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Capillary effects in buoyancy-driven spreading within a porous medium JEROME NEUFELD, BP Institute, University of Cambridge, OLIVIER DUBOURDIEU, Ecole Normale Superieure de Lyon, HERBERT HUPPERT, Institute of Theoretical Geophysics, University of Cambridge — Patterns driven by the imbibition and spread of fluids in porous media due to gravity and capillarity can be found in a host of industrial and environmental settings. We show experimentally that for small, constant fluid volumes, gravity and capillarity can lead to static fluid configurations. In contrast, when the fluid exceeds a critical depth it can flow under gravity before finding a new static configuration. We show that the evolution can be modeled as a gravity current in which capillarity, manifest as hysteresis between advancing and receding interfaces, plays a key role. Model predictions of the ultimate extent of such currents are compared to our experimental results.

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