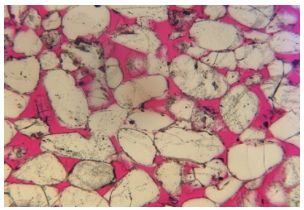
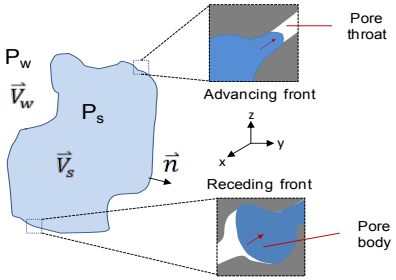
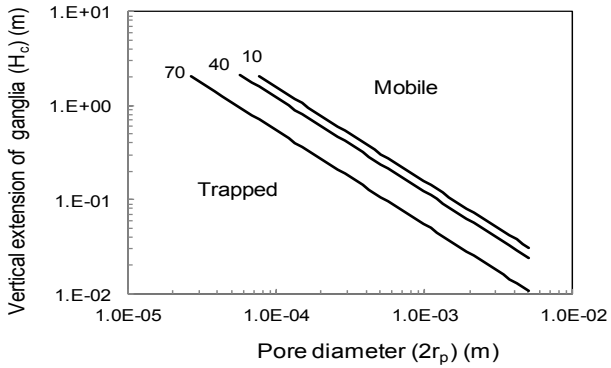
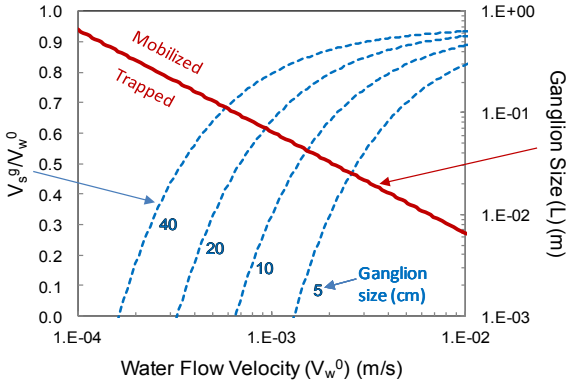
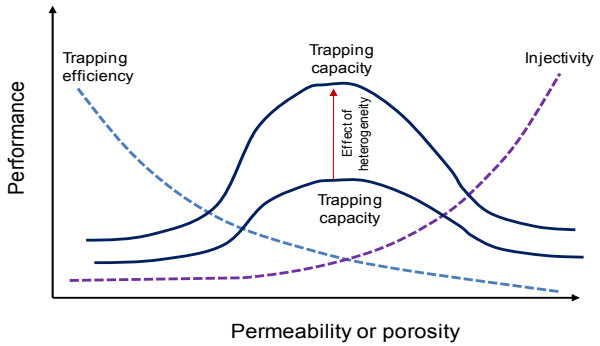
# Ganglion dynamics of Supercritical $CO_2$ in heterogeneous media






## Research Team

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## Objectives of Research

- Develop observationally-constrained models that unify our understanding of the transition from compact flow to capillary channeling to residual trapping, while honoring cm scale heterogeneity.
- Mechanistically understand ganglion formation, interaction and coalescence in a heterogeneous geologic medium.

## Conclusions

- Mobility of a ganglion is inversely dependent on its size.
- Breaking the injected $scCO_2$ into small disconnected ganglia enhances the efficiency of capillary trapping can be greatly enhanced
- Supercritical $CO_2$ ganglia can be engineered by promoting $CO_2$-water interface instability during immiscible displacement.
- Ganglion size distribution can be controlled by injection mode (e.g., water-alternating-gas) and rate.
- Vertical structural heterogeneity within a reservoir can inhibit the buoyant rise of $scCO_2$ ganglia.

## Impacts

- Deepens our understanding of subsurface CO2 storage and migration.
- Help to develop engineering approach to maximizing storage efficiency.


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