Laboratory experiments and modeling to accurately evaluate critical CO_2 saturation for geologic carbon storage

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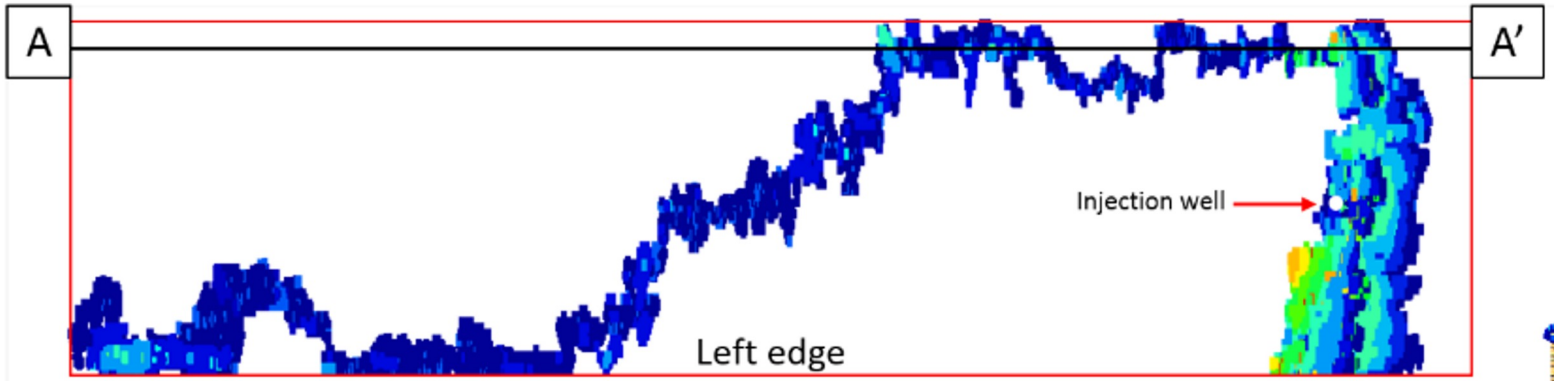
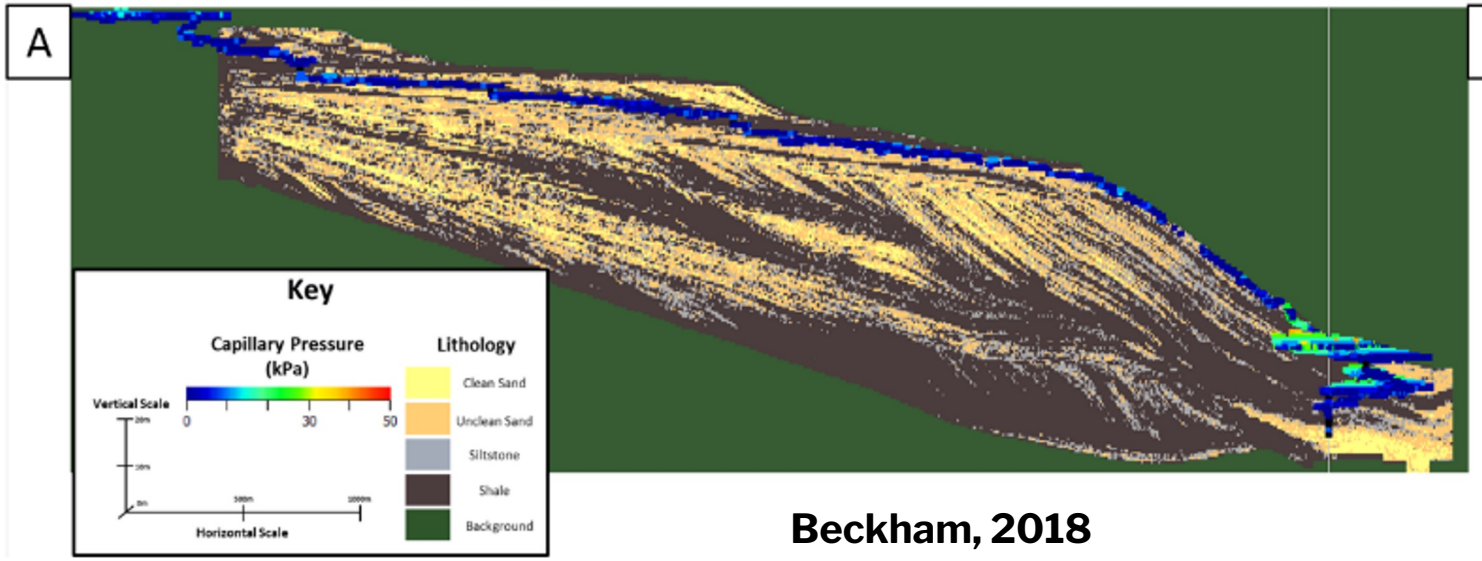
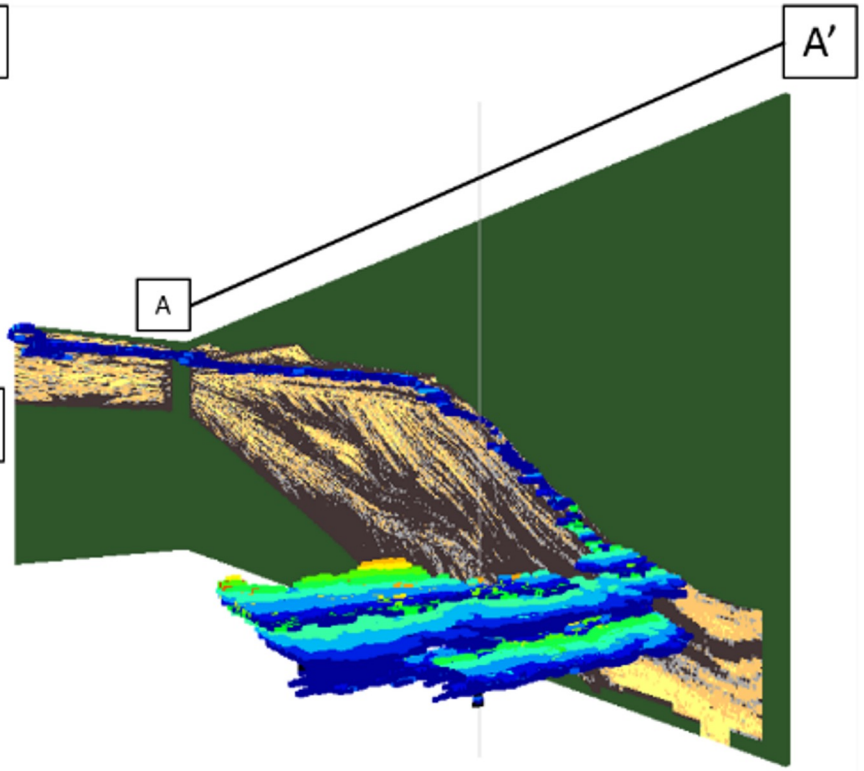
The effect of small-scale barriers, when not properly upscaled, can lead to inaccurate field-scale estimation of CO_2 storage capacity



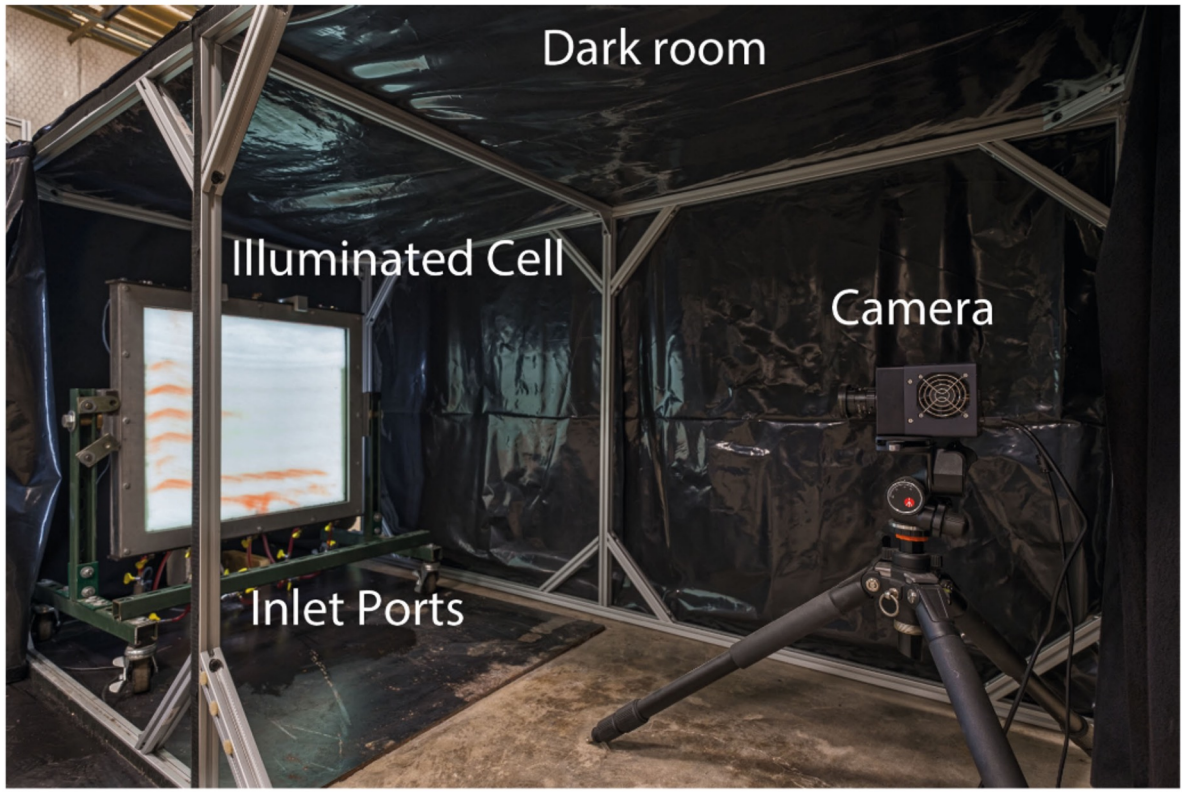




Beckham, 2018

CO_2 retained per grid block: 3% -> 48%
CO_2 retained: 10% -> 21%

Intermediate-scale sand tank experiments have unique advantages



- Customizable domain
  - Different types and degrees of heterogeneity
- High-resolution imaging
  - Light transmission visualization
  - Both in time and space
- Buoyancy-driven flow
  - Most closely matches CO_2 geologic storage flow regime

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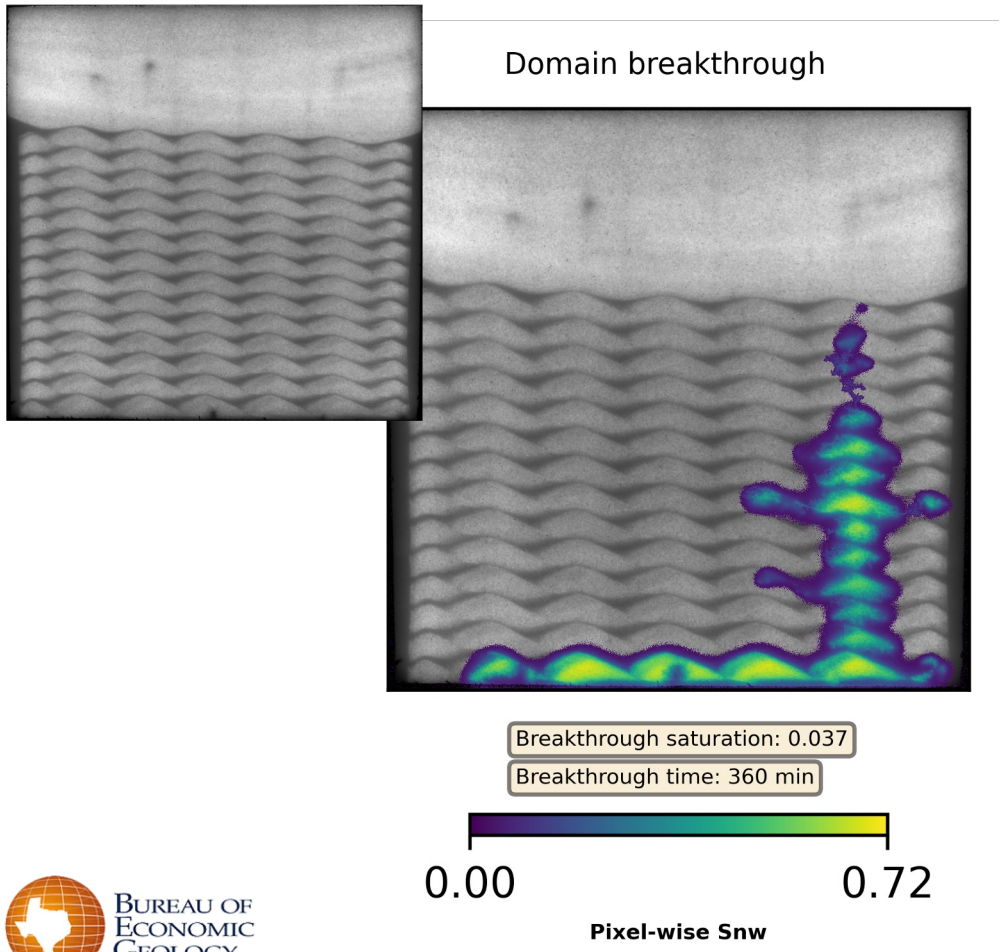
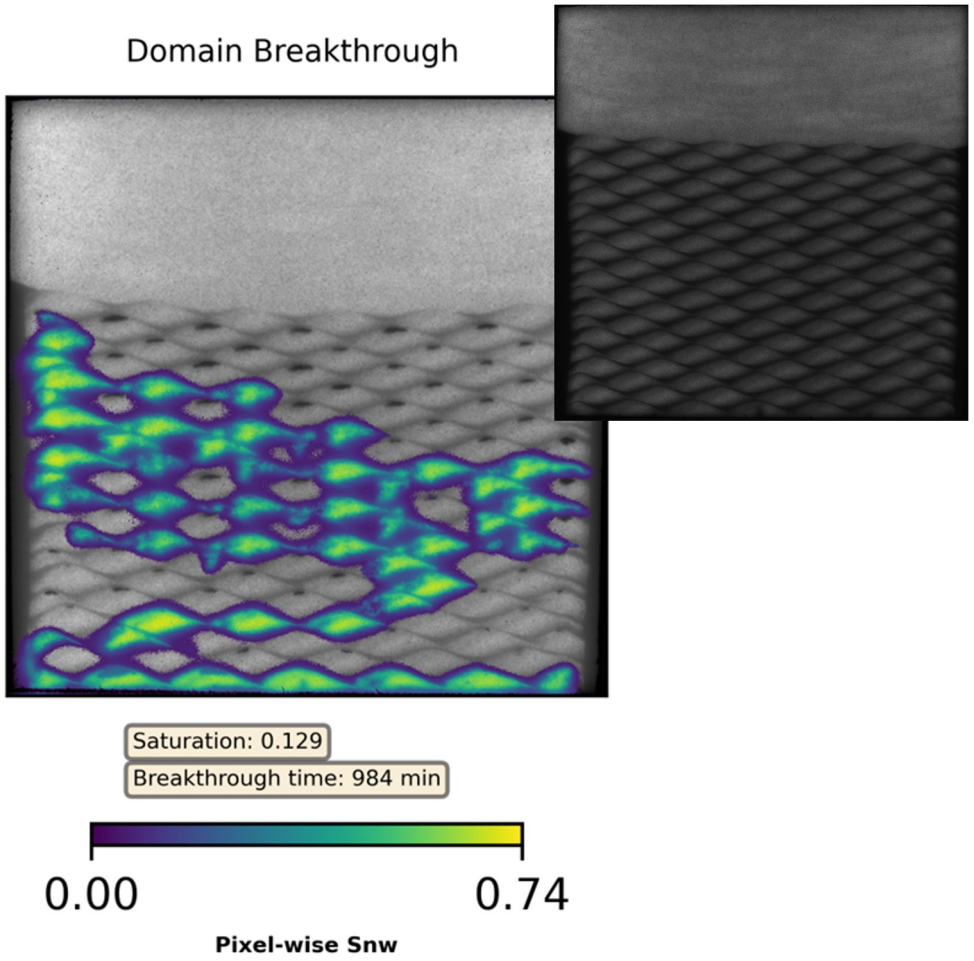
Krishnamurthy, 2020

Heterogeneities does affect CO_2 saturation and migration dynamics

In phase ripples



Climbing ripples



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