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Sub-core scale investigation of heterogeneity effect on CO2 transport in natural conglomerate cores

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To assess the impact of complex heterogeneities in conglomerate on pore distribution and fluid flow, the effect of heterogeneous debris spatial distribution in conglomerate on CO2 migration under reservoir conditions was studied using X-ray Computed Tomography (X-CT). Four types of conglomerate cores were drilled from the CO2 storage site in the Fushan Depression, China, which include uniformly distributed clasts sandstone, layered clasts, mud-bearing interlayered sandstone, and sandstone. These four conglomerate cores, characterized by different distributions of matrix and clasts, represent highly heterogeneous features. We conducted two-stage sub-core scale flow experiments. Drainage and imbibition tests were carried out under reservoir conditions, with a focus on the impact of heterogeneity on CO2 distribution. We used CT to quantify the detailed process of residual and dissolution capture in heterogeneous rocks caused by clasts presence, which can be widely applied in areas such as CO2 sequestration and enhanced hydrocarbon reservoir exploitation.

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