

# **Assessment of Geological Storage Capacity of the Southeastern U.S. for CO<sub>2</sub> in Brines and Economic Use for EOR**

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# Assessment of Geological Storage Capacity of the Southeastern US for CO<sub>2</sub> in Brines and Economic Use for EOR

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Prepared by the Gulf Coast Carbon Center at the Bureau of  
Economic Geology

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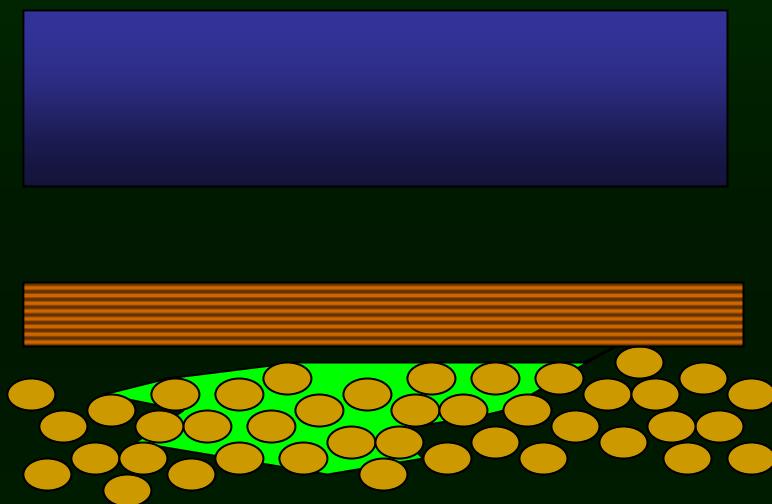
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*Prepared for Southeast Regional Carbon Sequestration Partnership  
Phase I, led by the Southern States Energy Board*

*1/19/2006, Atlanta Georgia*

# Assessing Storage Capacity In Brine

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Identify a porous and permeable rock volume in the subsurface

...That is below underground sources of drinking water

...and isolated from them and from escape to the atmosphere by one or more seals

... and collect data on areal extent, thickness, CO<sub>2</sub> density porosity, and permeability that permit simple estimates of storage capacity for CO<sub>2</sub>

If preceding steps are favorable, proceed to additional steps, including matching to sources, estimating cost, permanence, and risk/uncertainty

# Status of Capacity Assessment

**Greens**= known capacity

**Oranges and reds** = capacity poor to none

**Blue outlines** = likely capacity under study

Appalachians and  
Atlantic Coastal Plain

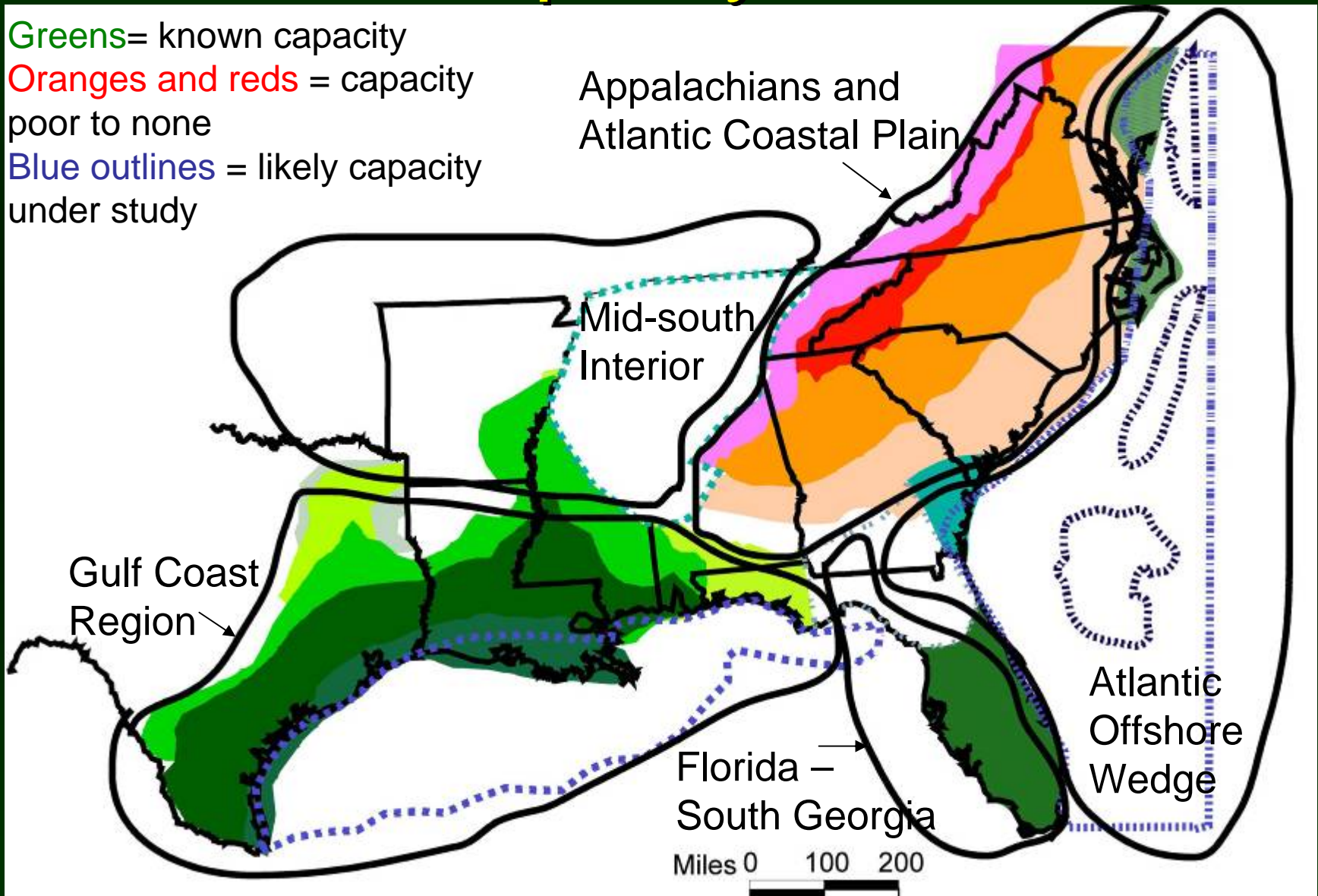
Mid-south  
Interior

Gulf Coast  
Region

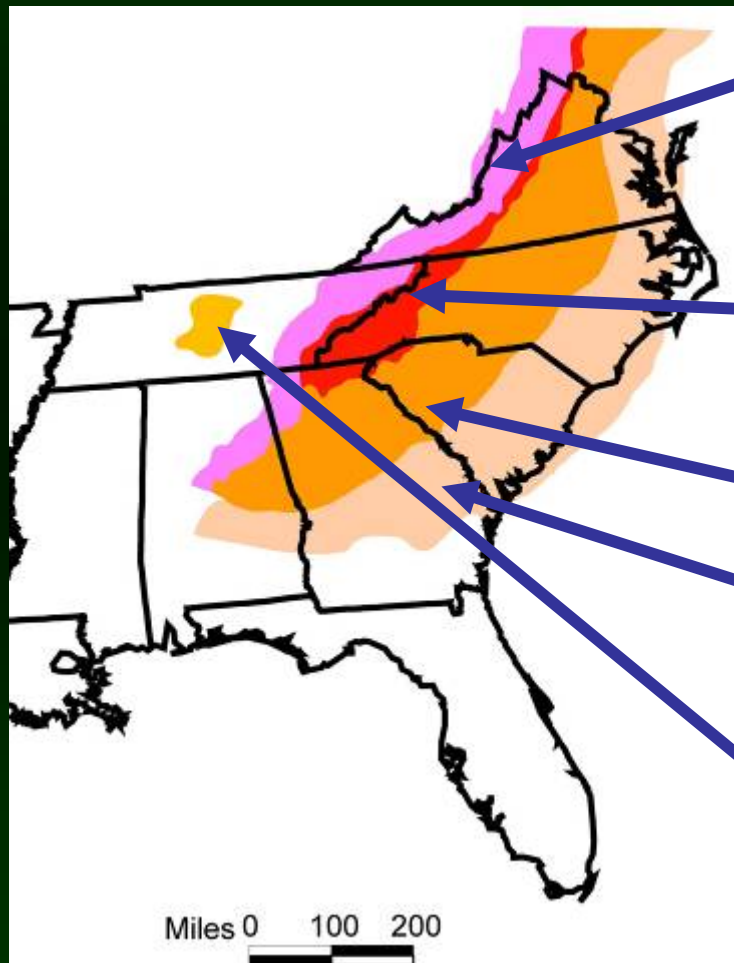
Florida –  
South Georgia

Atlantic  
Offshore  
Wedge

Miles 0 100 200

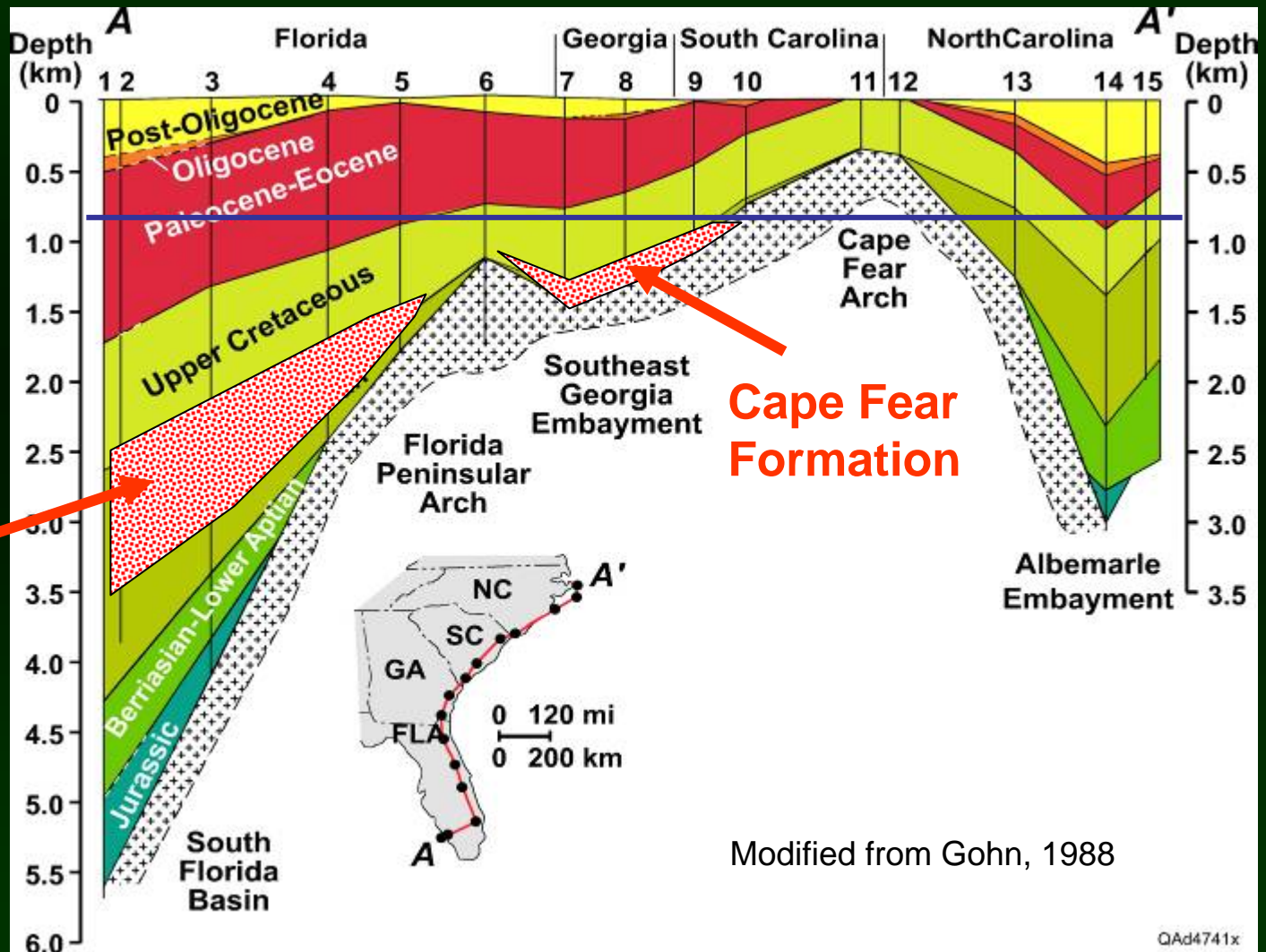


# Appalachians and Atlantic Coastal Plain



- Valley and Ridge – complex, likely local capacity
- Blue Ridge – no capacity
- Piedmont – no capacity
- Atlantic coastal plain – capacity only near coast
- Nashville dome – poor to no capacity

# Capacity along the Eastern Seaboard

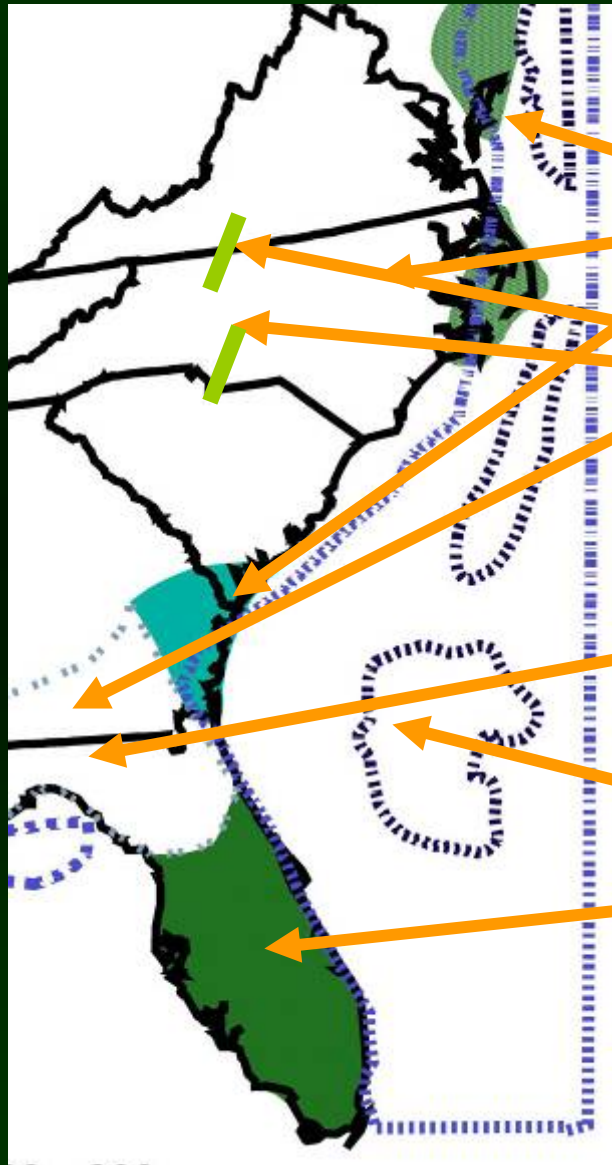


Minimum  
Depth 800 m

Cedar Keys/  
Lawson &  
other  
carbonates



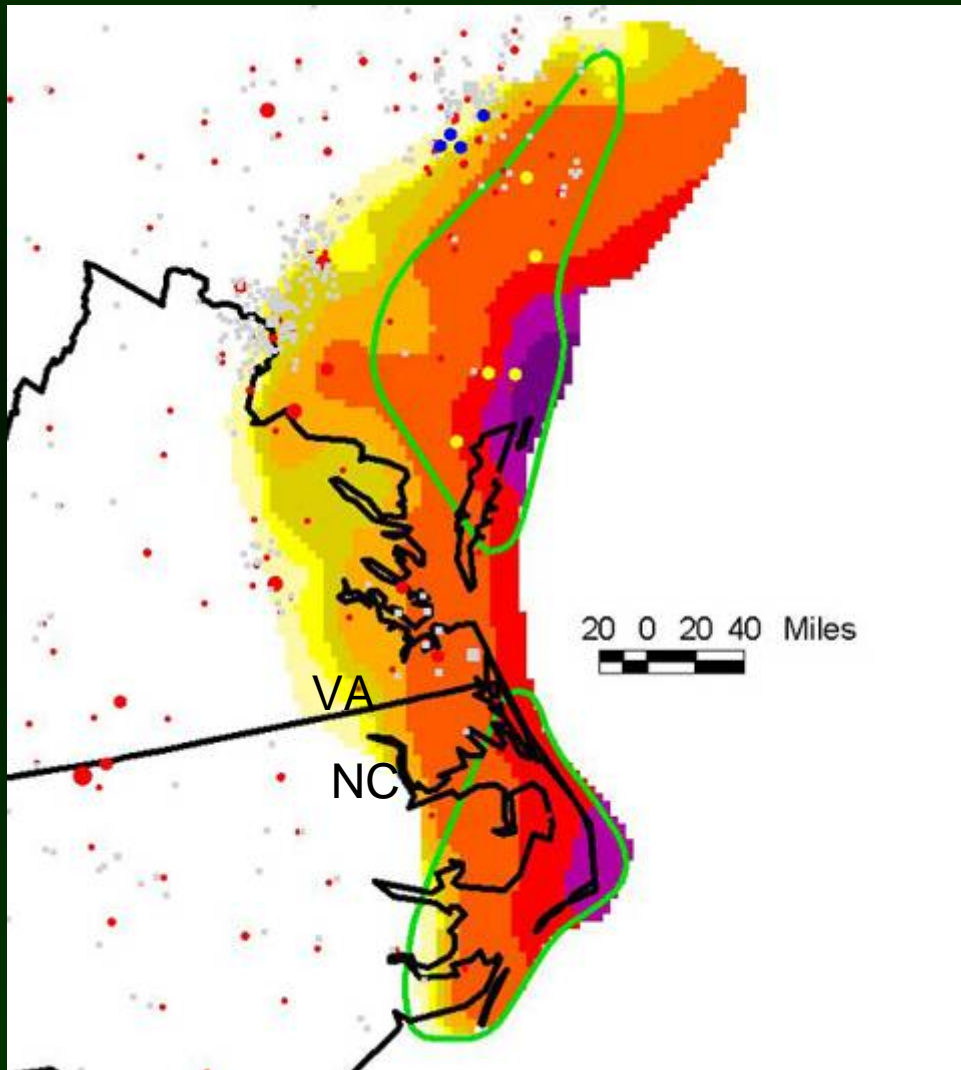
# Brine Storage Capacity for Eastern SE US



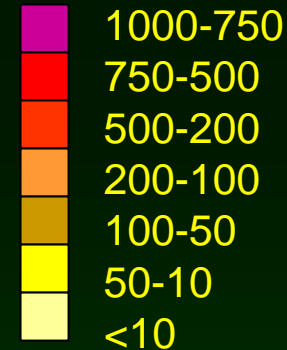
- Cretaceous of the Atlantic Coastal margin
- Mesozoic Rift Basins
- North Florida - south Georgia Cretaceous and Mesozoic Rift Basins
- Offshore Atlantic wedge
- Southern Florida
- West of Appalachians

# Detail study eastern seaboard options: lower Potomac Formation Thickness and Salinity

These trends encourage us to explore for geologic storage options on the continental shelf of the eastern US.



## Formation thickness (m)



• Power plant

○ Adequate depth

• Fresh

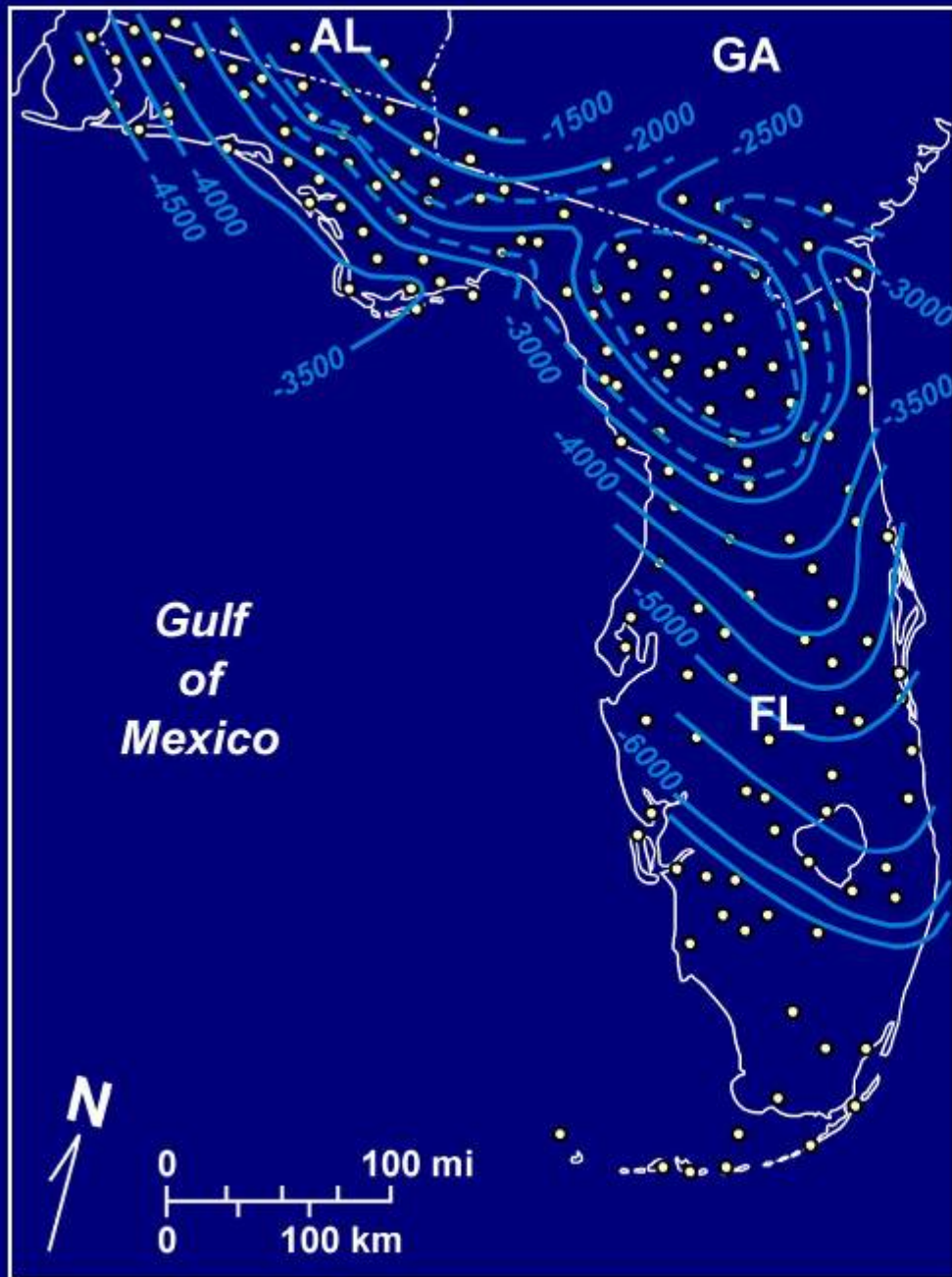
• Saline



# TOP "TAYLOR KICK" U. CRETACEOUS

Thin, low-resistivity shale

Possible regional seal on  
Cretaceous carbonates and  
evaporites

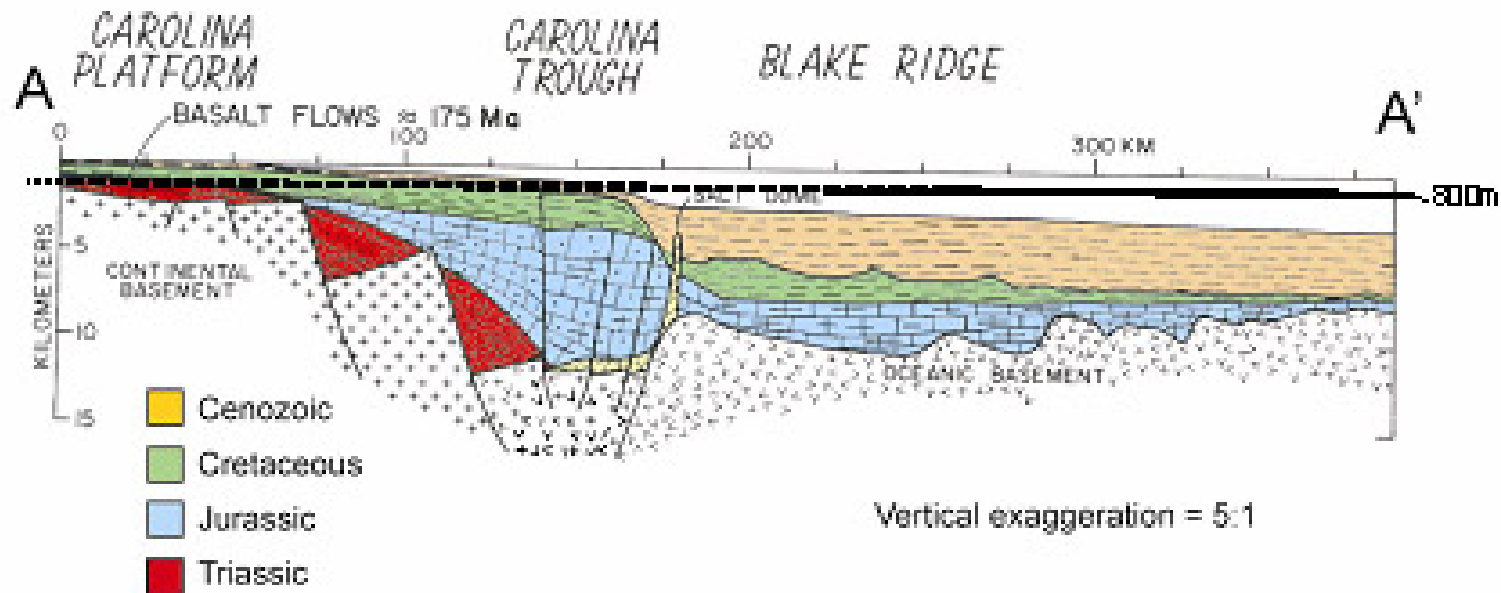


— Elevation contour (ft)

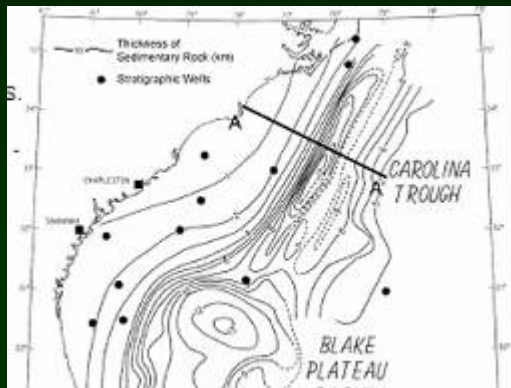
• Well

adapted from Chen (1965)

# Significant Capacity Offshore Atlantic Wedge



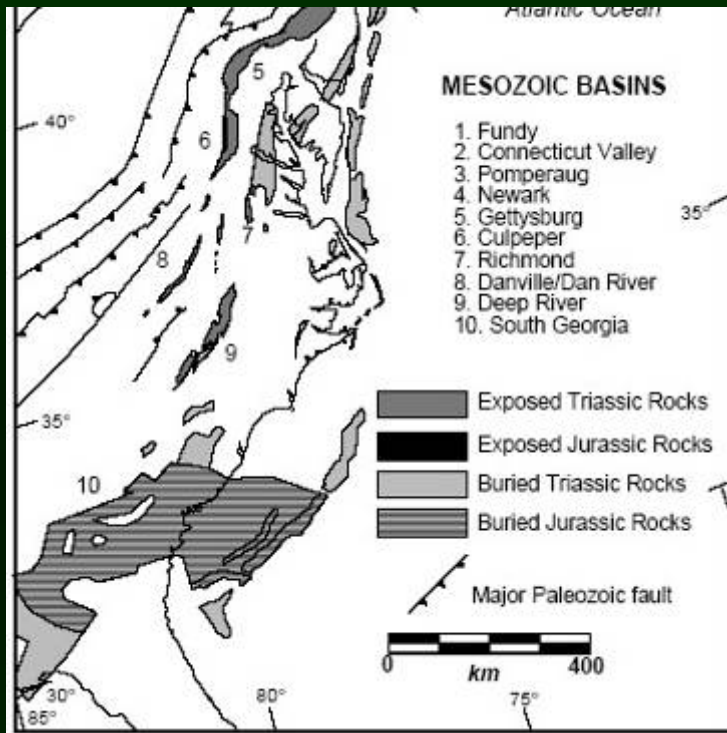
Modified from Dillon and Popenoe, 1988



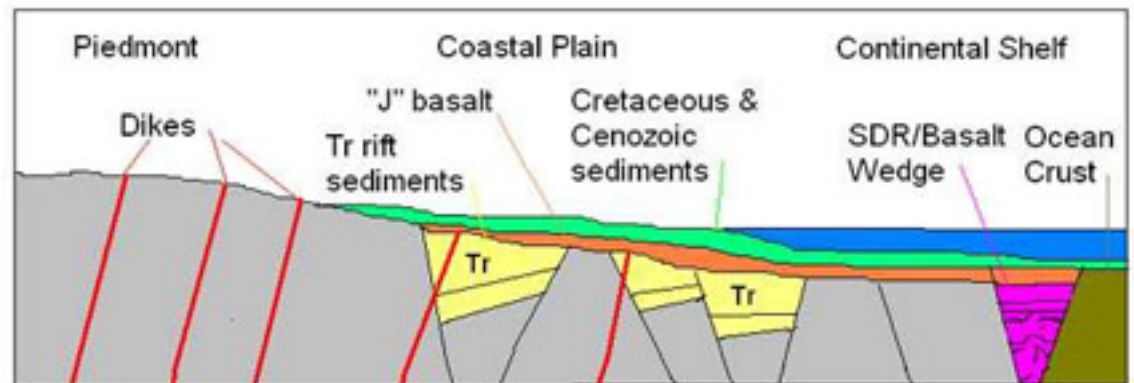
Subsea geologic storage in thick sediments  
[n.b. not “ocean storage”= in ocean water]  
Large volumes known from sparse core and seismic surveys  
Feasibility, cost, and legal/treaty issues to be surveyed

# Mesozoic Rift Basins

- Dan River, Deep River, and South Georgia Rift are mostly buried, complex blocks of heterogeneous sediment and basalts, depths in the range of 2 km, with variable permeability and porosity

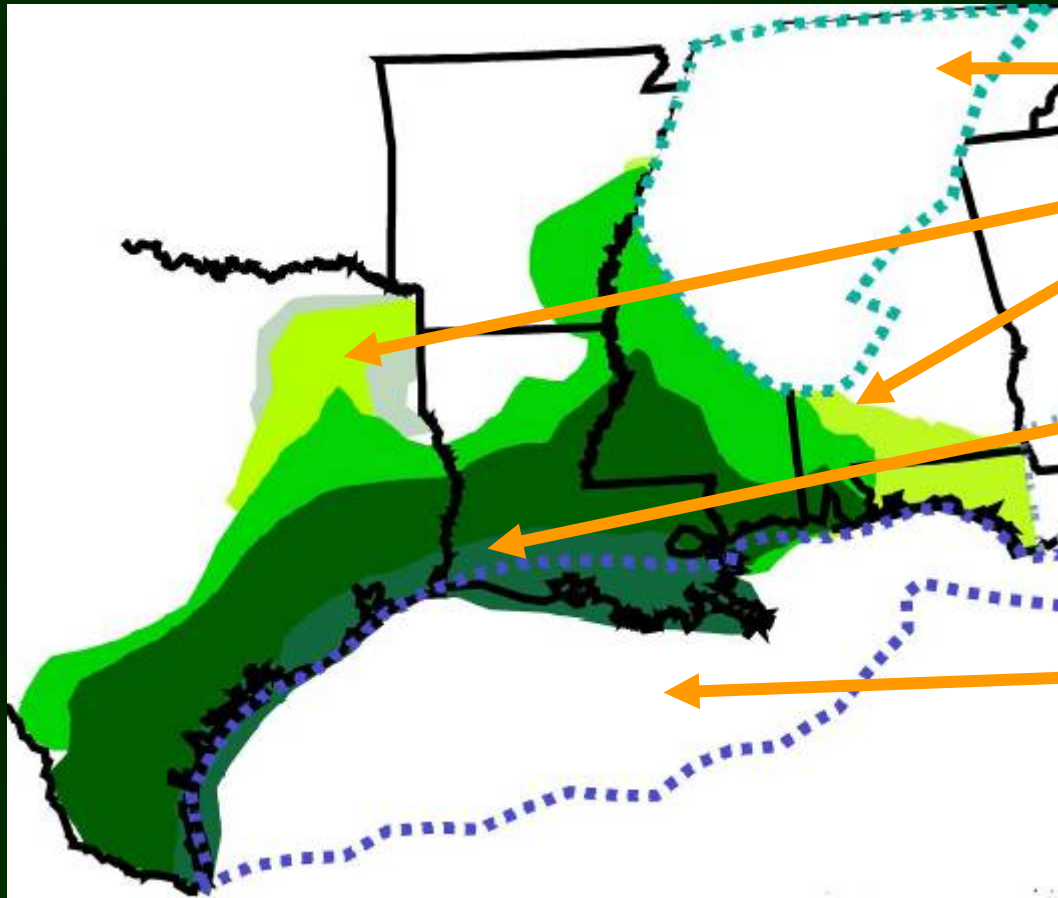


From Schlische, 1995  
and McHone 2006



Cross section of the southeastern USA rift zone (South Georgia rift)

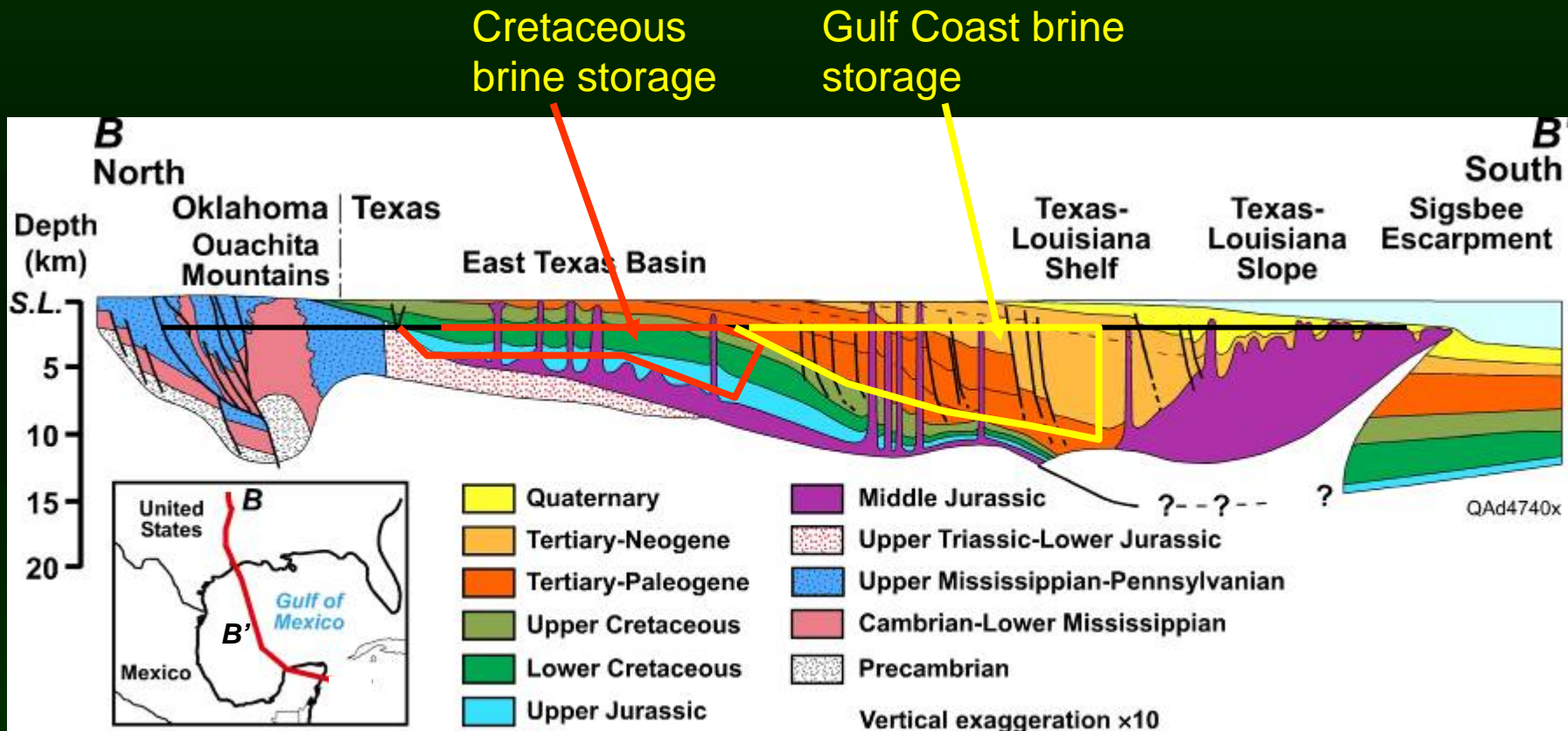
# Brine Storage Capacity for Western SE US



- Mid South interior
- Cretaceous wedge
- Tertiary Gulf Coast Wedge
- Gulf Coast offshore



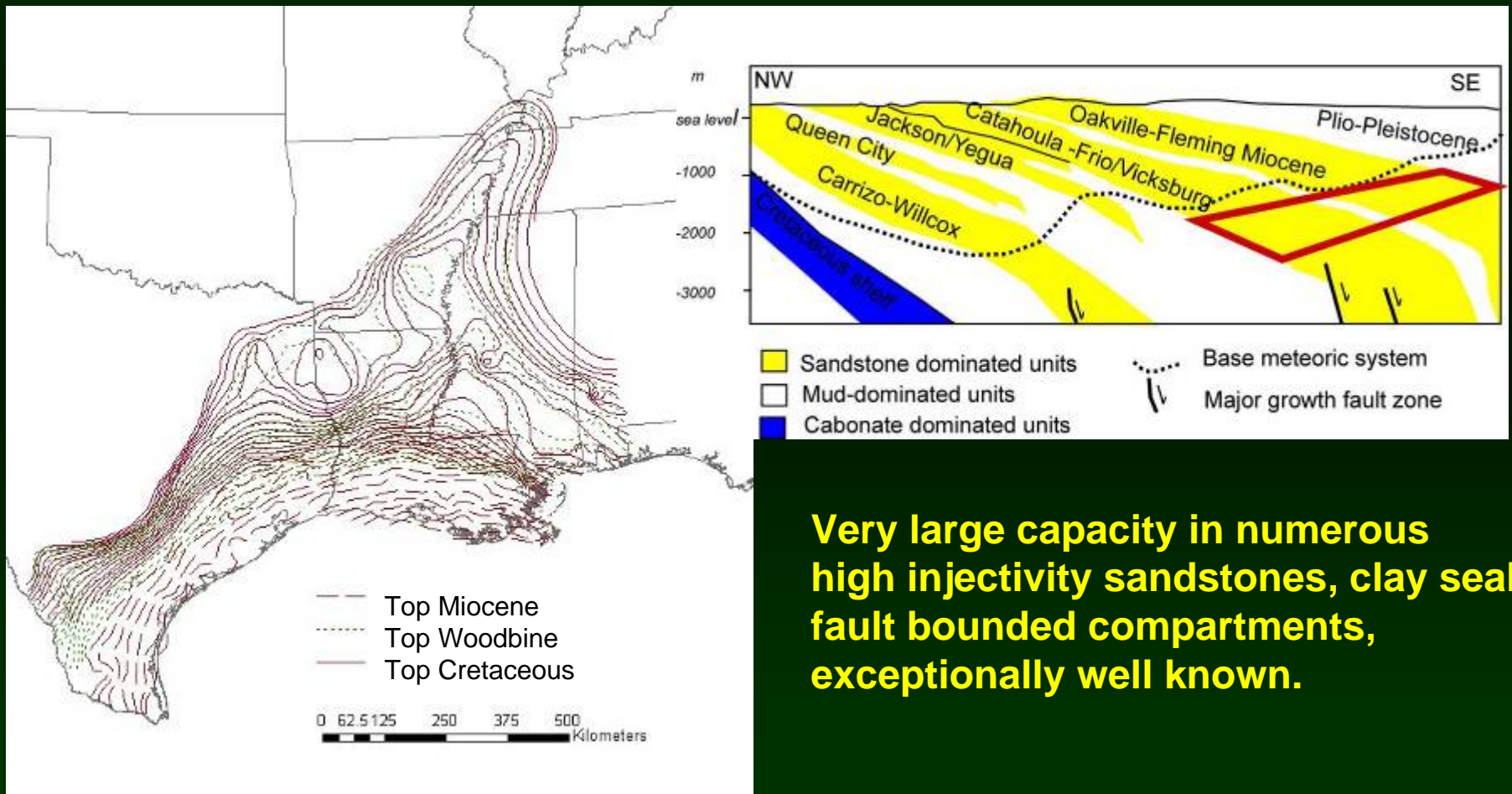
# Gulf Coast Storage



Modified from: (1) Arbenz, 1988, Plate 11, cross section D-D' and  
(2) Salvador, 1991, Plate 6, cross section B-B'



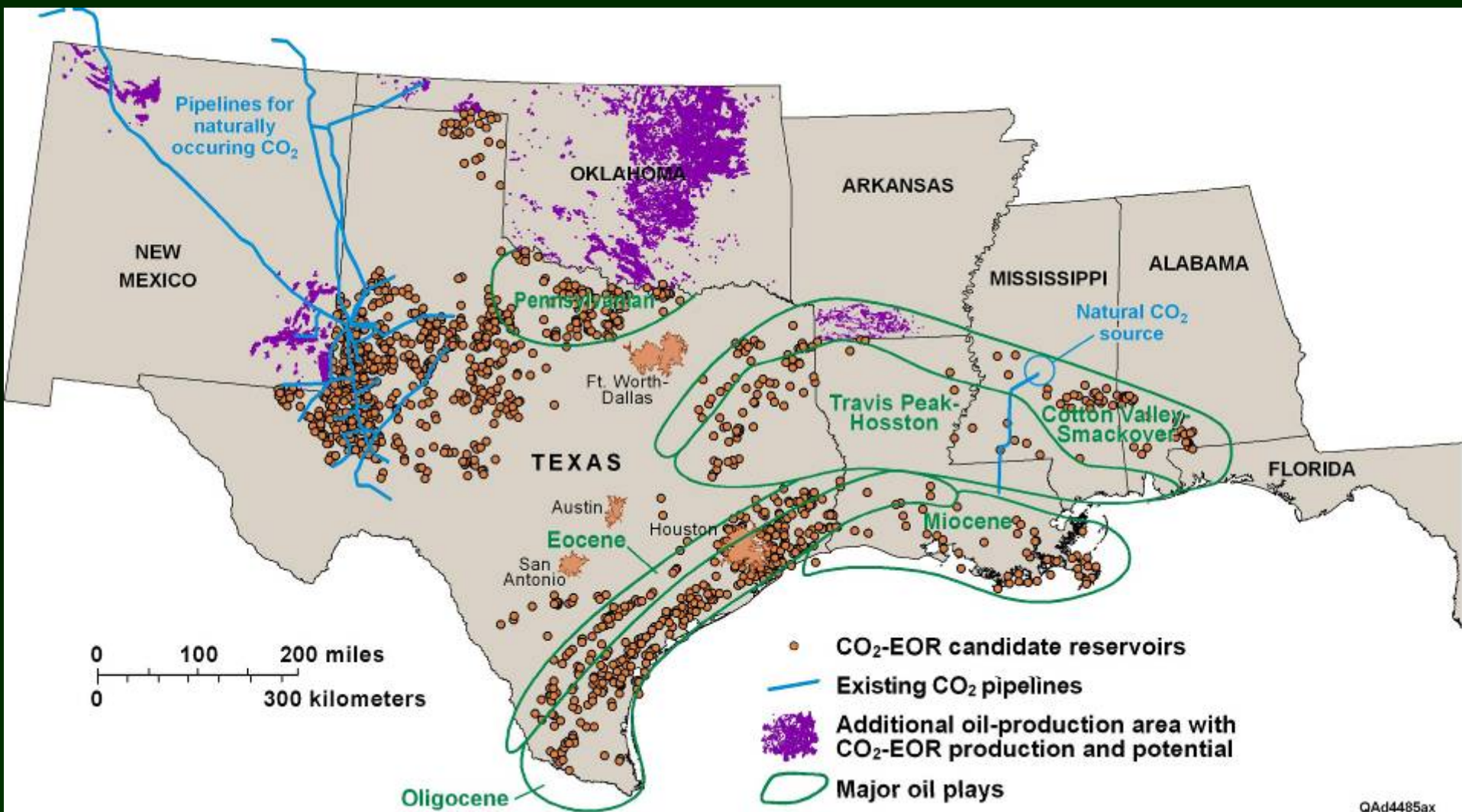
# Gulf Coast Wedge



**Very large capacity in numerous high injectivity sandstones, clay seals, fault bounded compartments, exceptionally well known.**

One of many detailed regional data sets

# CO<sub>2</sub>-EOR Candidate Reservoirs – Key Element in the Gulf Coast



# Gulf Coast Carbon Center (GCCC)



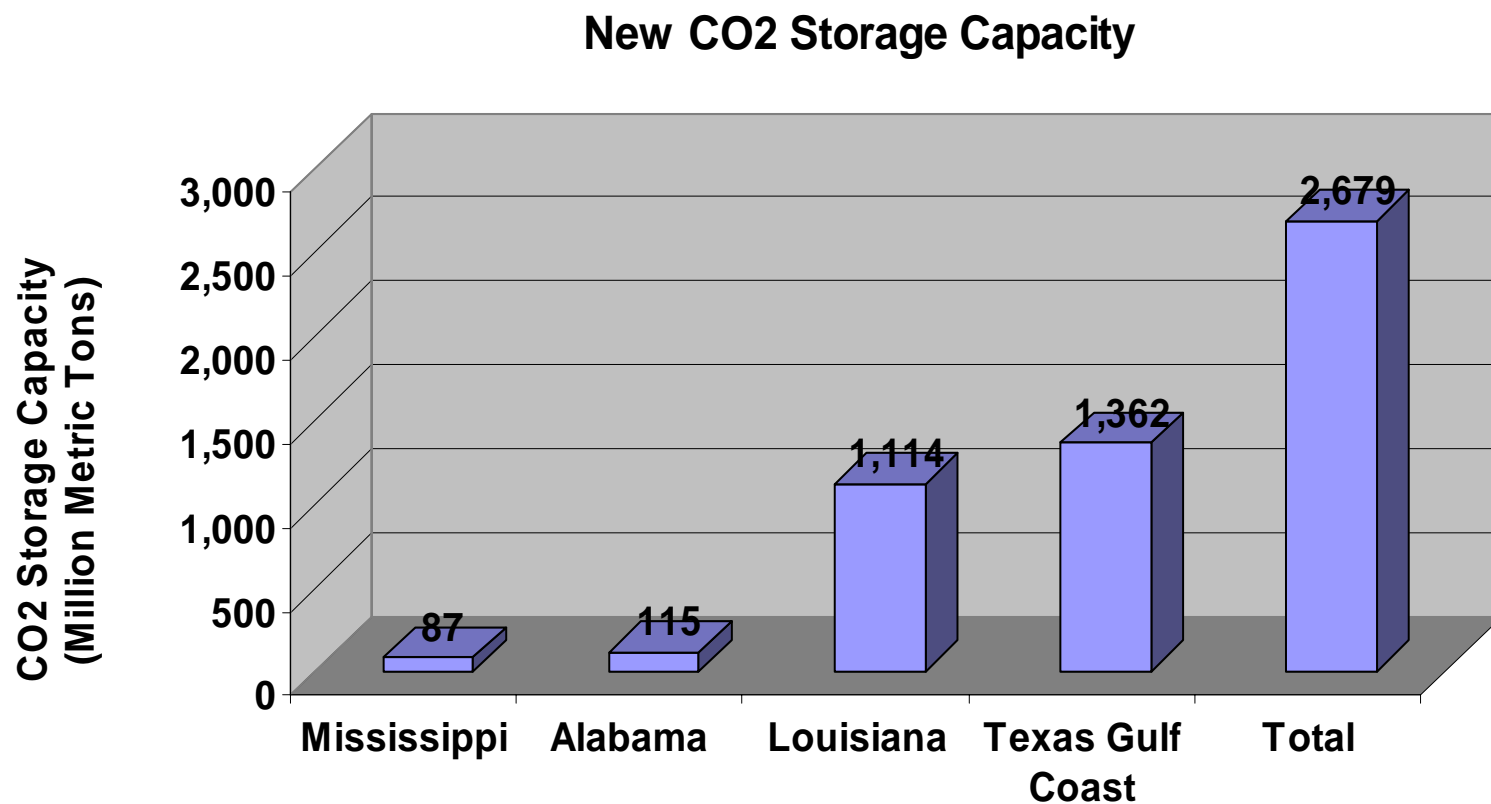
**Mission: *A global leadership position in **economic** implementation of large scale greenhouse gas sequestration.***



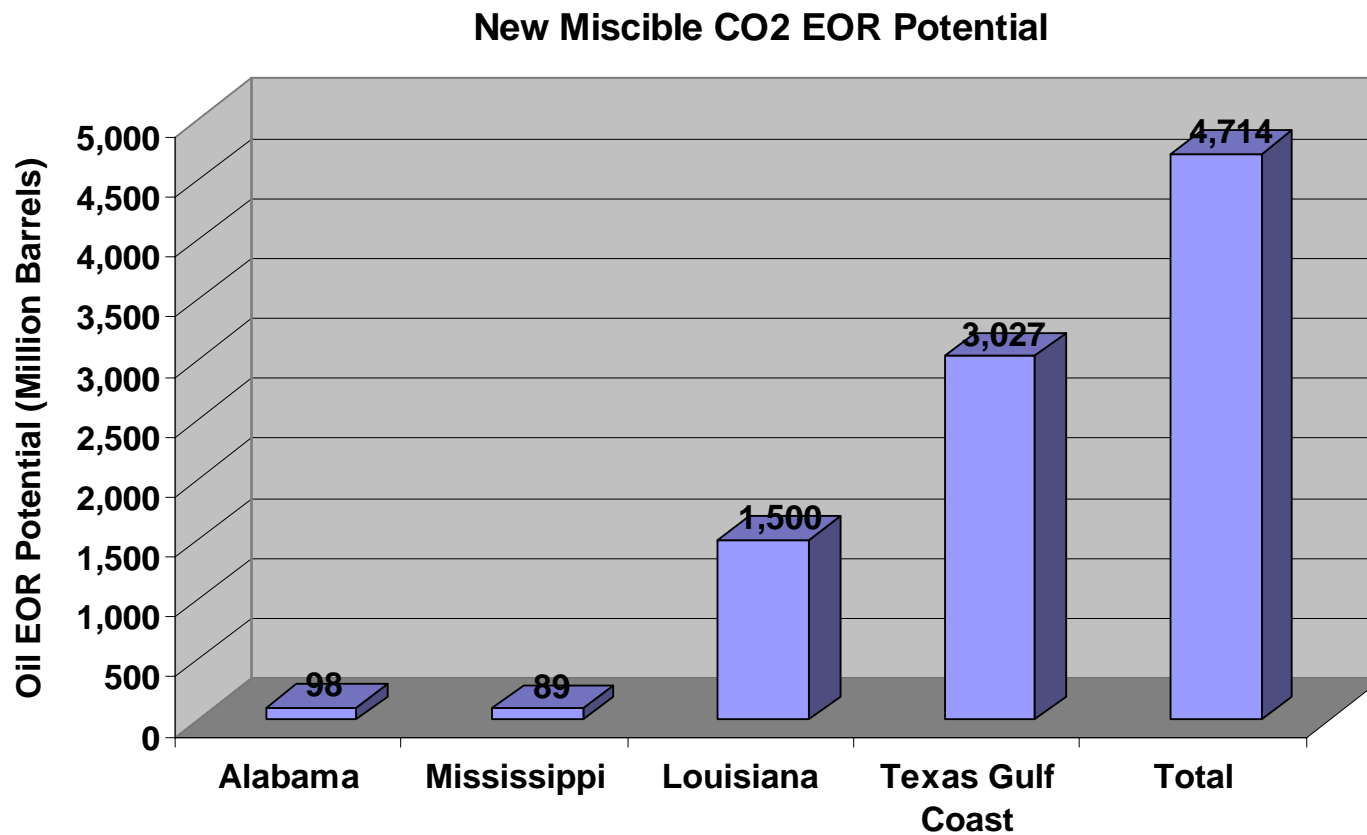
## **Sponsors**



# Storage Capacity associated with CO<sub>2</sub> EOR



# Looking at Miscible EOR from a Production Standpoint





# CO<sub>2</sub> EOR Is not “The Answer” ...

- Volume of CO<sub>2</sub> that could be sold for EOR is large but inadequate to solve the GHG issue
- CO<sub>2</sub> EOR is useful only in areas oil production, and is most useful only in certain reservoirs with lighter oil, moderate depth, unitized, with reasonable sweep efficiency.

## ...but CO<sub>2</sub> EOR is a great beginning

- Economic or near economic in current market, depending on cost of CO<sub>2</sub>
- Acceptable to public
- Other major benefits (domestic energy production, taxes, employment)
- Build infrastructure that can be used long term for large volume CO<sub>2</sub> disposal = stacked storage

# Model for Stacked Storage in the Gulf Coast

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