Gravitational trapping of carbon dioxide in deep sea sediments: Permeability, buoyancy, and geomechanical analysis

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Abstract (Summary)

Liquid carbon dioxide injected in deep-sea sediments at km depths and near freezing temperatures is denser than surrounding pore water and will be trapped by gravitational forces. Storage capacity for CO_2 in such formations below the ocean floor is shown to vary with seafloor depth, geothermal gradient, porosity, and pore water salinity. The formation permeability, or the successful engineering of such permeability through hydraulic fracturing, will determine the capacity for gravitational trapping in deep-sea geological formations. We conclude that most ocean sediments at appropriate depth will lack the required permeability and that conventional hydraulic fracturing would only be possible in carefully selected sites.