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Natural CO2 Reservoirs as Analogs for Gas Sequestration

Geologic storage is a possible option for sequestrating CO2. Natural geologic CO2 deposits are analogs providing unique insights that can address technical questions confronting geologic sequestration - the safety and security of geologic sequestration and the long-term impact of CO2 on reservoirs.

Three fields have been selected as natural analogs for study: McElmo Dome (Colorado) 30 Tcf, St. Johns field (Arizona and New Mexico) 16 Tcf, and Jackson Dome (Mississippi) 6 Tcf.

These three fields are quite different: carbonate vs. sandstone, shallow vs. deep, super critical vs. free gas, undeveloped vs. developed. Together they are providing an excellent analog test for CO2 sequestration rock interaction. Our work includes the analysis of both direct and indirect data. We have applied rock data, wireline logs, production pressure data, seismic interpretation, core data, surface soil data, and remote sensing to identify the commonalities and differences between the fields. Primary porosity ranges from 5% to 30% in the reservoirs. The carbonate fields are self-sourcing via local thermal decomposition of calcite to CO2 and may have enhanced pore space (McElmo and St. Johns). At present we see no evidence of large-scale leakage from the reservoirs. The current work seems to imply that the fields behave in much the same manner as many natural gas fields with lateral variations in porosity, permeability, and water saturation as well as complications from faulting. Future work includes gas and rock sampling from new well and geochemical and production/injection modeling.