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Pore-scale investigations into the stability of residual CO_2 CHARLOTTE GARING, JACQUES A DE CHALENDAR, Stanford University, MARCO VOLTOLINI, JONATHAN B AJO-FRANKLIN, Lawrence Berkeley National Laboratory, SALLY M BENSON, Stanford University — After brine imbibition following CO_2 injection, substantial volumes of supercritical CO_2 ($scCO_2$) may be disconnected from the plume and trapped in the pores. Whereas conventional multi-phase flow models assume that the residually trapped non-wetting phase is permanently immobilized, multiple physiochemical mechanisms exist which could potentially invalidate this assumption. One mechanism is CO_2 transfer driven by differences in capillary pressure between disconnected neighbor ganglia, called Ostwald Ripening.work presents two experiments. In the first experiment Ostwald ripening was assessed by calculating pore-scale capillary pressure distribution in sandstones using a multi-scale synchrotron-based X-ray microtomographic (micro-CT) dataset of residually trapped air after a simple gravity-driven imbibition experiment. In the second experiment a $scCO_2$-brine drainage-imbibition cycle was performed in a sandstone with reservoir conditions coupled with time-resolved synchrotron micro-CT imaging after imbibition stops.

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