



# US STORAGE PROJECTS UPDATE

## Southeast U.S. Projects

Presented By:

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Presented at CLIMIT Summit  
Side Event on Storage  
US-Norway MOU initiative  
Oslo, Norway

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# Overview of Presentation

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- U.S. Policy Developments Stimulating New Interest and Activity Regarding CCS
- Project ECO2S: Characterization of a World Class CO<sub>2</sub> Storage Complex
- Southeast Offshore Storage Resource Assessment (SOSRA)
- SECARB Offshore Gulf of Mexico

# FUTURE Act Enhancements to IRC Section 45Q -- Highlights

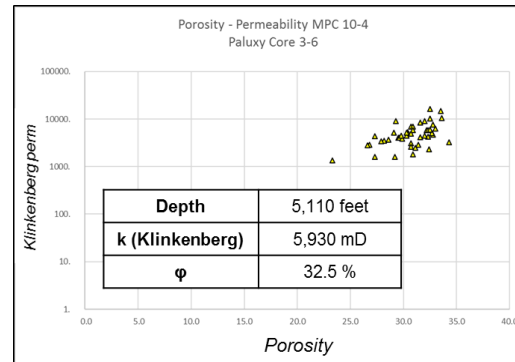
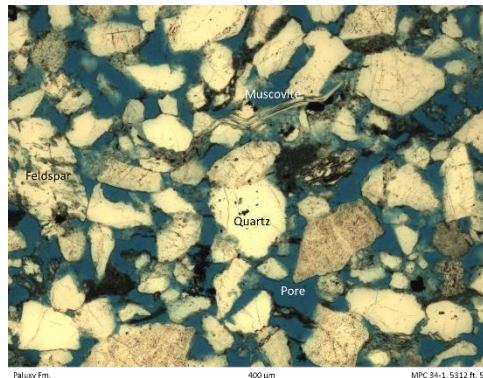
Previous 45Q	FUTURE Act
<ul style="list-style-type: none"> <li>75 million metric ton cap</li> </ul>	<ul style="list-style-type: none"> <li>Eliminates 75 million metric ton cap; applies to new facilities that “break ground” by EOY 2023.</li> </ul>
<ul style="list-style-type: none"> <li>Credit based on “captured qualified CO<sub>2</sub>”</li> </ul>	<ul style="list-style-type: none"> <li>After enactment, credit based on captured “qualified carbon oxide” (CO<sub>2</sub> and other carbon oxides)</li> </ul>
<ul style="list-style-type: none"> <li>\$20/metric ton for CO<sub>2</sub> stored and not used for EOR</li> <li>\$10/metric ton for CO<sub>2</sub> stored and used for EOR</li> </ul>	<ul style="list-style-type: none"> <li>\$50/mt for geologic storage and \$35/mt for EOR (each rate phases up over 10-year period from 2017 to 2026).</li> <li>Existing qualified facilities would continue to receive the original inflation adjusted \$20 and \$10 credit rates.</li> </ul>
<ul style="list-style-type: none"> <li>Available to <u>facility</u> with capture equipment capturing at least 500,000 metric tons CO<sub>2</sub>/year.</li> </ul>	<ul style="list-style-type: none"> <li>Capture &gt; 500,000 metric tons CO<sub>2</sub>/year for electric generating units; &gt; 100,000 metric tons CO<sub>2</sub>/year for other.</li> <li>Credit goes to the <u>owner of the capture equipment</u>.</li> <li>Available to “direct air capture” and “beneficial use”</li> </ul>
<ul style="list-style-type: none"> <li>Credit available until the 75-million-ton cap is reached.</li> </ul>	<ul style="list-style-type: none"> <li>Credit available for 12 years from the date the carbon capture equipment is placed in service.</li> </ul>

# Project ECO2S Storage Zone Properties

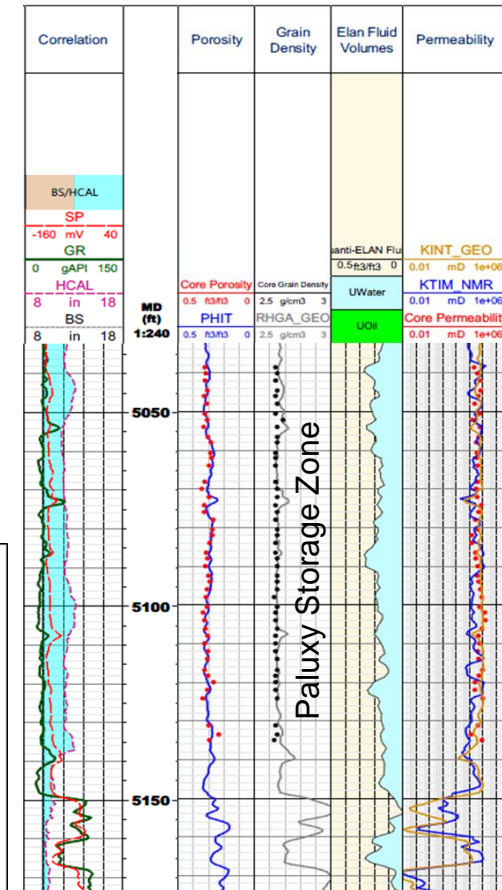
## Paluxy sandstone

- **Goal: Demonstrate the subsurface at Kemper can safely/permanently store commercial volumes of CO<sub>2</sub>**
- Abundant stacked saline sandstone bodies in Paluxy, Wash-Fred, and lower Tuscaloosa.
- 350 meters of net sand. Logs and core show sandstone average porosity of 30%(!!)
- Core analysis indicates all sandstones water-saturated
- Darcy-class permeability common (up to 16 Darcies)

### High-porosity sandstone in Paluxy Formation



## Elemental Log Analysis (ELAN\*) interpretation



\*ELAN is a mark of Schlumberger

Interpretation: sandy braided stream deposit

MPC 10-4, 5091.5 ft

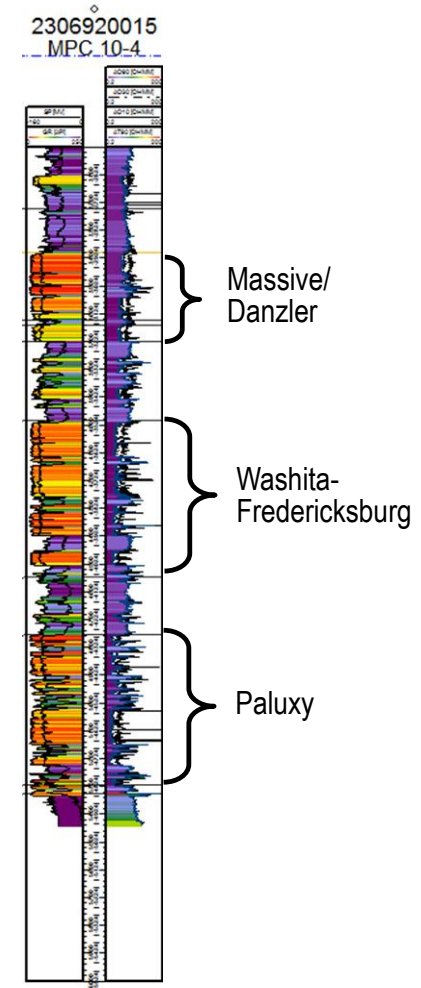
# Storage Complex Capacity

- Each of the three potential storage zones have commercial capacity
- Together the three storage zones result in a gigatonne capacity storage complex that has the potential to act as a regional hub

CO <sub>2</sub> Storage Reservoir	P <sub>10</sub> Capacity (MMmt)	P <sub>50</sub> Capacity (MMmt)	P <sub>90</sub> Capacity (MMmt)
Massive/Dantzler	60	120	200
Wash.-Fred.	280	540	920
Paluxy	160	310	530

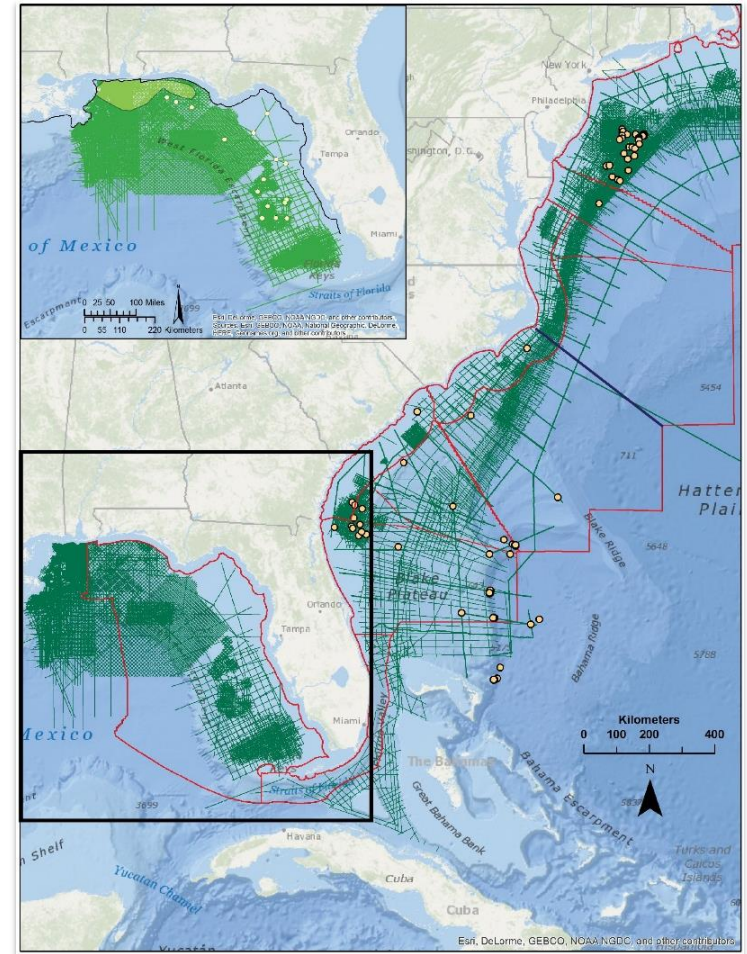
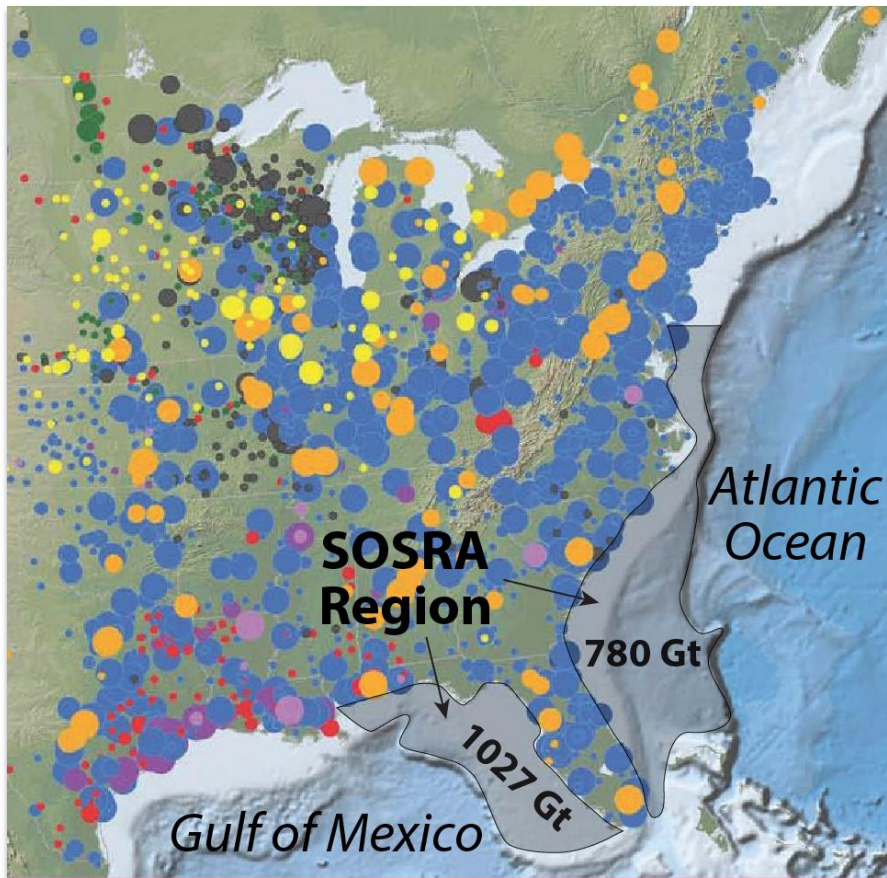
DOE methodology for site-specific saline storage efficiency calculation based on fluid displacement factors for clastic reservoirs where net pay, net thickness and net porosity are known of 7.4% (P<sub>10</sub>), 14% (P<sub>50</sub>) and 24% (P<sub>90</sub>) (Goodman et al., 2011)

- Low-cost storage options occur beneath the energy facility -- \$2.00 - \$4.00 USD per metric ton depending on volume of CO<sub>2</sub> captured (*after DOE investment*)
- Drives the value proposition where existing infrastructure could be utilized for CO<sub>2</sub> capture, compression, transportation and storage



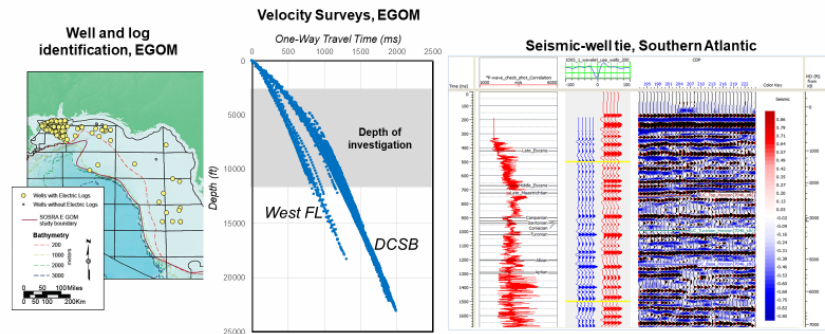


# Southeast Offshore Storage Resource Assessment (SOSRA) - Project Area

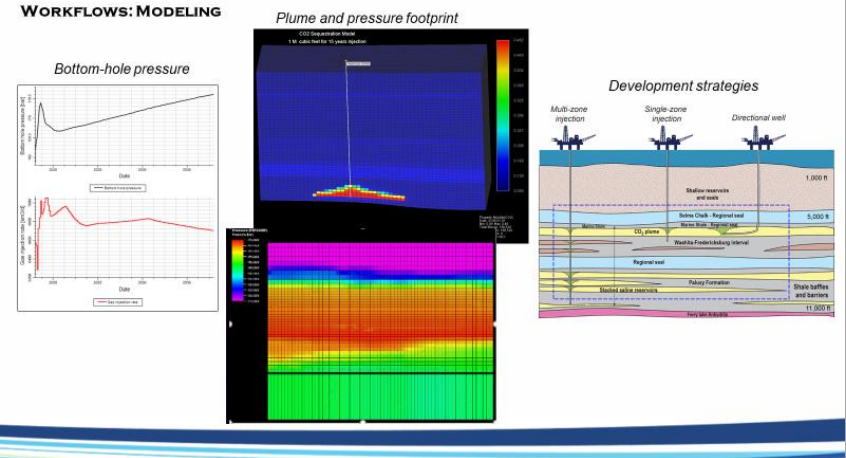


# Southeast Offshore Storage Resource Assessment (SOSRA) - Project Area

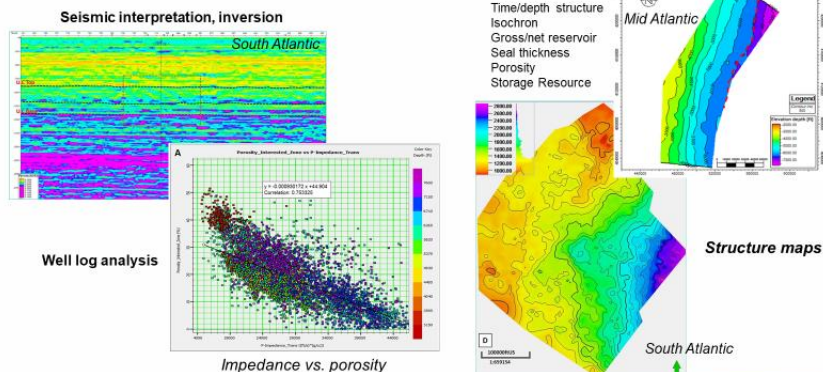
## WORKFLOWS: DATA ACQUISITION, ANALYSIS



## WORKFLOWS: MODELING



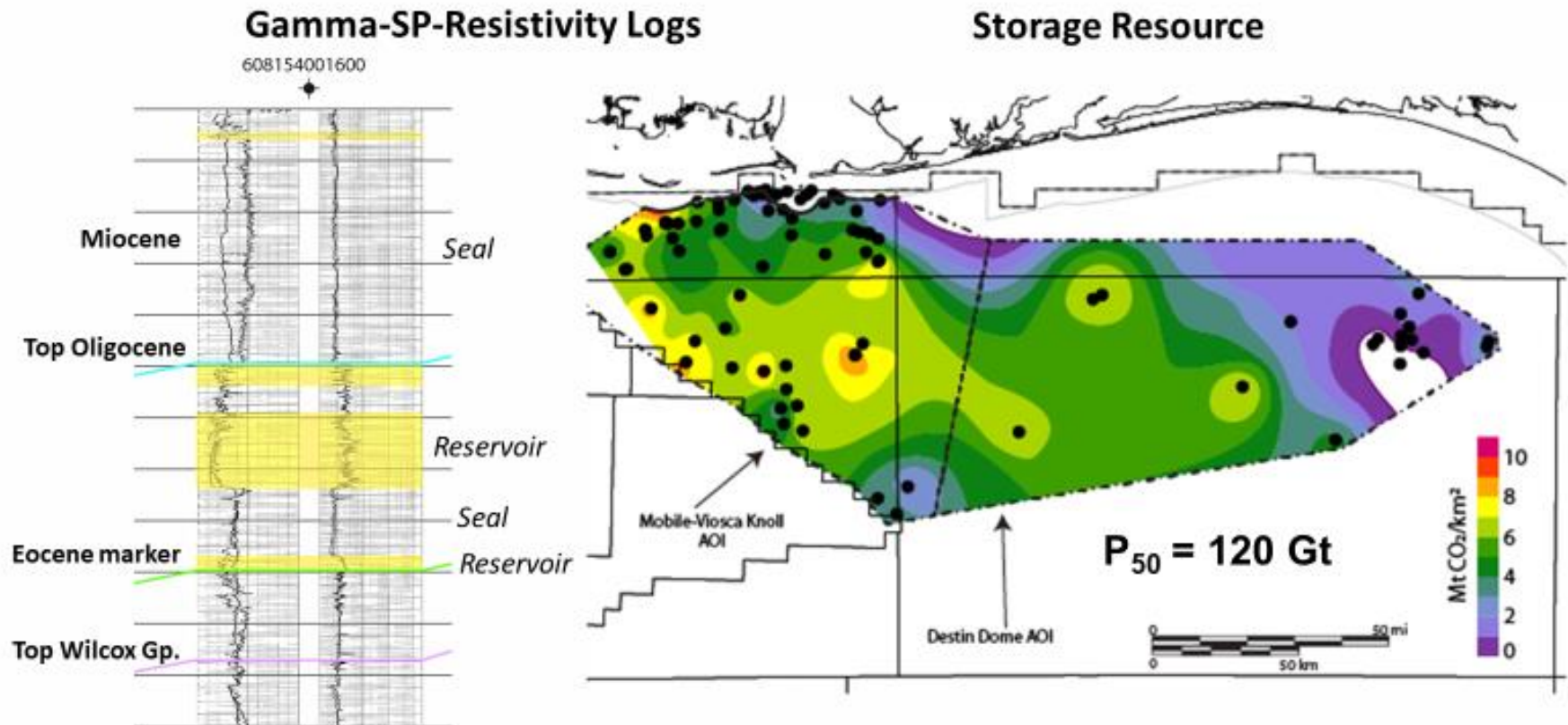
## WORKFLOWS: INTERPRETATION, MAPPING





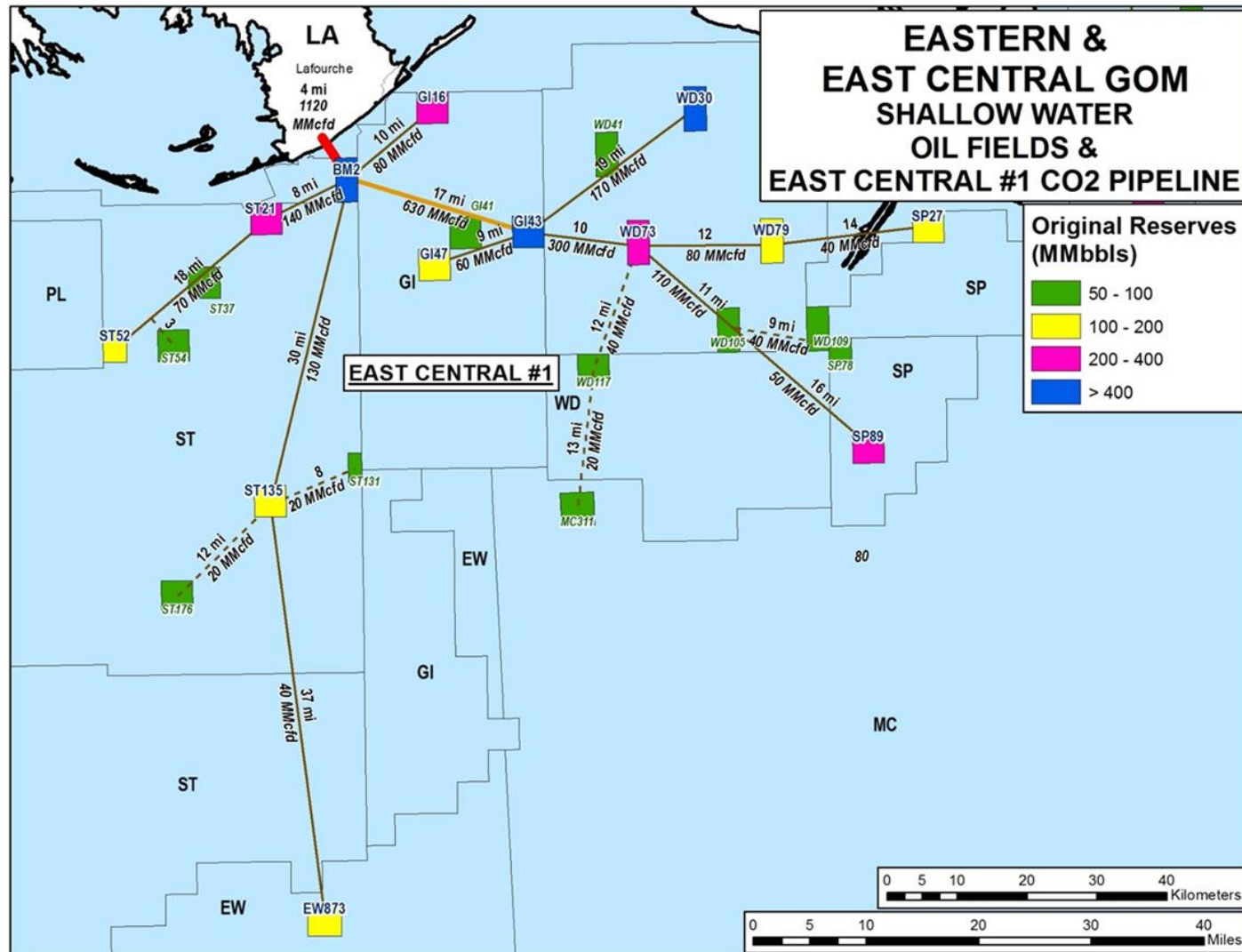
# Paleogene-Neogene Reservoirs, DeSoto Canyon Salt Basin

## PALEOGENE-NEOGENE RESERVOIRS, DESOTO CANYON SALT BASIN





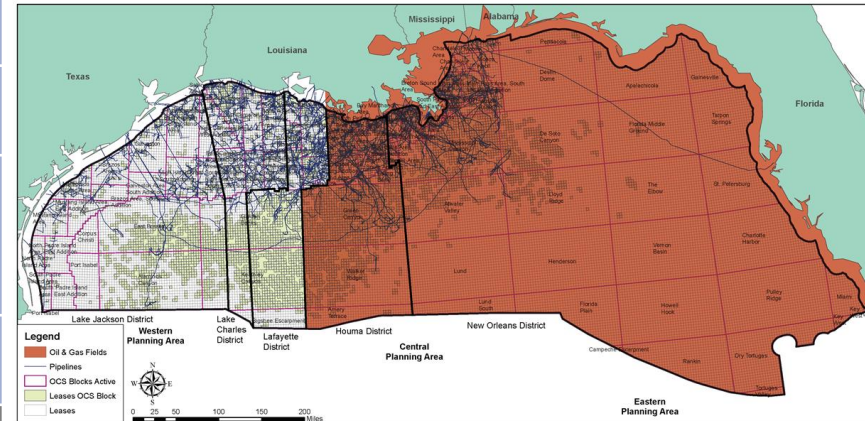
# East and Central Deep Water GOM CO<sub>2</sub> Pipeline Example



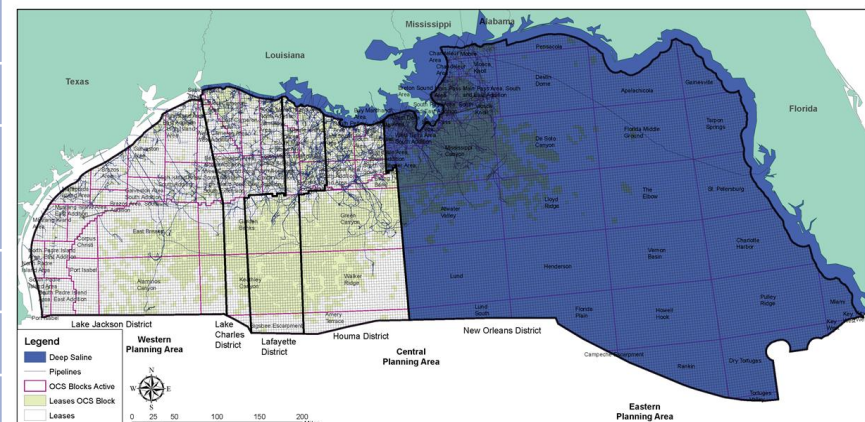
# SECARB Offshore Study Area & Project Boundaries

FEDERAL WATERS		
	Depleted Oil & Gas Fields, and Potentially Associated CO <sub>2</sub> -EOR	Deep Saline
Western Planning Area	No	No
Central Planning Area	Study Area is East of Houma District's Western Boundary (includes Houma District)	Study Area is East of New Orleans District's Western Boundary (excludes Houma District)
Eastern Planning Area	All	All
STATE WATERS		
	Depleted Oil & Gas Fields, and Potentially Associated CO <sub>2</sub> -EOR	Deep Saline
Texas	No	No
Louisiana	Partial, Includes State Waters East of Houma District Boundary Extension	Partial, Excludes Chandeleur Sound/Islands
Mississippi	Yes	Yes
Alabama	Yes	Yes
Florida (West Coast)	Yes	Yes

## Study Area | Oil and Gas



## Study Area | Saline Aquifers



# Anticipated Project Outcomes

- Integrating data to characterize offshore CO<sub>2</sub> storage resources resulting in decision system to identify high-quality “prospects.”
- Development of concept for commercially viable CO<sub>2</sub>-EOR and a saline storage prospects, perhaps using subsea completions/separation/ compression; with or without utilization of existing infrastructure.
- Refinement/adaptation of simulation tools, geologic models, risk assessment/mitigation strategies for site-specific assessments
- Development of “best practices” based on understanding of the offshore storage prospect(s) targeted
- Reduce uncertainties/risks, better understand MVA approaches
- Address regulatory gaps in the oversight and regulation of CO<sub>2</sub> storage activities (with and without EOR) in the offshore GOM.





# INITIAL Focus of Activity

- Defining what a good CO<sub>2</sub> storage prospect might look like in the offshore Gulf of Mexico.
- Understanding the current regulatory environment in the GOM, so that regulatory gaps are characterized and potentially addressed early to ensure expeditious project deployment.
- Reviewing how regulatory frameworks have evolved in other jurisdictions, and how they might apply in the offshore GOM.
- Understanding possible financial incentives and their potential applicability for CO<sub>2</sub> storage/CO<sub>2</sub>-EOR in the offshore GOM.
- Reviewing characterizations of project risks and uncertainties that may impact regulatory frameworks and financial incentives.





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# Project ECO2S Partners





# Southeast Offshore Storage Resource Assessment (SOSRA)



U.S. DEPARTMENT OF  
**ENERGY**



VirginiaTech



UNIVERSITY OF  
**SOUTH CAROLINA**



# SECARB Offshore Gulf of Mexico Project Overview and Status – February 2019

