Geomechanical Characteristics of the DeSoto Canyon Salt Basin, east-central Gulf of Mexico: Implications for offshore storage of Carbon Dioxide

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ABSTRACT

Subsurface geologic storage of CO2 can play a major role in offsetting greenhouse gas emissions in a manner that is safe and efficient. Due to legal advantages and apparently vast resource capacity, offshore storage offers an attractive alternative to onshore storage. Seal integrity is a critical issue that must be addressed to ensure safe long-term storage. Performing geomechanical analysis of the potential storage unit can help quantify and reduce the risk of leakage caused by injection.

Recent studies indicate that gigatonne-class storage capacity exists in Cretaceous and Miocene sandstone in the DeSoto Canyon Salt Basin (DCSB). The sandstone reservoirs are overlain by thick sections of shale and chalk, which form regionally extensive seals. Based on geophysical well log data, the thickness of individual reservoirs is on the order of 10-30m with porosity commonly exceeding 20%. I hypothesize that the storage capacity of CO2 is significantly influenced by the geomechanical properties of each reservoir unit. The objectives of the proposed research are to 1) Investigate in-situ stress information to illustrate the stress state of the DCSB; 2) calculate the geomechanical properties of the storage-unit sandstone and sealing formations to obtain the rock strength and sealing capacity of individual stratigraphic units; and 3) analyze the reservoir and seal integrity and identify the most suitable storage units.

This study will use public domain wellbore information, geophysical well logs, and additional data from the Bureau of Ocean Energy Management (BOEM). In-situ stress orientations were identified in wells with four-arm dipmeter logs. Additional digital well logs are needed to calculate stress magnitude and geomechanical properties of each potential reservoir unit.

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