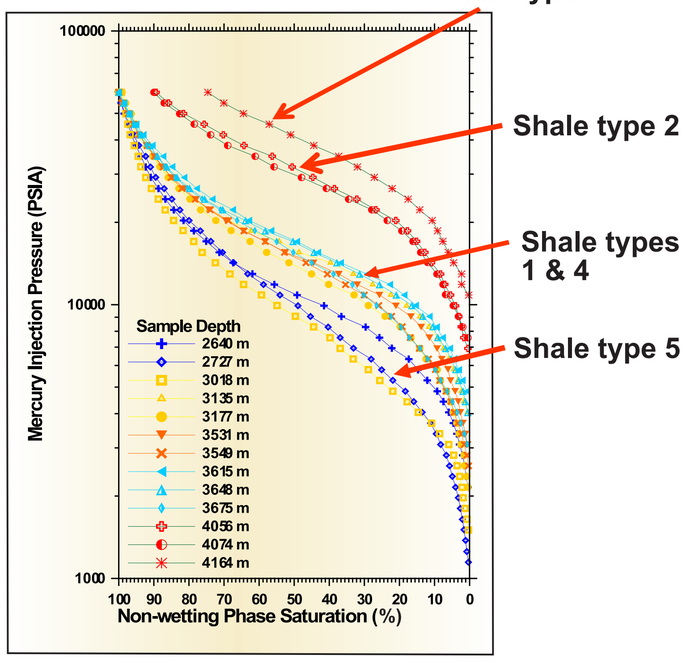


Our data show that burial-driven compaction (i.e., systematic reduction of pore throat size during progressive burial) is not the primary control on seal capacity. These samples are from depths where compaction should be well-advanced, yet a broad range of sealing capacities is present. Other possible controls include early marine (carbonate) cementation and

sedimentation rate. Alternatively, variations in texture related to high-frequency sequence stratigraphy could be responsible for some observed variability in seal character. Excellent top seals occur most frequently in upper parts of transgressive systems tracts. Silt-rich highstand and lowstand shales have relatively low sealing capacities.

Controls on Seal Capacity

- Sequence stratigraphy and depositional setting
- Fabric and texture
- Diagenesis
- Compaction and burial history



Facies - Influenced Shale Compaction Curves