Data-driven Approach to Refine Carbon Storage Efficiency Factors for Regional-scale Offshore Saline Reservoirs

Andrew Bean[1], Kelly K. Rose[2], Randal B. Thomas[3], and Emily M. Cameron[3]

[1]Oak Ridge Institute for Science & Education
[2]National Energy Technology Laboratory
[3]AECOM Corporation

ABSTRACT

Carbon capture and storage (CCS) is an effective method of curbing anthropogenic CO2 emissions. The National Energy Technology Laboratory's (NETL, Dept. of Energy) CCS assessment efforts have been focused on applying efficiency factors that describe the percentage of geologic pore space that will be occupied by injected carbon dioxide. Efficiency factors have been primarily utilized in onshore scenarios. However, considering the vast resource potential in deep saline formations, offshore carbon storage is gaining more attention. Therefore, it is necessary to refine NETL's onshore efficiency factors for the offshore environment.

We present our approach to refine the specific efficiency factor for net-to-gross thickness of sand suitable for offshore CO2 storage. Unlike previous efforts that are simulation-based or limited in scope, we constructed a data-driven, regional-scale methodology for offshore storage. Our method leverages in-house well logs from the Gulf of Mexico (GOM) and the Bureau of Ocean Energy Management's (BOEM) Oil and Gas Sands Atlas. Following statistical analyses (Spotfire and ArcGIS), we chose a representative subdomain of the GOM as a case study. We interpreted well logs (Petra) that contained sand formations within the GOM subdomain that met specific criteria to compare with attributes from BOEM's database. Maps were generated (ArcGIS) that visualize this comparison. Our analysis found that the BOEM database lacked critical sand thickness information. We recommend a methodology that utilizes empirical relationships specific to each subdomain built from public data and our well log interpretations that maximize spatial coverage and minimize storage estimate error.