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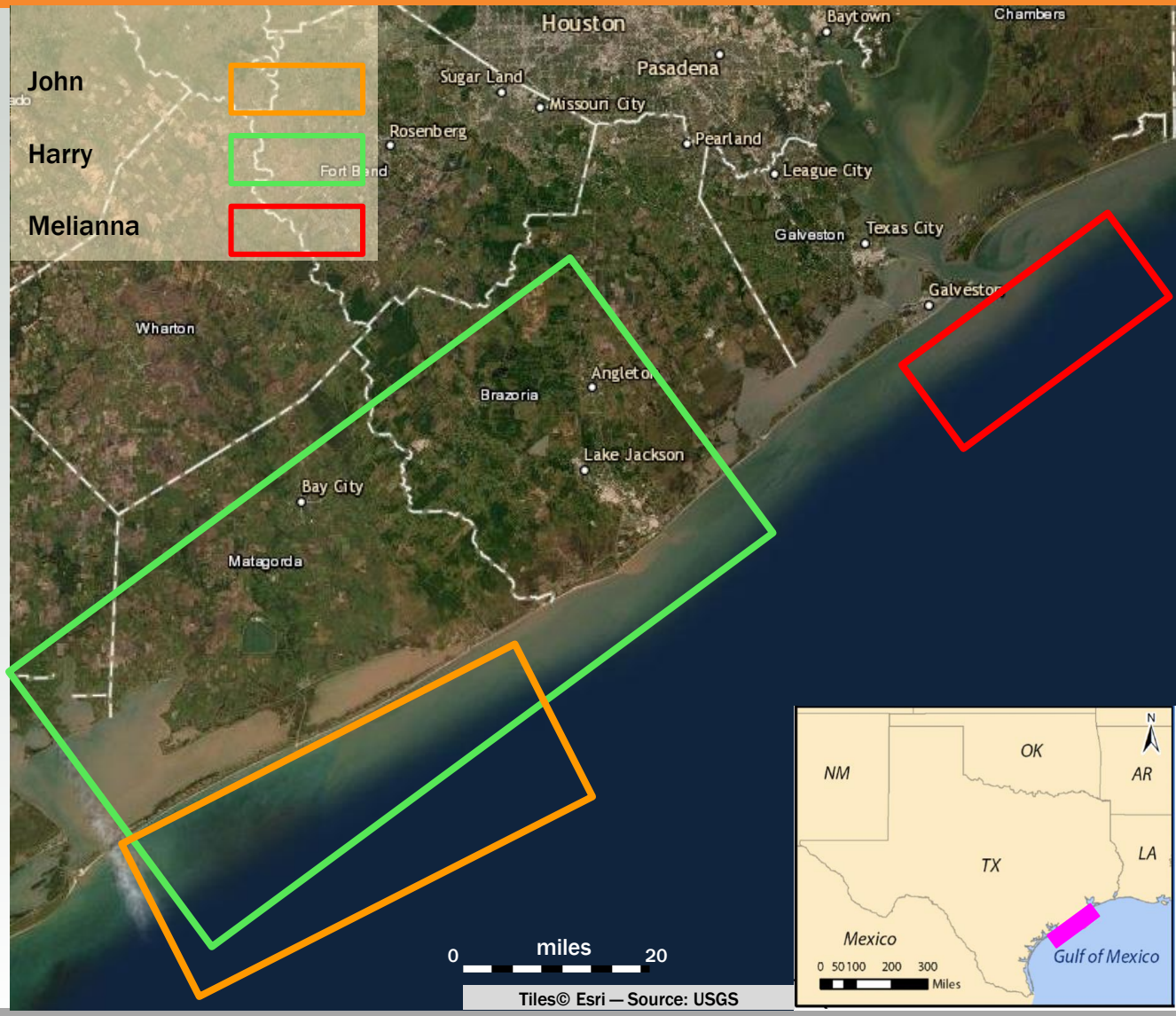
Graduate Student Research

Upper Texas Coast

John Franey — Stratigraphic Framework of Intraslope Growth-Faulted Subbasins

Harry Hull — Geologic Characterization of Shoreface successions for CCS—Field Scale Heterogeneity



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Stratigraphic Framework of Intraslope Growth-Faulted Subbains

John Franey (M.S. ‘21)

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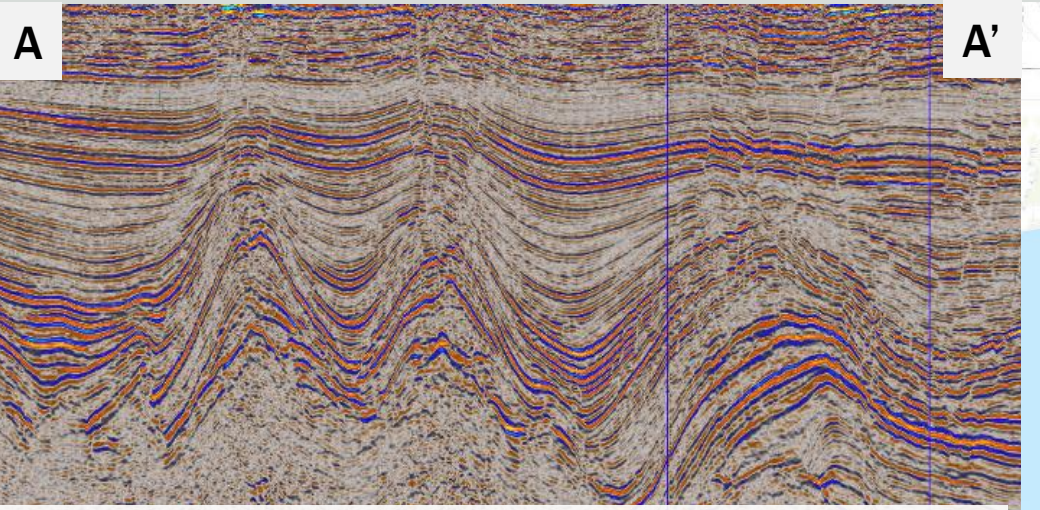
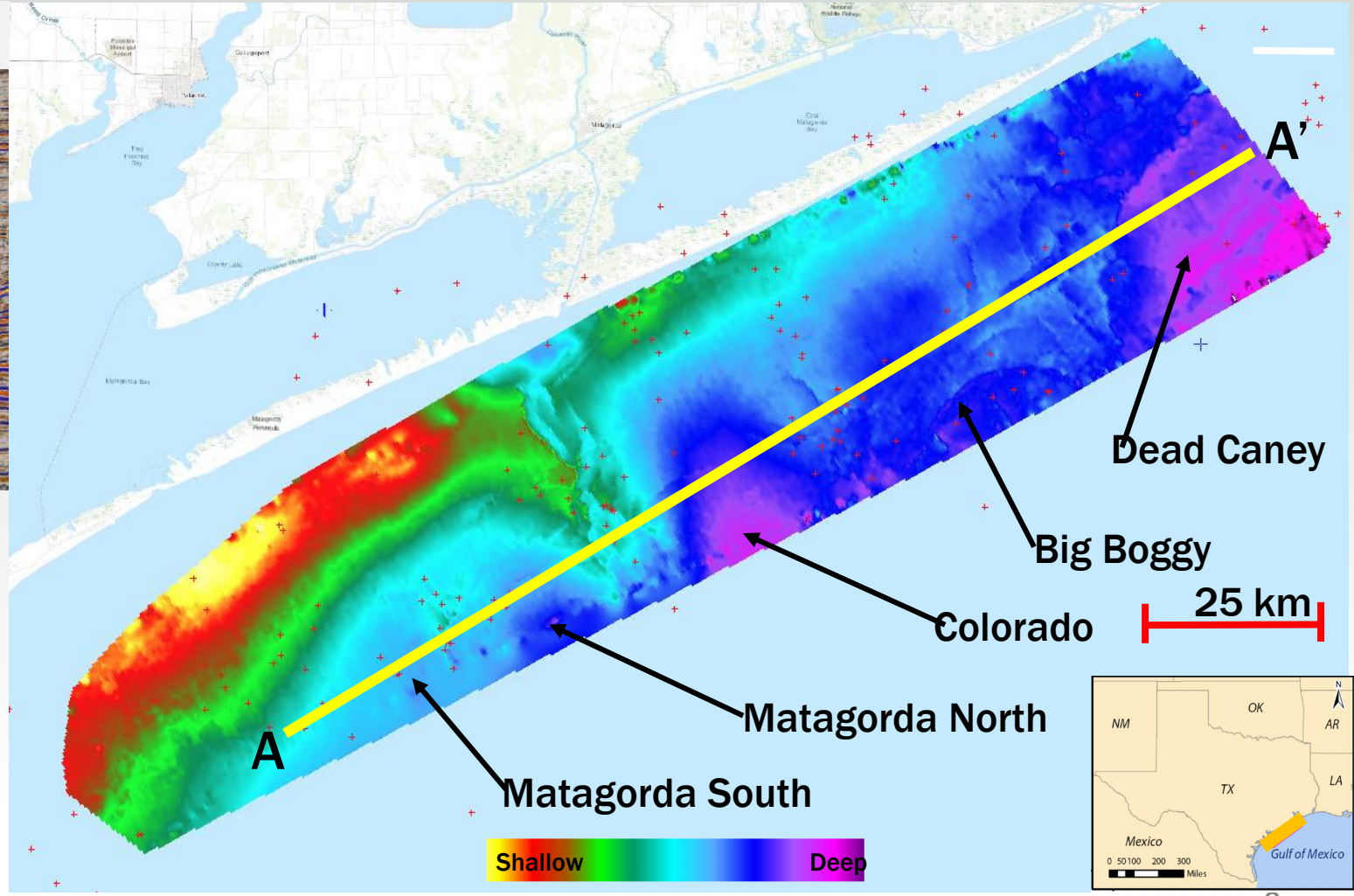
Can high order stratigraphic interpretation aid in risking seal quality of CO_2 injection sites?



Seismic data controlled by SEI. Inc. Interpretation is that of the University of Texas at Austin

- Suite of strike-parallel intra-slope, growth faulted subbasins (*Brown, 2004*)
- High Quality Sands
- Meets depth requirements
- Near Existing CO_2 production sites



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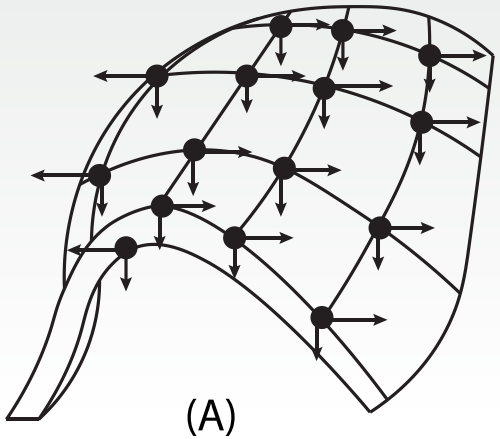
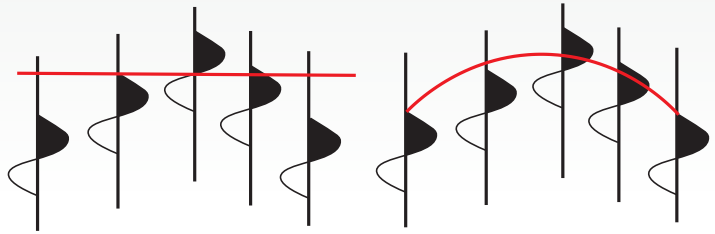
Geophysical Processing

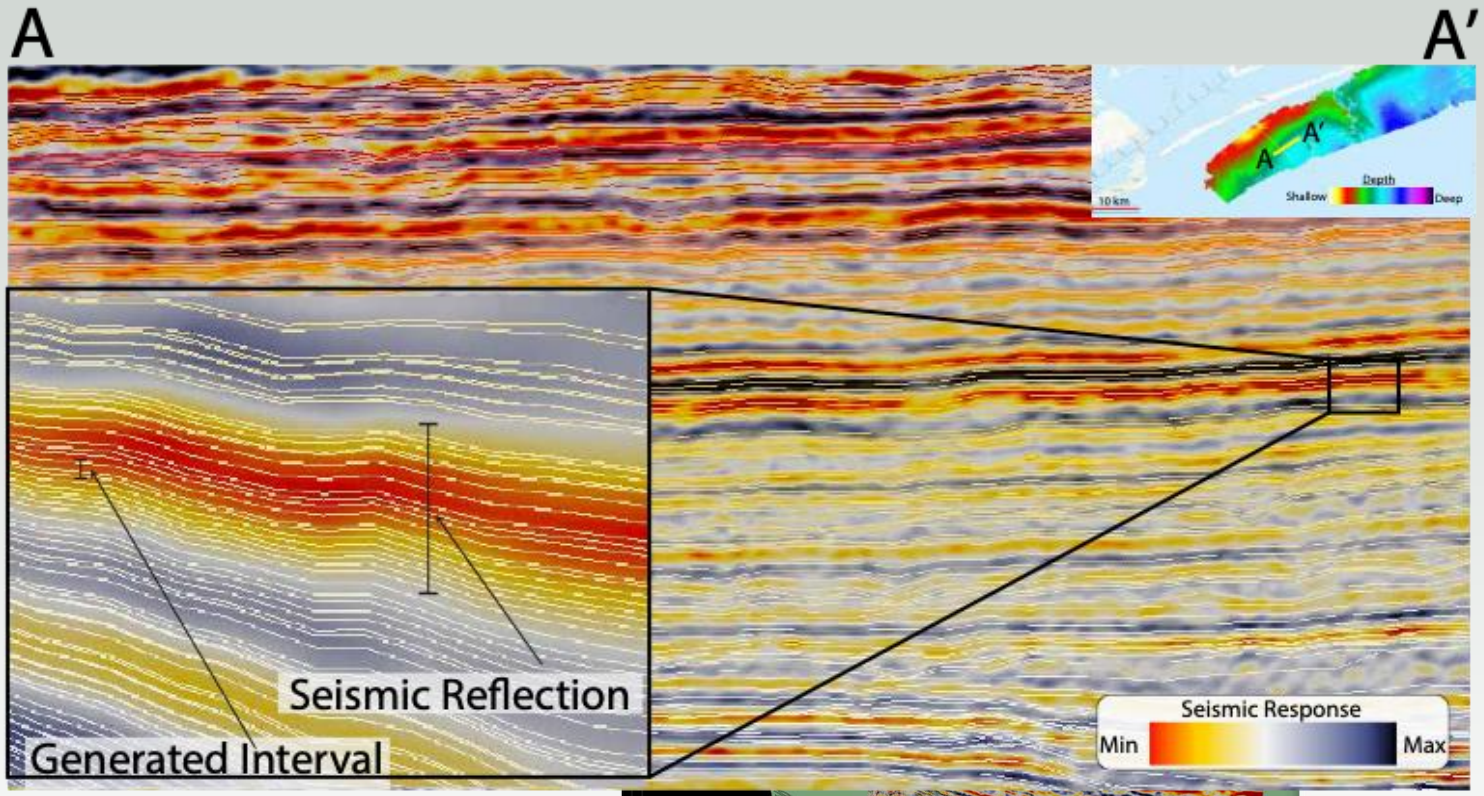
- Dip-Steering Seismic Volume
- HorizonCube: Generate set of dense, 3D auto-tracked horizons
- Dip-steering vectors used as weighting parameters

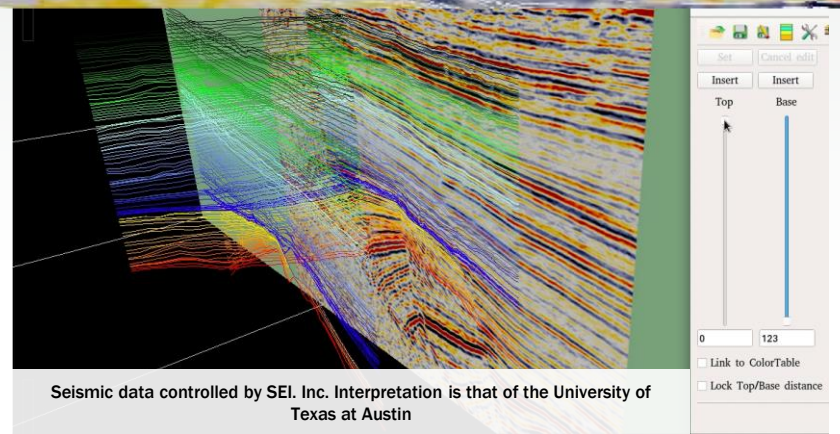


(A)



(B) (C)





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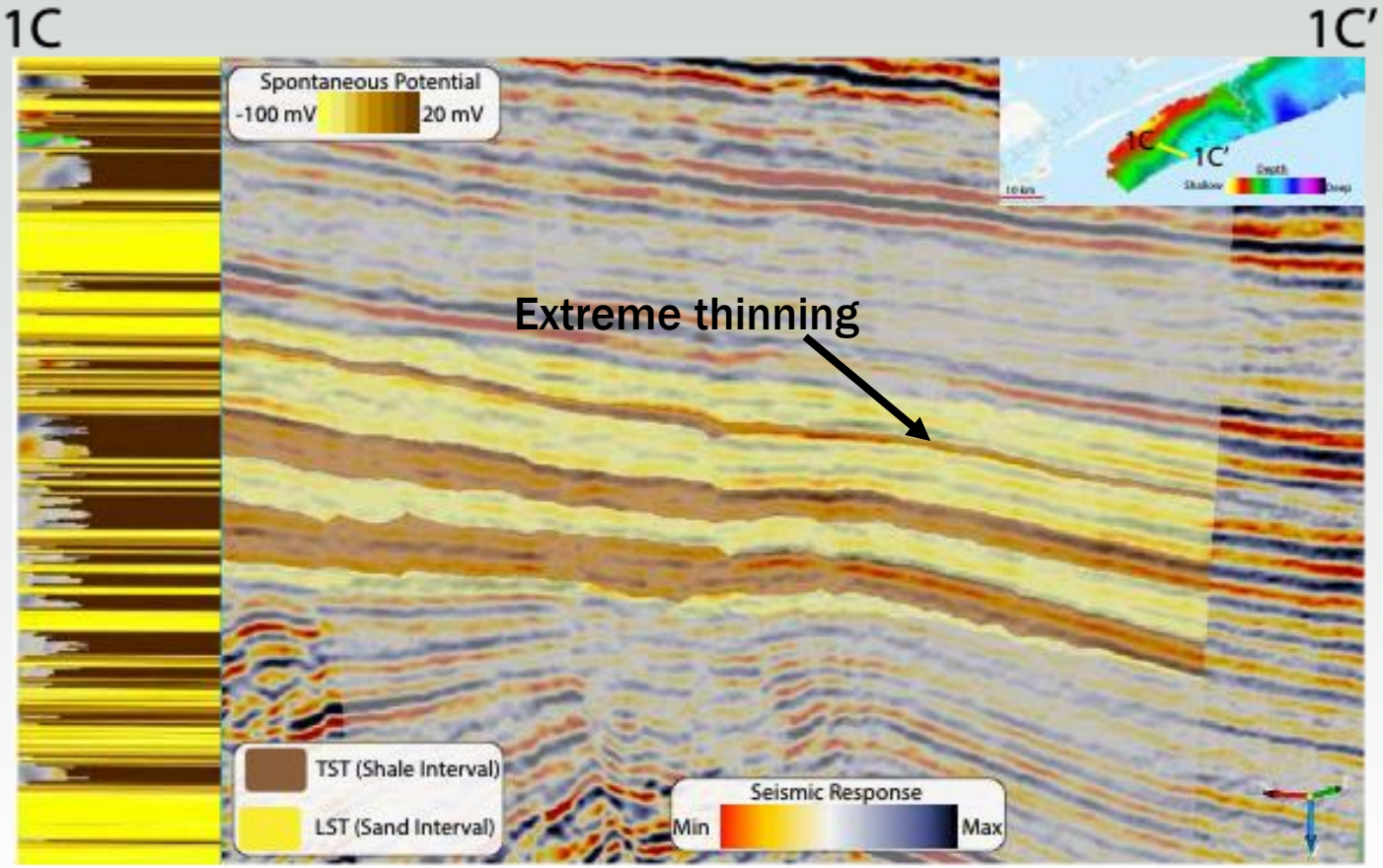
Shale Thickness Analysis



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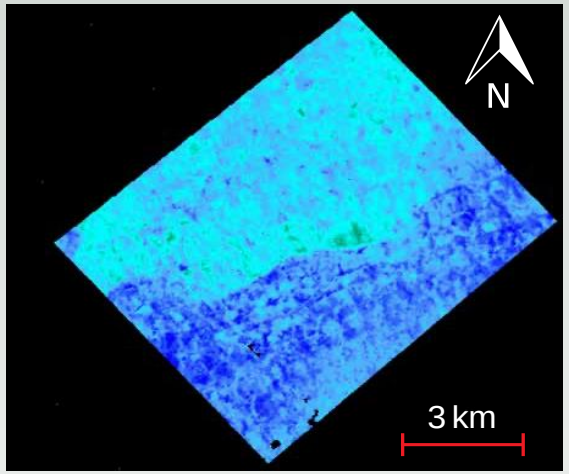
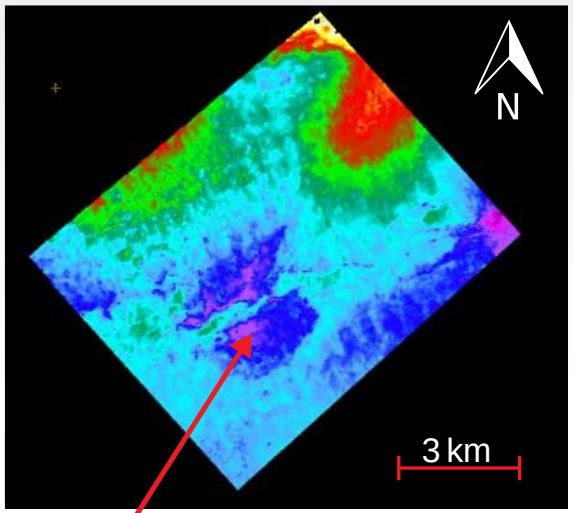
Interval 1



Uniform thickness across the subbasin

Interval 2



Areas of local thinning

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Key Takeaways

- High Order analysis provides insight to thickness variations of sealing intervals
- Dip-Steering interpretation aids in high resolution interpretation
- Improve risk assessment for CO_2 injections sites

Geologic Characterization of Shoreface successions for CCS—Field Scale Heterogeneity

Harry Hull (M.S. ‘21)

Gulf Coast Carbon Center

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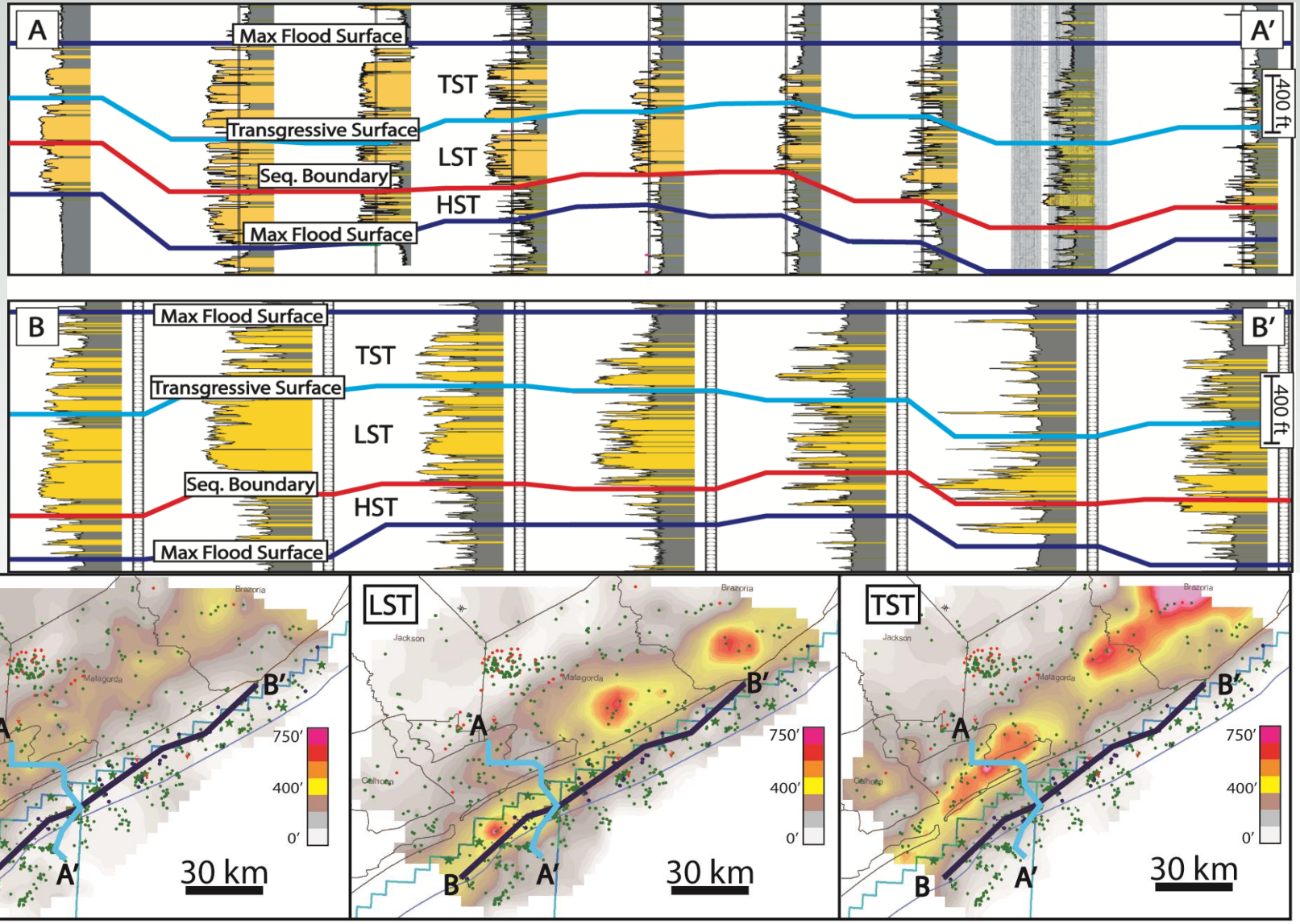
Can we demonstrate the controls that geologic processes have over CO_2 storage capacity and reservoir heterogeneity?

Play Scale Characterization

- Well-based interpretation
- Stratigraphic Framework—HST, LST, TST
- Net Sand Maps



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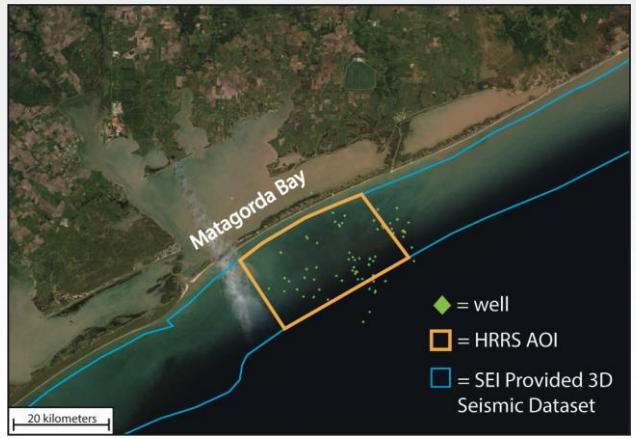
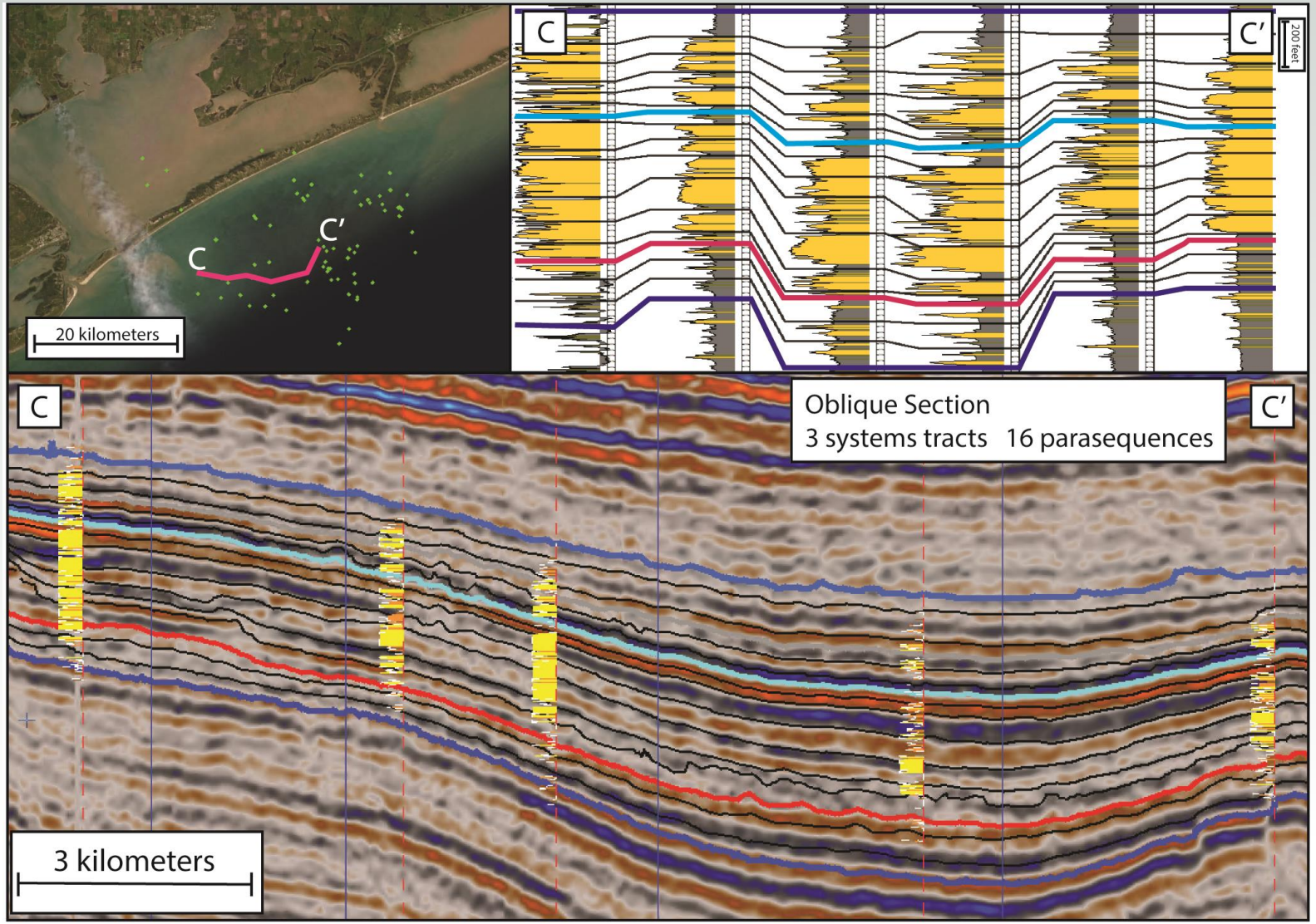
Geologic Characterization—HRRS Scale

- Well and Seismic based Interpretation
- Stratigraphic Framework—16 parasequences
- Seismic Stratal Slices





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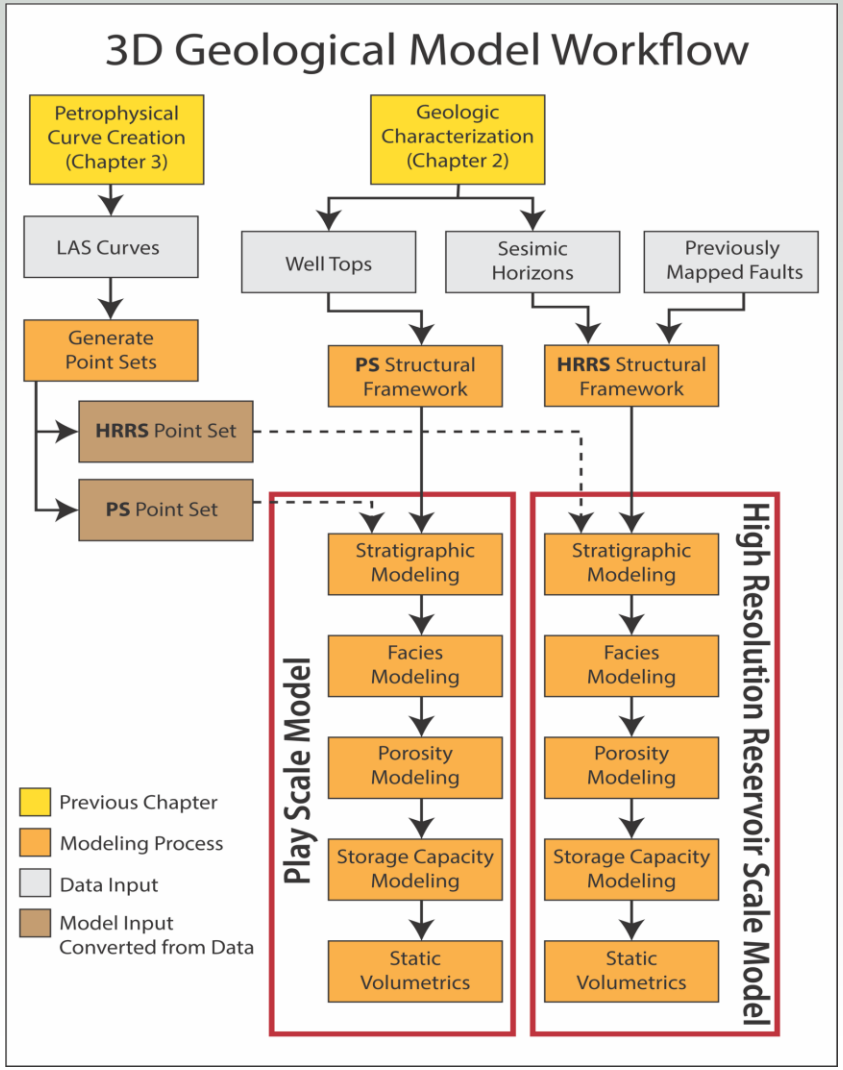
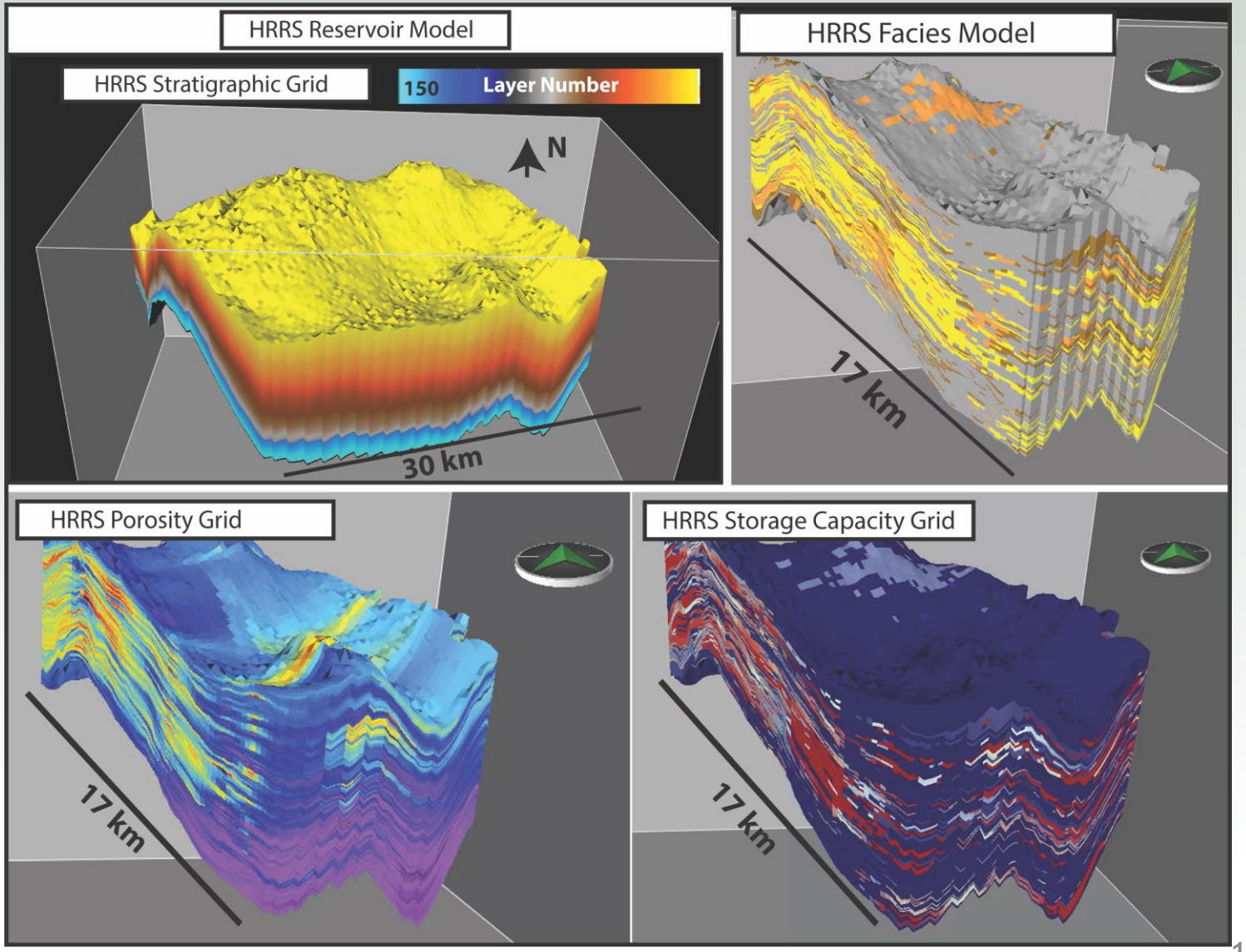
3D Geocellular Modeling





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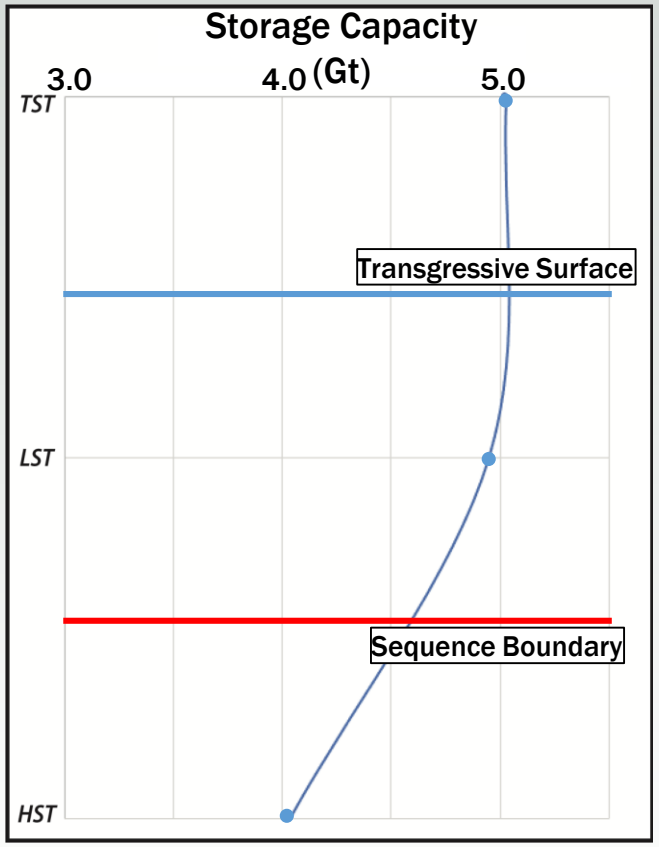
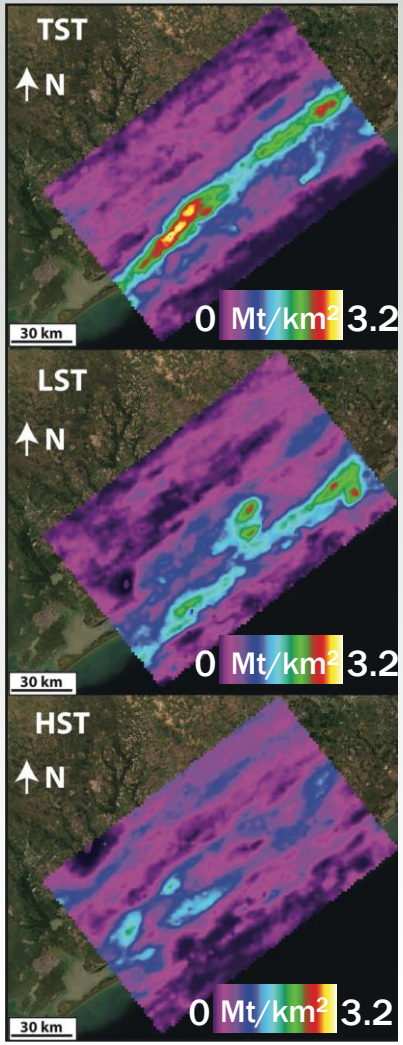
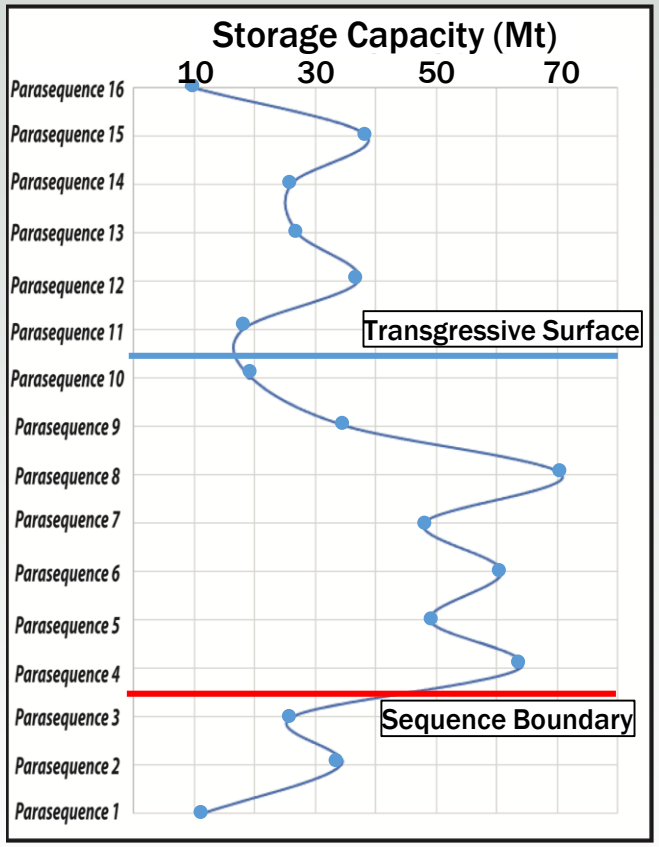
Results

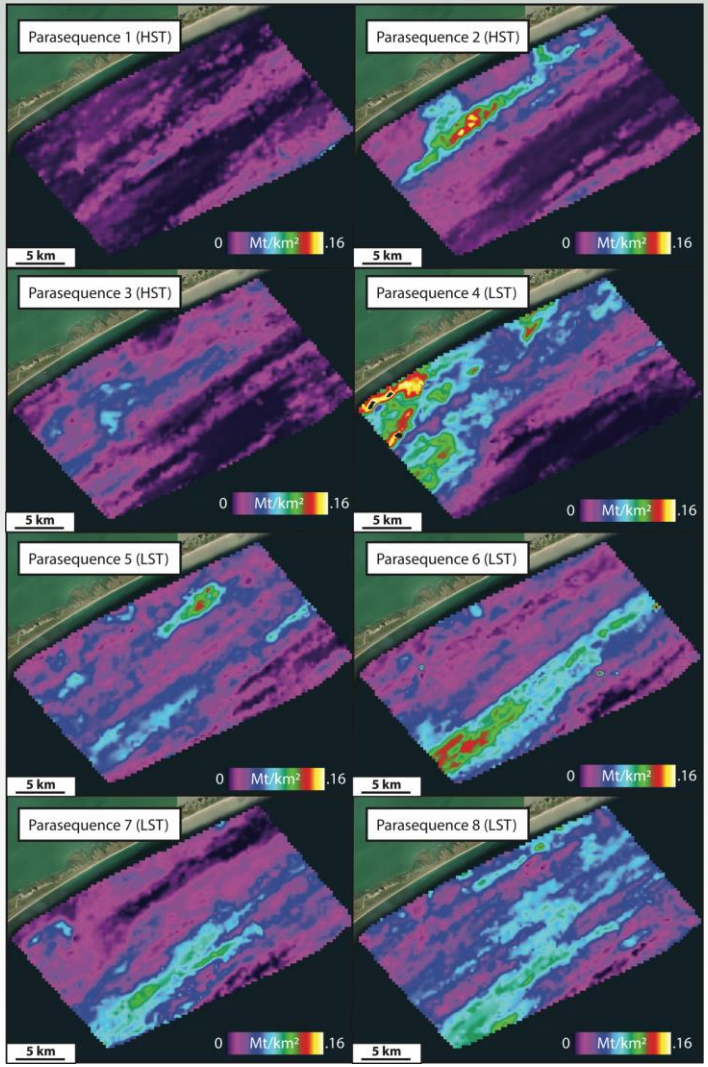
Play Scale AOI





HRRS AOI





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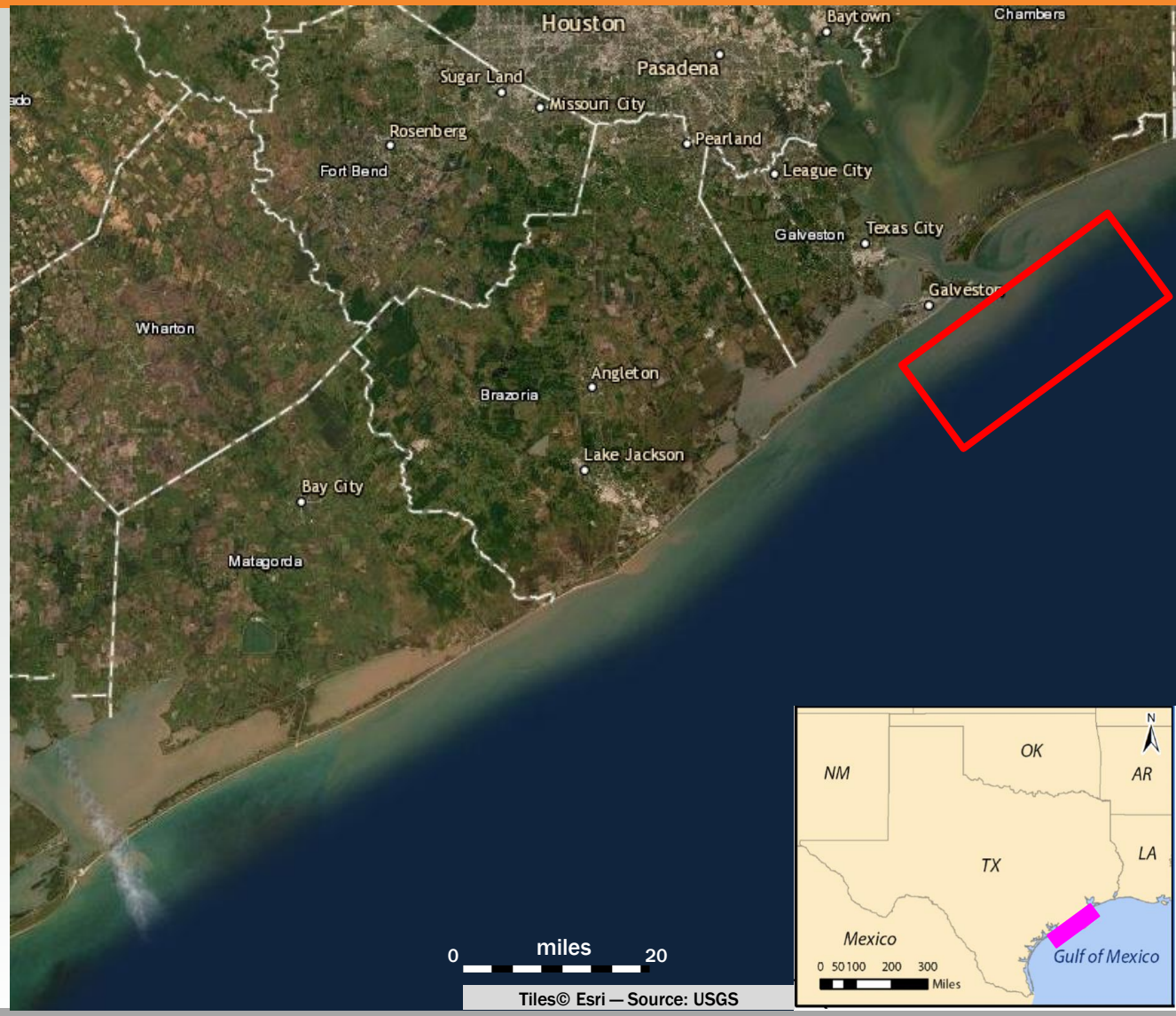
Key Takeaways

- Storage capacity tracts with the observed foreshore and shoreface facies of the strandplain/barrier bar system
- The mapped shore zones at the play scale can store gigatons of CO_2 (4-5 Gt per Lower Miocene 2 systems tract)
- The LST within the HRRS AOI can store as much as 350 Mt—enough to store all CO_2 produced at point sources in Matagorda, Victoria, Calhoun, and Jackson counties for 35+ years

Obtaining Additional CO_2 Storage and Predicting Plume Stabilization by Utilizing Oil Migration Concepts

Melianna Ulfah (M.S. '21)



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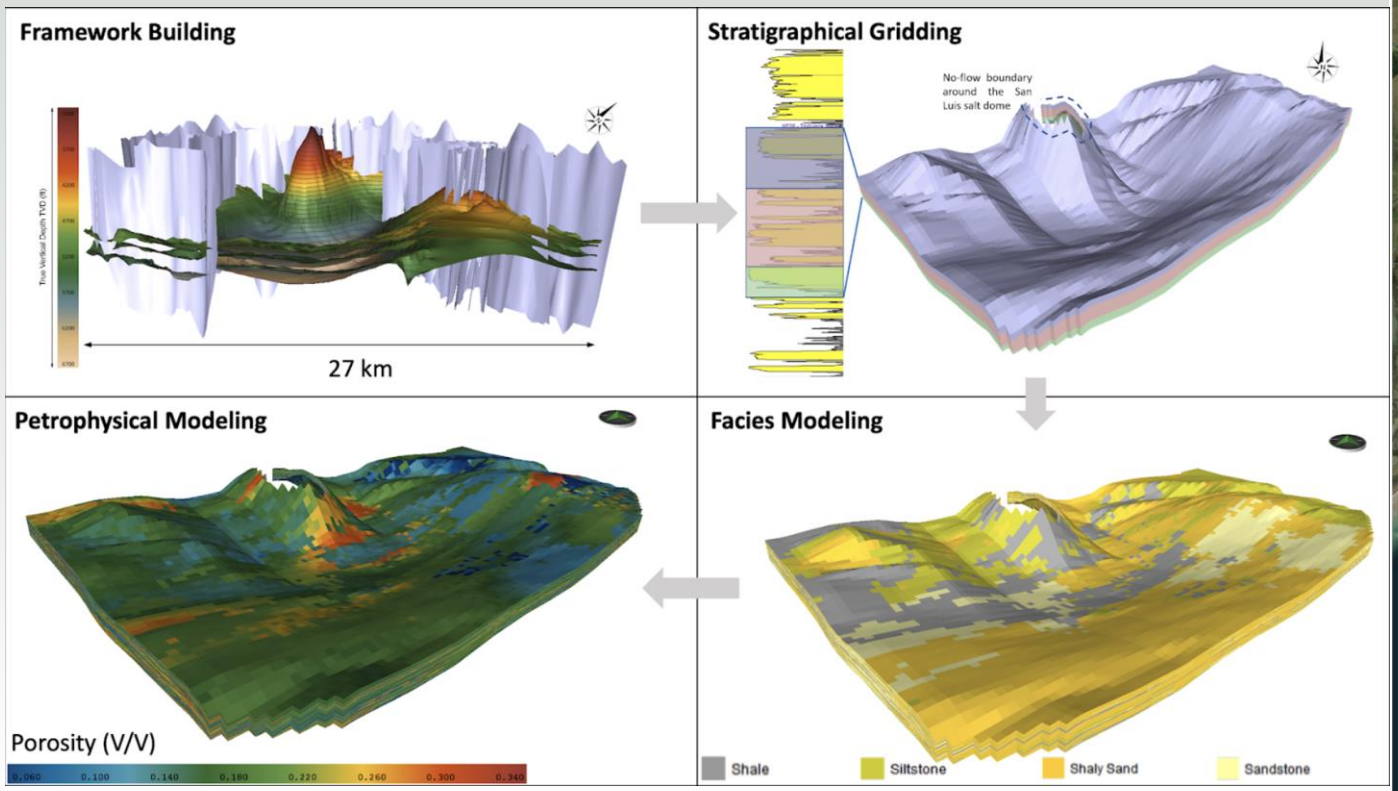
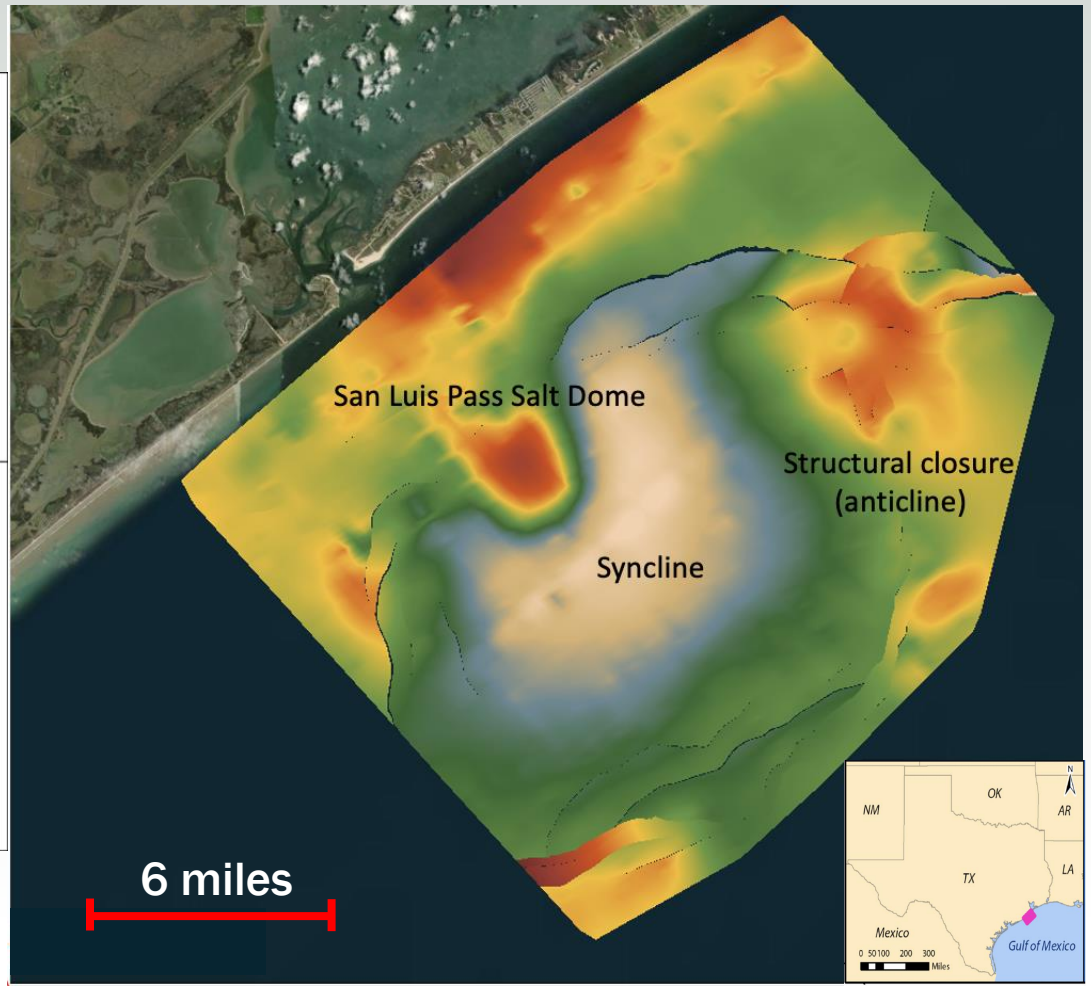
Can CO_2 injection simulations aid in risk assessment and well optimization?





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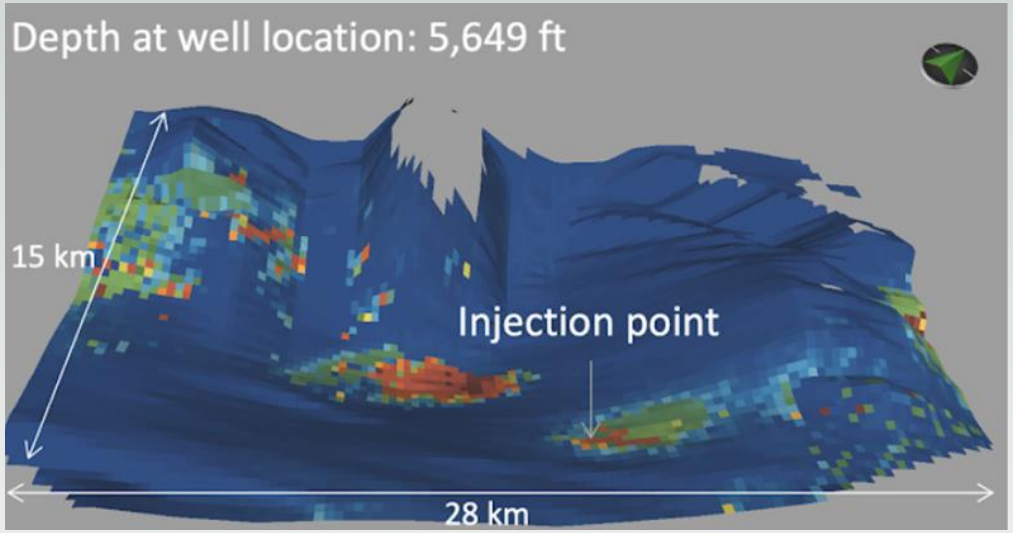
Simulation Comparison

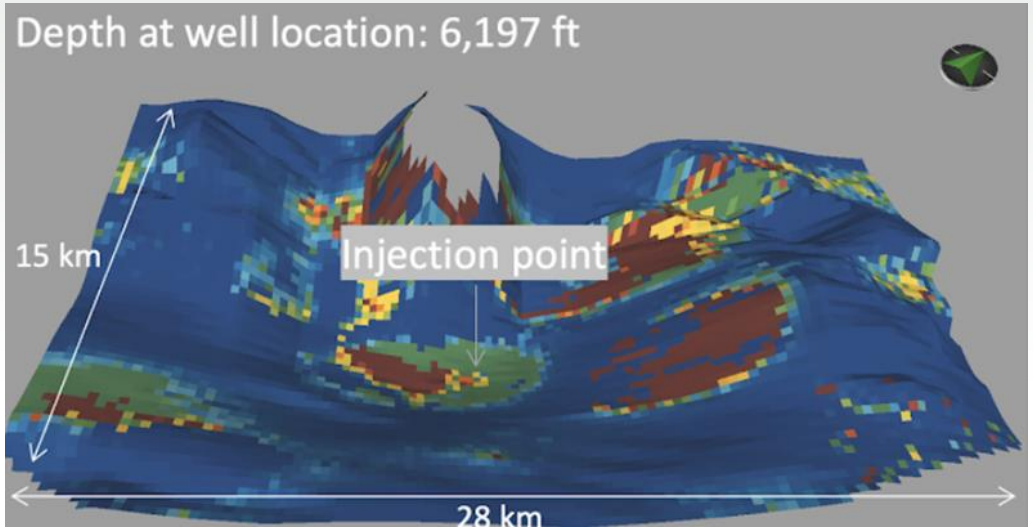
Insights

- Residual Trapping
- Plume Migration
- Changes in Reservoir Pressure
- Storage Efficiency (MT/acre)

Injection near anticline



Injection near base of syncline



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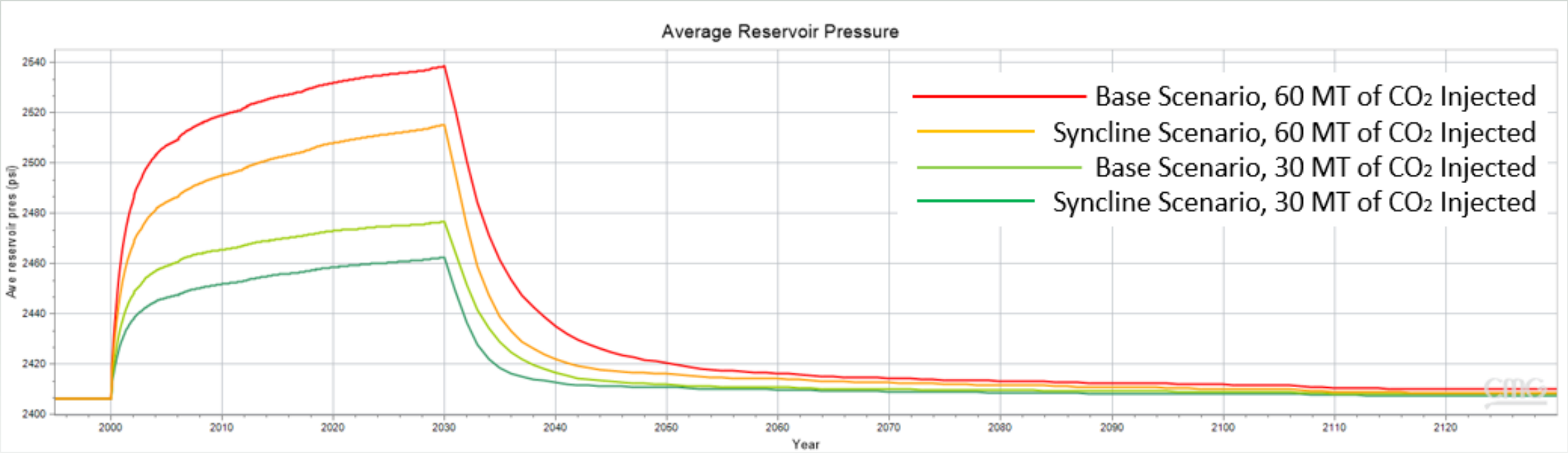
Results



Case	Time of pressure to 2410 psi	Maximum up-dip migration distance	Maximum area contacted by CO_2	Storage/Acreage ratio (million tons/km²)
Syncline scenario – 60 MT	58 years	10.74 km	67.73 km^2	0.88
Syncline scenario – 30 MT	20 years	8.69 km	44.84 km^2	0.67
Base scenario – 60 MT	77 years	8.23 km	50.27 km^2	1.19
Base scenario – 30 MT	25 years	5.94 km	26.81 km^2	1.12

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Key Takeaways

- Injection simulations aid risk assessment for top seal failure from injection pressure
- Aid in policy recommendations for acerage leasing timelines
- Optimize injection well placement