

Abstract Submitted
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Dissolution-driven convection in porous media: Experiments MAHESH BANDI, ANJA SLIM, L. MAHADEVAN, School of Engineering and Applied Sciences, Harvard University — The carbon geo-sequestration proposal has received extensive theoretical and numerical scrutiny in recent times, but few supporting experimental observations exist. Here we experimentally investigate this proposal, and study the onset of convection away from a time-dependent pure diffusion base state. The experimental setup comprises a Hele-Shaw cell containing Potassium Permanganate (representing carbon dioxide) and water (representing brine). Upon coming in instantaneous contact, Potassium permanganate dissolves in water and produces an initially clean diffusion layer. The Potassium Permanganate solution being slightly denser than pure water, becomes gravitationally unstable and sinks by forming fingers, and heralds the onset of convection. Inclining the Hele-Shaw cell at steep angles extends the diffusive range and allows us to capture the cross-over from diffusive to convective regimes. System dynamics are captured by digitally imaging the light transmitted across the Hele-Shaw cell by a back-lit diffuse illumination source. Pre-calibration of the transmitted light at various Potassium Permanganate concentrations allows us to convert the digital images into concentration fields and calculate the local and global flux in the system. We present preliminary results from this experimental study.

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