SOUTHEAST OFFSHORE STORAGE RESOURCE ASSESSMENT (SOSRA)

SOUTH ATLANTIC

08 March 2017

SECARB
12th Annual Stakeholders’ Meeting
Atlanta, GA

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University of South Carolina
South Atlantic Team Members

- USC School of the Earth, Ocean, and Environment
  - Prof. James H. Knapp
  - Prof. Venkat Lakshmi
- USC Earth Sciences and Resources Institute
  - Prof. Camelia C. Knapp
  - Dr. Duke Brantley
- South Carolina Geological Survey
  - Dr. Scott Howard
3 Full time PhD students not on project funds; grant had 2 full time PhD students in the budget

Institutional issues affecting invoicing
- staff turnover in Contract and Grant Accounting Office
- introduction of new accounting system

Extensive data conditioning to create a robust 3D Petrel project incorporating all available data into one cohesive project for seismic interpretation, structural modeling and volumetric calculations
Petrel 2-Day Short Course

- Petrel is industry standard for subsurface interpretation
- Held 2-day short course at USC, taught by Schlumberger staff member and USC alum
- Six SOSRA team members were among 25 course participants
Overview

- Project Overview
- Geologic Overview
- Data Summary
- Data Assimilation and Clean-up
- Phase 2 work, SCGS contribution
- Conclusions
Brief Geologic History

- Continental collision between Gondwanan and Laurentian continents in Late Paleozoic
- Rifting and associated magmatism beginning in early Triassic, and continuing through early Jurassic
- Extensive carbonate platform through most of Jurassic and Cretaceous
- Clastic margin through most of Cenozoic
- Storage resource assessment focused on Cretaceous and Cenozoic stratigraphic sections
Major Geologic Features

- Carolina Platform
- Carolina Trough
- Southeast Georgia Embayment
- Blake Plateau Basin
- Cape Fear Arch
- Peninsular Arch
> 200,000 line km 2-D seismic reflection data

6 exploration wells plus COST-GE well

ODP / DSDP / IODP scientific drilling

Seismic refraction data
Much of shelf underlain by 4-6 km section of Paleozoic stratigraphy

Distinct lack of evidence for Mesozoic extensional basins

Implications for subsidence and heat flow during Mesozoic and Cenozoic evolution
Gondwanan Crust

- Entire southeast U.S. offshore underlain by crust of Gondwanan origin (Africa-South America)
- Boundary with former Laurentia (North America) projects offshore between South and Mid-Atlantic planning areas
- Potential for significant changes in geologic history
Significant Phase 1 time and effort dedicated to tying all of the well and seismic data together into one cohesive Petrel geologic project

Effort included but is not limited to:

- Seismic-Well Ties
  - Loading checkshots and QC
  - Sonic calibration
  - Creation of synthetic seismograms

- Amplitude Scaling
- Matching formation tops using well logs
Line name: MME-101_stk

Amplitude = 172

Amplitude = -159

Amplitude = 159

Amplitude = -159
Task 5.0 Volumetric Calculations

- Preliminary CO$_2$ injection simulation modeling
- Studying phase behavior to better understand:
  - Fluid dynamics
  - CO$_2$/carbonate interaction
  - How these change as PVT conditions change
Subtask 8.1 Public Outreach

- Design and Implement Webpage for SOSRA Project with USC Partners
- Story Map detailing project progress and goals
Subtask 8.2  Knowledge Sharing and Technology Transfer

- Design Web Tools to work with project data on web site
- Data visualization and analysis = information to stakeholders
Conclusions

- South Atlantic is a major frontier area despite decades of data acquisition and an earlier phase of hydrocarbon exploration.
- Extensive conditioning of the data seismic-well ties completed.
- Robust geologic project created in Petrel for seismic interpretation, structural modeling and volumetric calculations (Next Steps).
- Preliminary CO₂ injection simulation modeling begun; Phase 2 will incorporate structural model created in Petrel.
- SCGS will build an interactive online storybook for public dissemination of project information.
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