Southeast Offshore Storage Resource Assessment (SOSRA)
Project Number: DE-FE0026086
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Mastering the Subsurface Through Technology Innovation, Partnerships, and Collaboration
Pittsburgh, PA
August 01, 2017

This material is based upon work supported by the U.S. Department of Energy National Energy Technology Laboratory. Cost share and research support are provided by the Project Partners and an Advisory Committee.
SOSRA

- Southeast Offshore Storage Resource Assessment
  - Managed by the Southern States Energy Board (SSEB)
  - SSEB appointed three planning area managers to each offshore region (Eastern GOM, South Atlantic, Mid-Atlantic)
  - Geologic characterization of offshore storage opportunities
  - Static volumetric assessment of storage capacity using NETL methodology
Decision Making & Communications

Advisory Committee:
state geological surveys, universities, state oil and gas boards, oil and gas companies, and utilities
(no contract, no decision making authority)
GO/NO-GO DECISION POINT: The data collected and analyzed in Phase I is sufficient to perform a quality prospective storage resource assessment and the project should proceed to Phase II.

Note: Task 1.0, Project Management and Planning, extends throughout the entire program period.
Summary – SOSRA
EGOM Study Area and Subregions

DCSB  DeSoto Canyon Salt Basin
MGA  Middle Ground Arch
TE  Tampa Embayment
SA  Sarasota Arch
SFB  South Florida Basin
Geothermal and Burial Data, DCSB

Temperature-depth profile

Burial history curve
Normal Brine, Pressure Gradients, Onshore Eastern Gulf

TDS-depth plot

\[ y = 21.81x \]
\[ R^2 = 0.86 \]

Pressure-depth plot

\[ y = 0.23x^{1.08} \]
\[ R^2 = 1.00 \]

0.54 psi/ft

0.44 psi/ft
Depth-Converted Structural Cross Sections, DeSoto Canyon Salt Basin

Destin Dome

Salt Roller Province

Seabed (0 Ma) Tilt block

Extensional strain = 1.4%

Extensional strain = 52.0%
West Florida Shelf Bathymetry

- Broad, shallow, region near shore (NE of 80 m contour).
- Distally steepening outer shelf leading to West Florida Escarpment.
Data Quality – West Florida

Detail imaged at escarpment and toe of slope

Ancient shelfbreak imaged

Platform imaged far beyond depth of investigation
Prospective EGOM Sinks

Well G02468, Desoto Canyon Salt Basin

Paluxy Formation
Major prospects in sandstone of Tuscaloosa Group and Paluxy Fm.

Topseal

Well G3912, West Florida Shelf

Punta Gorda Anhydrite

Topseal
Porosity locally >15%

Reservoir

Major prospects in porous dolomite associated with anhydrite intervals

Reservoir
Porosity locally >20%

Shale

Sandstone

Limestone

Dolomite

Anhydrite
South and Mid-Atlantic Planning Areas

- Total of six exploration wells, on Georgia/Florida shelf
- Major depocenters in Carolina Trough and Blake Plateau Basin
Prospective Mesozoic Section

<table>
<thead>
<tr>
<th>Reservoir Properties</th>
<th>Positive Indicators</th>
<th>Cautionary Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>&gt;800 m, &lt;2500 m</td>
<td>&lt;800 m, &gt;2500 m</td>
</tr>
<tr>
<td>Reservoir thickness</td>
<td>&gt;50 m</td>
<td>&lt;20 m</td>
</tr>
<tr>
<td>Porosity</td>
<td>&gt;20%</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>Permeability</td>
<td>&gt;500 mD</td>
<td>&lt;200 mD</td>
</tr>
<tr>
<td>Salinity</td>
<td>&gt;100 g/l</td>
<td>&lt;30 g/l</td>
</tr>
<tr>
<td>Stratigraphy</td>
<td>Uniform</td>
<td>Complex lateral variation and complex connectivity of reservoir facies</td>
</tr>
<tr>
<td>Capacity</td>
<td>Estimated effective capacity much larger than total amount of CO2 to be injected</td>
<td>Estimated effective capacity similar to total amount of CO2 to be injected</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Caprock Properties</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral continuity</td>
<td>Stratigraphically uniform, small or no faults</td>
<td>Lateral variations, medium to large faults</td>
</tr>
<tr>
<td>Thickness</td>
<td>&gt;100 m</td>
<td>&lt;20 m</td>
</tr>
</tbody>
</table>

Scholle (1979)

Chadwick et al (2008)
Upper Cretaceous Prospective Sink

- Flat-lying, regionally extensive, structurally uncomplicated thick stratigraphic section
- Significant porosities (15-30%) and permeabilities (3.5-450 mD) within interbedded clastic and carbonate rocks
- Appropriate depths (4,000-6,000 ft.) for CO₂ storage
Data Coverage — Mid-Atlantic Planning Area

Over 1,000 lines and 34 wells (only 5 offshore) were selected for the study of the Mid-Atlantic Region.

Areal Coverage Method:
- Line/grid Spacing: Regional, Semi-Regional, Exploration scale
- Location of offshore wells outside the study area. Presence of 5 exploration wells at the North of the region.

Results:
Unlike the sparse distribution of well data, the seismic data collected on the Mid-Atlantic margin is of sufficient density to perform the interpretation task.
Over 1,000 lines and 34 wells (only 5 offshore) were selected for the study of the Mid-Atlantic Region.

Quality Assessment Method:
- Resolution: frequency analysis, data stacked or migrated
- Survey Design: source volume and cable length
- Benefit of reprocessing: identify lines of poor quality and potentially reprocess if needed

Results:
The quality varies from fair to poor and is better for more recent data. Offshore wells were QC’d to improve their quality.
Concluding Thoughts

• Giant potential for offshore CO₂ storage.
• Large portfolio of potential sinks and seals in eastern Gulf and Atlantic regions.
• Seismic and well data being interpreted.
• Geopressure >12,000 ft; main storage prospects in Cretaceous-Miocene section.
• High porosity reservoirs identified in sandstone and carbonate; seals include mudrock, chalk, and evaporites.
• Pristine reservoir potential represented by much of the southeast offshore.