



Regional assessment of CO₂-solubility trapping potential: a case study of the coastal and offshore Texas Miocene interval

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Abstract

This study presents a regional assessment of CO₂-solubility trapping potential (CSTP) in the Texas coastal and offshore Miocene interval, comprising lower, middle, and upper Miocene sandstone. Duan's solubility model [Duan et al. Mar. Chem. 2006, 98, 131-139] was applied to estimate carbon content in brine saturated with CO₂ at reservoir conditions. Three approaches (simple, coarse, and fine) were used to calculate the CSTP. The estimate of CSTP in the study area varies from 30 Gt to 167 Gt. Sensitivity analysis indicated that the CSTP in the study area is most sensitive to storage efficiency, porosity, and thickness and is least sensitive to background carbon content in brine. Comparison of CSTP in our study area with CSTP values for seven other saline aquifers reported in the literature showed that the theoretical estimate of CO₂-solubility trapping potential (TECSTP) has a linear relationship with brine volume, regardless of brine salinity, temperature, and pressure. Although more validation is needed, this linear relationship may provide a quick estimate of CSTP in a saline aquifer. Results of laboratory experiments of brine-rock-CO₂ interactions and the geochemical model suggest that, in the study area, enhancement of CSTP caused by interactions between brine and rocks is minor and the storage capacity of mineral trapping owing to mineral precipitation is relatively trivial.