

Leakage pathways from potential CO₂ storage sites and importance of open traps: Case of the Texas Gulf Coast

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Abstract:

The Texas Gulf Coast is an attractive target for carbon storage. Stacked sandstone and shale layers provide large potential storage volumes and defense-in-depth leakage protection. Two types of traps are important in the initial sequestration stages: (1) closed structural and stratigraphic traps analogous to oil and gas traps, and (2) open traps where the residual saturation trail of capillary trapping is the main active mechanism. Leakage pathways of primary concern are wellbores and faults. Both could produce a direct connection to the atmosphere. However, most faults do not reach the surface, leaving abandoned wellbores the main focus of a risk analysis. Other leakage pathways, such as a closed trap overflowing through spill points or a seal failure, can be accommodated by the capillary trapping mechanism. The effectiveness of this mechanism depends on the level of heterogeneity of the formations. Determining formation heterogeneity is the second emphasis of any risk analysis in the Texas Gulf Coast.

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