

# Gulf of México Mapping NATCARB Atlas

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University of Texas at Austin,  
Bureau of Economic Geology

NACAP

Cuernavaca, Morelos, México  
March 9, 2010



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# Acknowledgements

- Gulf Coast Carbon Center researchers: Susan Hovorka, Tip Meckel, Jiemin Lu, JP Nicot, Katherine Romanak, Changbing Yang, David Carr, Becky Smyth, Jong-Won Choi
- BEG Associate Director: Ian Duncan
- BEG Director: Scott Tinker
- Funding organizations: The Department of Energy National Energy Technology Laboratory, Southeast Regional Carbon Sequestration

## GCCC sponsors





# OVERVIEW

## I. Previous Work (GCCC)

## II. Current Studies

### A. SECARB III – Task 15

### B. Texas Offshore Miocene

1. Department of Energy

2. Texas General Land Office





# PREVIOUS GCCC EFFORTS

## Brine Formations Atlas

- Approach – Critical Constraints
  - Static Parameters
    - Reservoir Depth, Thickness, Mineralogy,  $\Phi$
    - Net Sand, Heterogeneity, % Shale
    - Seal Thickness & Discontinuities
  - Dynamic Parameters
    - Formation Pressure, Temperature, Salinity,  $k$
    - Brine Age & Chemistry, CO<sub>2</sub> Reactions
    - Hydrologic regime, Dissolution, etc.



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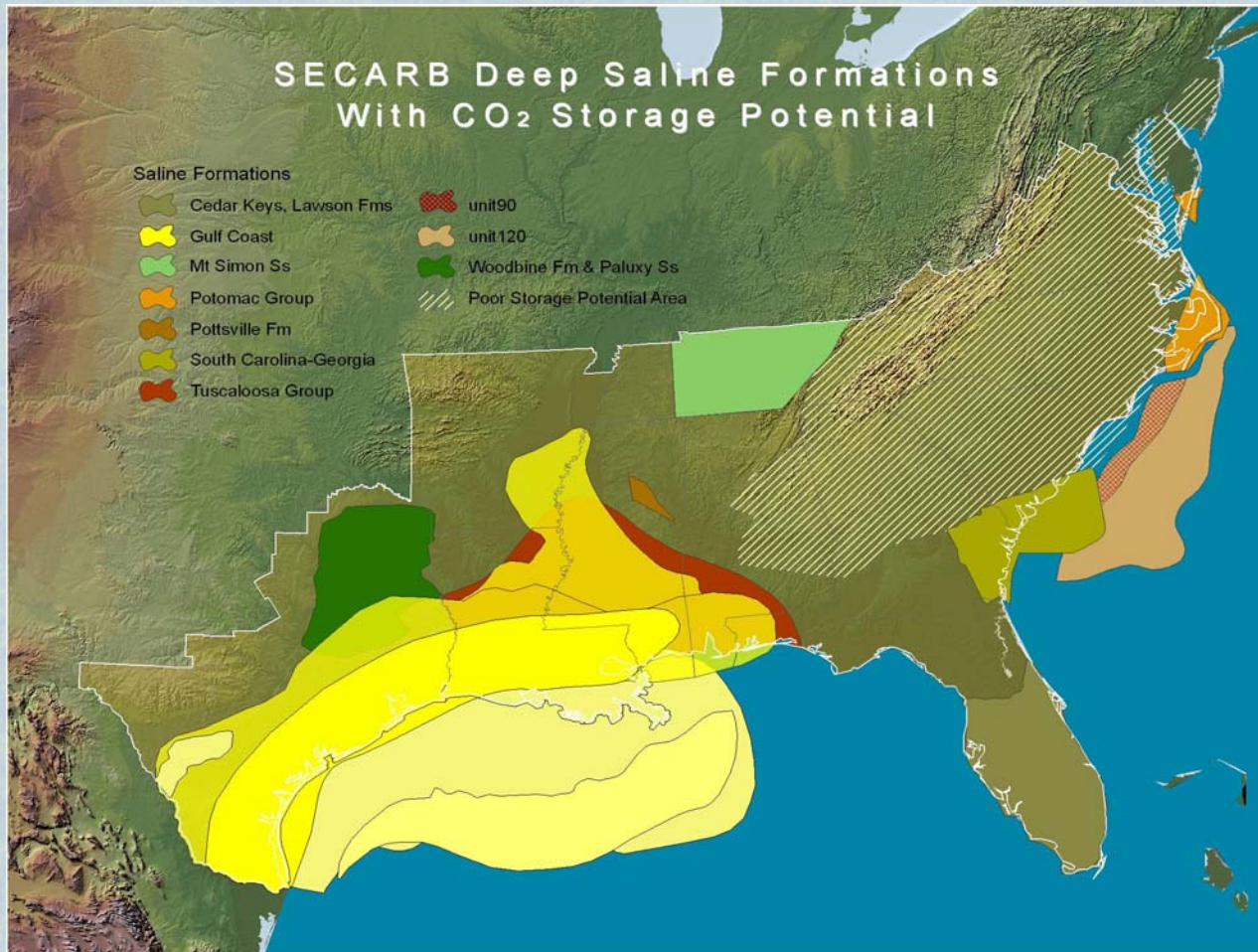
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# PREVIOUS GCCC / SECARB EFFORTS

## Atlas II



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# Special Acknowledgement

- SECARB's NatCarb Atlas II Contribution
- Data & Interpretive Contributions From:
- *Gulf Basin Depositional Synthesis*  
Consortium
  - Dr. Bill Galloway, et al.Institute for Geophysics  
Jackson School of Geosciences  
University of Texas at Austin



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# Joint Bureau of Economic Geology / PEMEX Studies of Mexican Basins

- Regional basin studies
  - Burgos Basin Miocene
  - Laguna Madre Tuxpan shelf
  - Veracruz Basin
  - Salina Basin
  - Macuspana Basin
- Reservoir Characterization study
  - Poza Rica – giant carbonate field, well into secondary recovery phase



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# Joint BEG / PEMEX Studies



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# OVERVIEW

## I. Previous Work (GCCC)

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### A. SECARB III – Task 15

1. U.S. Dept. of Energy (DOE)

### B. Texas Offshore Miocene

1. U.S. Dept. of Energy (DOE)
2. Texas General Land Office (GLO)



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# Geologic Database – Petra (IHS)

**PETRA Main [v3.2.6.0] - MIOCENE\_OFFSHORE\_CO2 - Offshore GOM Miocene Regional Assessment, CO2 Sequestration Potential**

Project Wells Zones Logs Compute Tools Units View Help Last

Wsn:29927 WELL: 17-711-00505-00 (OCS 00346 #028S0B0)

Well

WSN	Unique Well ID	Well Label
30738	177110049001	OCS 00067 #019S1B0
30737	177110049070	OCS 00067 #019S0B1
32276	177110049100	OCS G01230 #001S0B0
31776	177110049200	OCS G12355 #F006S0B0
30399	177110049300	OCS 00814 #035S0B0
46773	177110049400	OCS G01010 #004S0B0
31773	177110049500	OCS G12355 #F003S0B0
31774	177110049600	OCS G12355 #F004S0B0
31775	177110049700	OCS G12355 #F005S0B0
30051	177110049800	OCS G01000 #001S0B0
31141	177110049900	OCS 00420 #008S0B1
31140	177110049970	OCS 00420 #008S0B0
31134	177110050000	OCS 00420 #0003S0B0
30049	177110050100	OCS G00999 #001S0B0
31508	177110050200	OCS G01017 #001S0B0
1523	177110050300	OCS G03347 SL 04525 #00
57463	17711005040000	SL 04523 #2
29927	177110050500	OCS 00346 #028S0B0
29895	177110050600	OCS 00345 #008S0B0
30015	177110050700	OCS 00336 #002S0B0
32353	177110050800	OCS G01023 #001S0B0
31139	177110050900	OCS 00420 #007S0B0
32696	177110051000	OCS G01021 #001S0B0
32041	177110051100	OCS 00827 #005S0B0
29896	177110051200	OCS 00345 #009S0B0
57464	17711005130000	SL 03590 #1
57465	17711005140000	SL 04469 #1
32139	177110051500	OCS 00828 #C001S0B1
32138	177110051570	OCS 00828 #C001S0B0
31509	177110051600	OCS G01017 #002S0B0
57466	17711005170000	SL 04470 #2
29988	177110051800	OCS 00335 #005S0B0
30055	177110051900	OCS G01001 #001S0B0
30059	177110052000	OCS G01002 #003S0B0
30235	177110052100	OCS G01003 #001S0B0
30853	177110052200	OCS G01014 #003S0B0

Project Well Location FmTops Zones Logs IP Tests Fm Tests Cores Perfs/Shows Production Prod Cums Rasters

UWI 177110050500 Label OCS 00346 #028S0B0 Sort Key 177110050500

Well No 028S0B0 Well Symbol and Desc [GAS] - Gas Well

Name 28

Operator KERR-MCGEE CORP

Hist Oper

Lease OCS 00346

LeaseNo 346 TD 16,250

Field SHIP SHOAL BK 28

Fm at TD 654MOCNM

Prod. Fm 654MOCNM

Remark Added 10/01/2009 Chgd 03/03/2010

Active Datum ELEV\_KB 68

County SHIP SHOAL State LA

Zone Favorites...  Show  SSTVD

Name	Value	Quality	Zone
COMP_DA...	03/19/1966		WELL
TD	16,250		WELL
TVD(IHS)	16,250		WELL
DIR_IND(I...	V		WELL
ELEV_KB	68		WELL
ELEV_DF			WELL
ELEV_GR			WELL
ELEV_SEIS			WELL
INITCLAS...	MULTIPLE CO...	6	WELL

Well Status: GAS  
 Projected Formation: 000UNKWN (UNKNOWN)  
 Activity Code: D  
 IC Number: D  
 Product Objective: UNRPTD  
 Initial Lahee Class: D  
 Final Lahee Class: DG  
 Drig: 2005-12-03 : STATE PAPERWORKSFC LOCATION CHGD FROM 9455 FNL 3689 FWLJ

View As  Imperial  Metric  Raw System Units=Imperial

Datum=NAD27 Version 3.2.6.0



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# SECARB III – TASK 15

- Preliminary Wells & Infrastructure Assessment
- Mapping & Preliminary Capacity Assessment
- Integration / NatCarb ATLAS III Update

*David Carr, Becky Smyth*



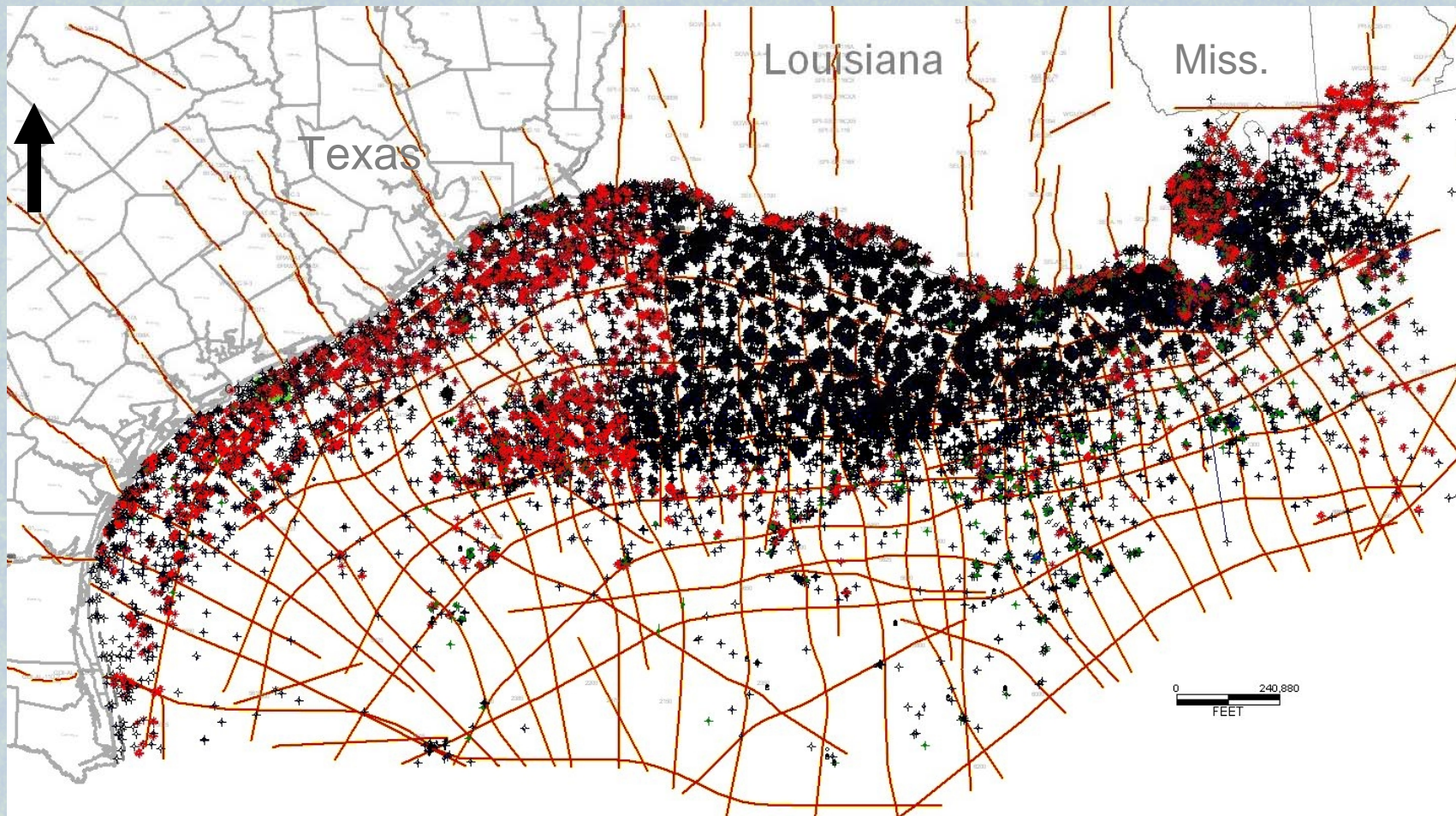
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# Current Dataset



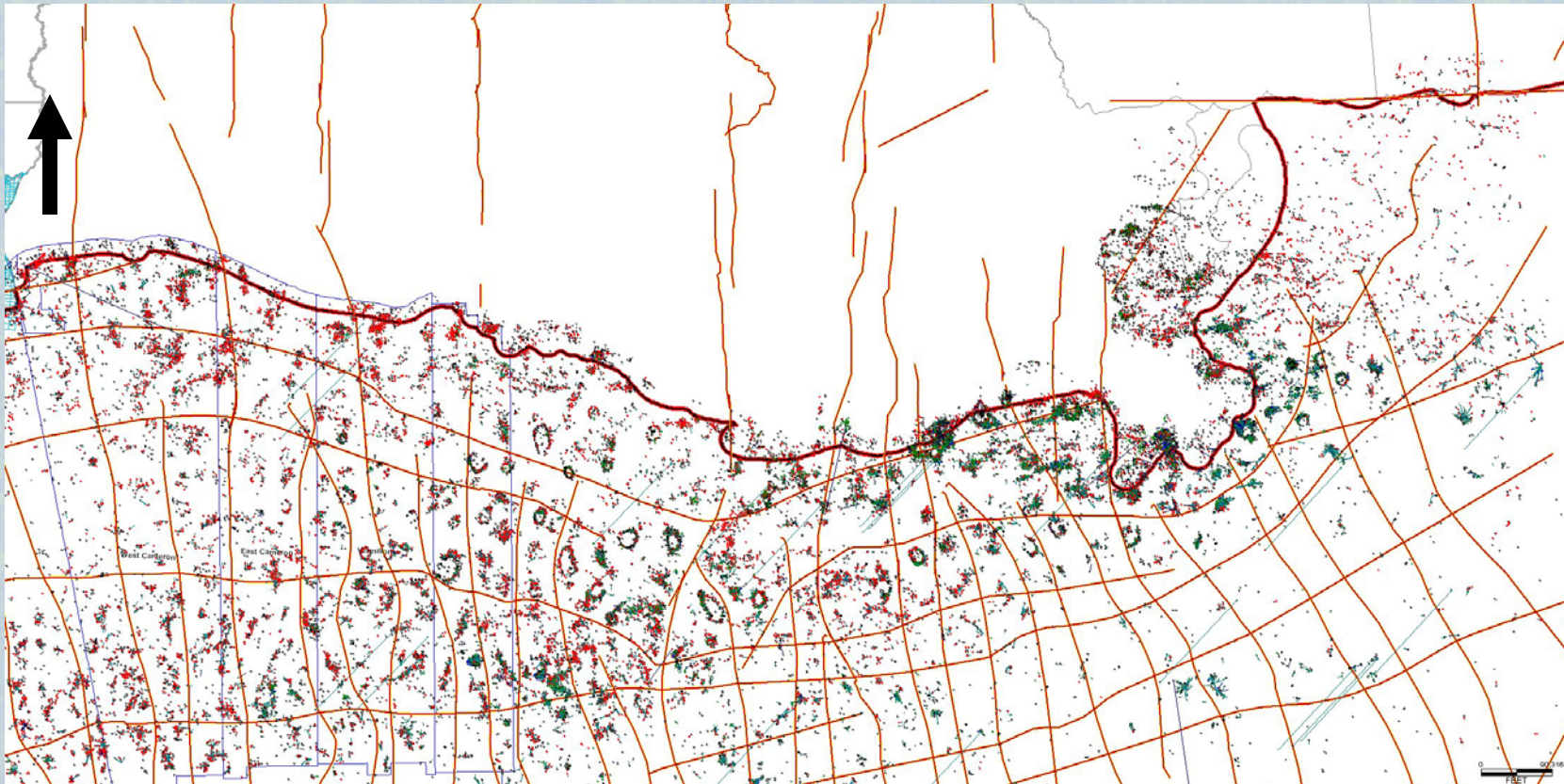
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# OCS / State Waters (LA & MS)



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# TEXAS OFFSHORE MIOCENE

- **DOE FOA-33: Site Characterization**
- **TX General Land Office**
  - (DOE Award Cost Match)
- **Task 3 – Capacity Estimates**
  - Subtask 3.1: Coordination with NATCARB



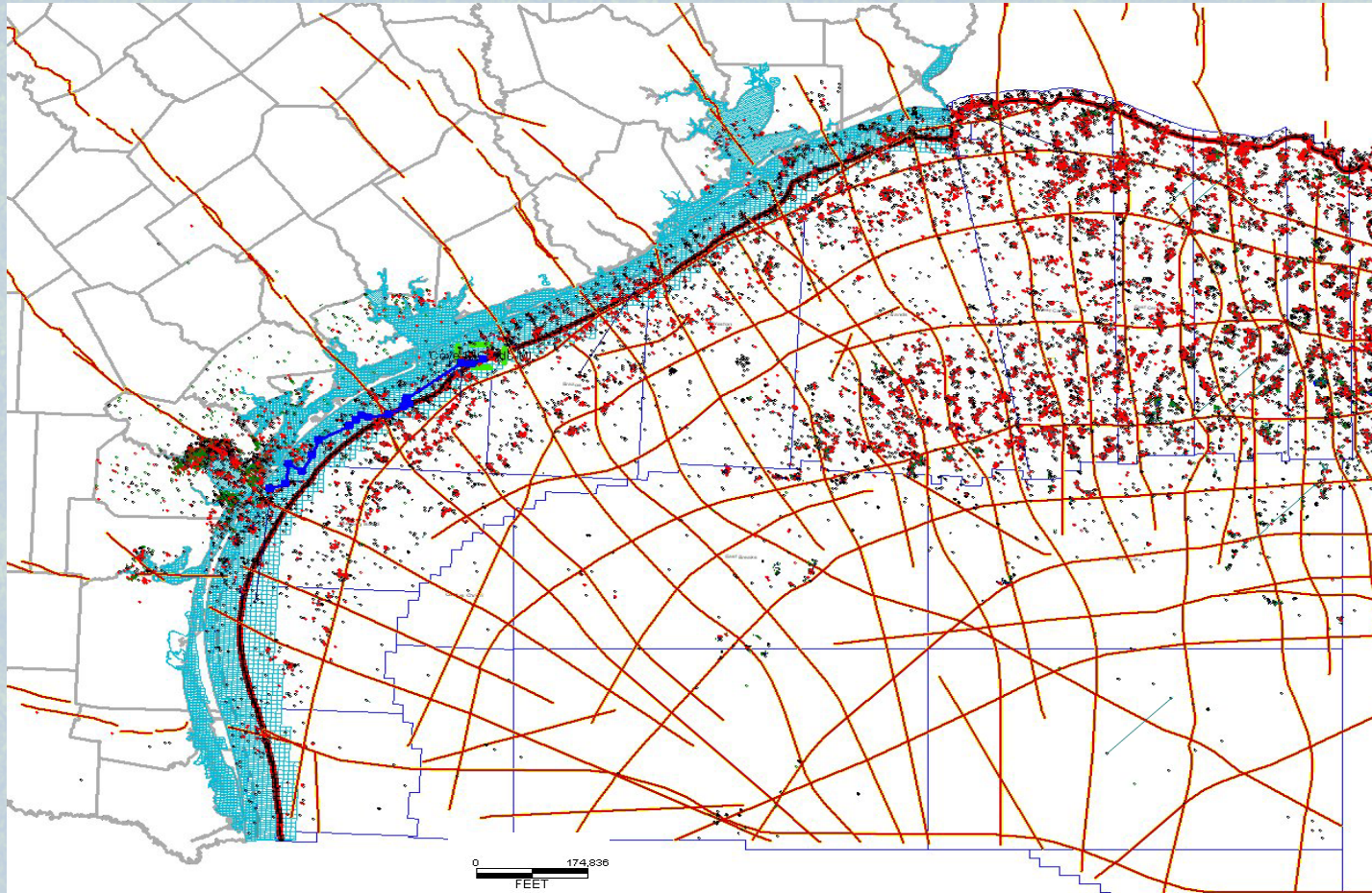
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# Texas Submerged Lands & Adjacent Federal Submerged Lands



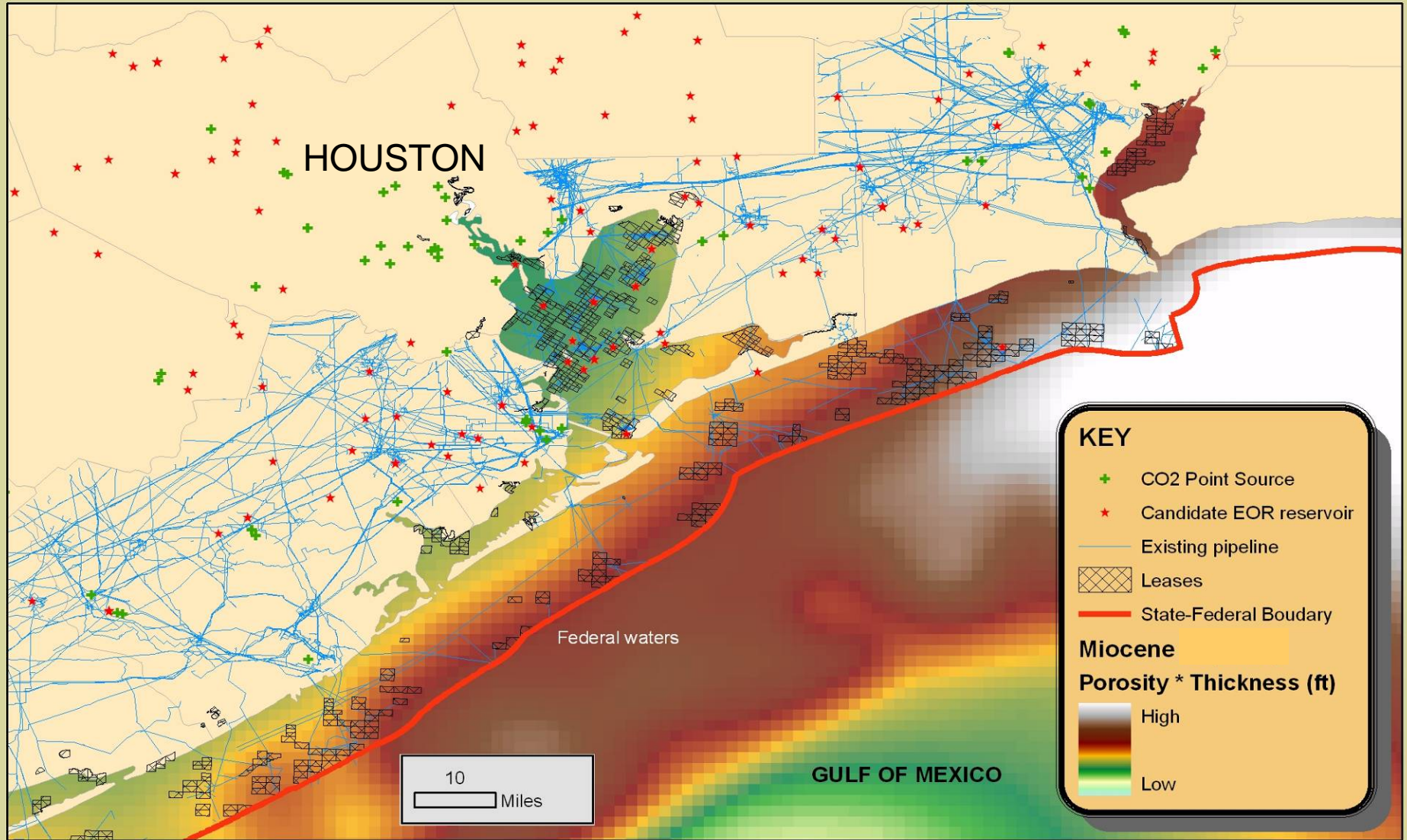
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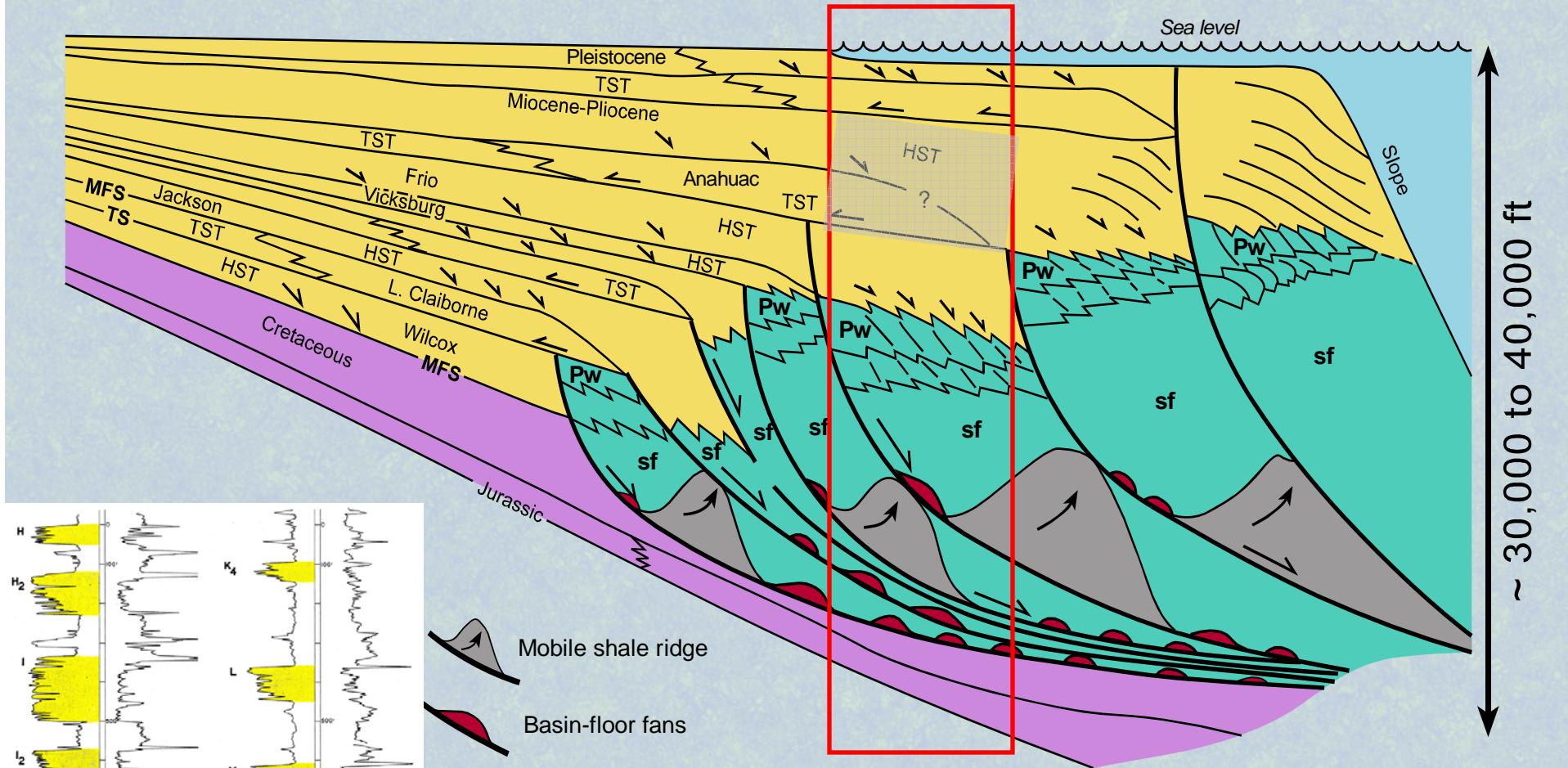
# CO<sub>2</sub> Brine Storage Capacity



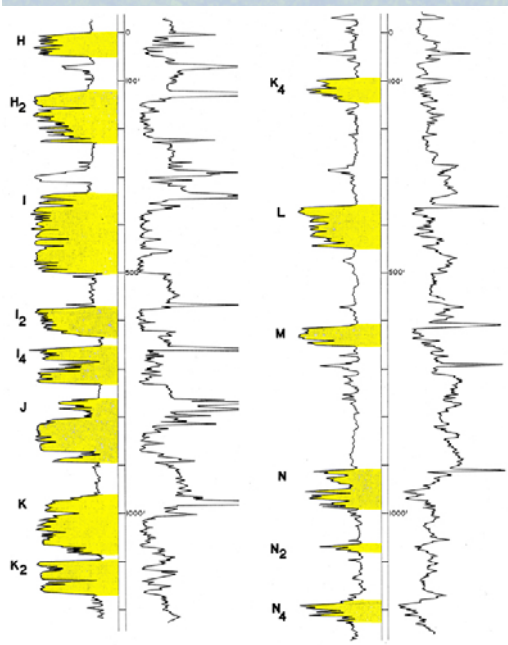


# Tremendous Capacity in Offshore Wedge

Prograding wedge of fluvio-deltaic sediments in upper Miocene stratigraphy

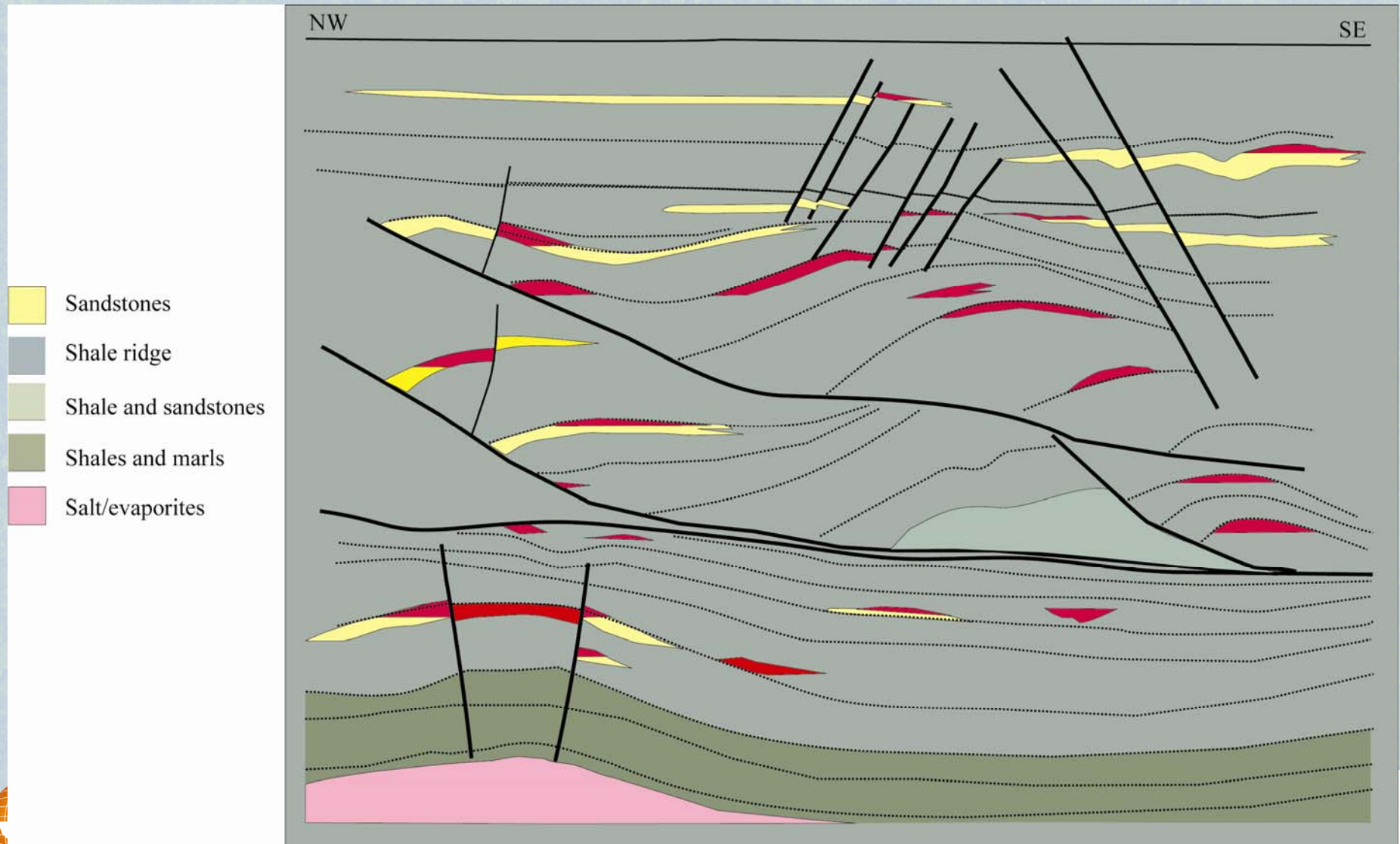


Brown, 2005, Modified from Bebout and Loucks (1981)



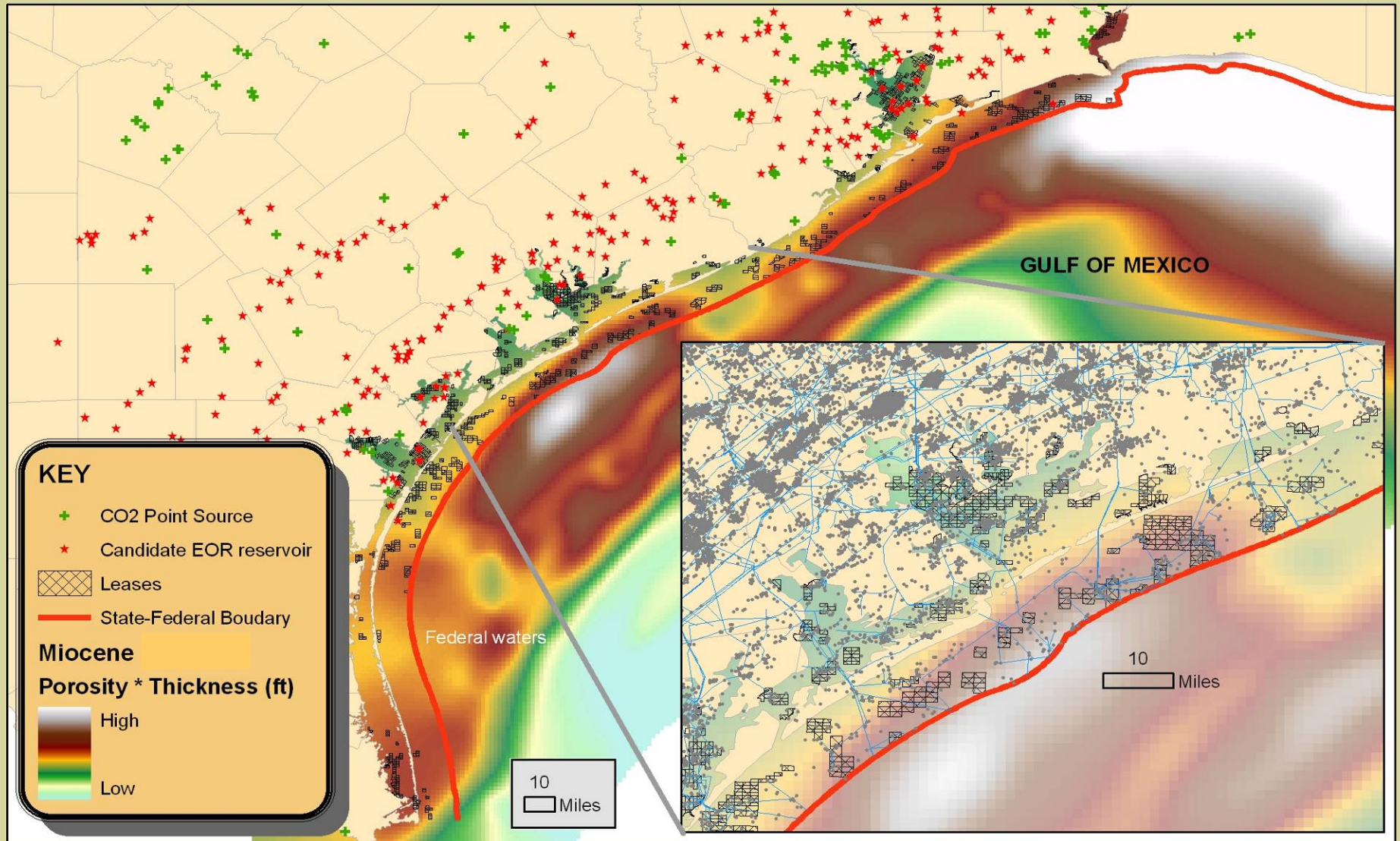


# Variety of Trap Types





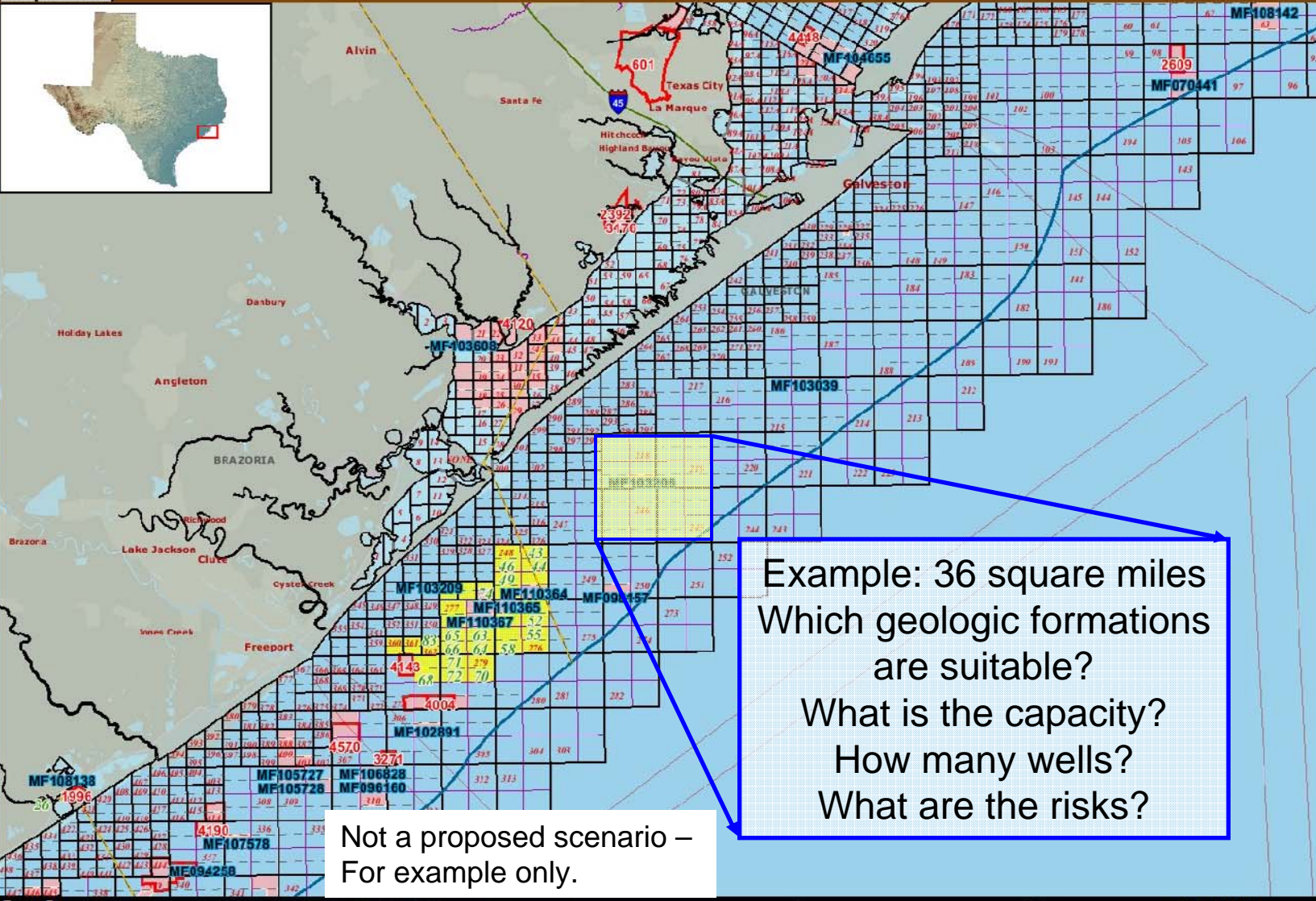
# Miococene Porosity x Thickness





# Energy Land Lease Information System

HIDE GET MAP URL



Survey Leases Oil & Gas Shipping

**MAP LAYERS**

Submerged OTLS

Bay Boundaries (Waterbodies)

If the box above is checked but you cannot see the selected item, continue to zoom in until it becomes visible.

Click on the layer name to make it active.

[Update Map](#) [Show Legend](#)

**ELLIS Search**

To map a Lease Parcel or State Tract select a search criteria, enter the name or number in the text box, and click **SEARCH**.

[Help](#) [Contact Us](#)

Search by...(select one):

Enter a name or number:

To zoom to a Coastal County, select from this list:

**Zoom to scale:**

Use the PAN tool to center the map on the desired area enter the desired map scale.

1:

**Search by Coordinates**

Choose the type of coordinate search you would like to use:

**Degrees, Minutes, Seconds (DD.MM.SS)**

Example: 26° 39' 57.42" N

**Decimal Degrees (DD.ddddd)**

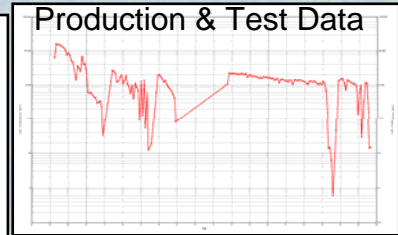
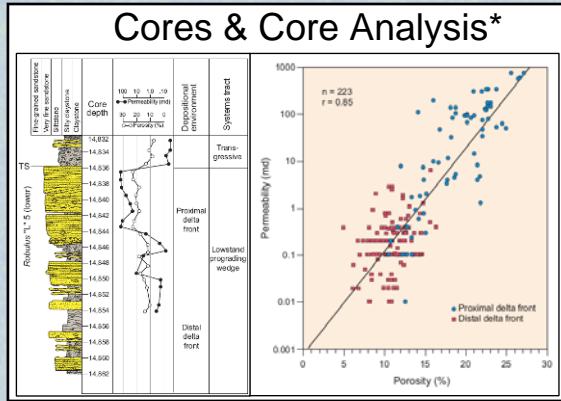
Example: 26.66594 N

Example: 36 square miles  
Which geologic formations are suitable?  
What is the capacity?  
How many wells?  
What are the risks?


Not a proposed scenario –  
For example only.

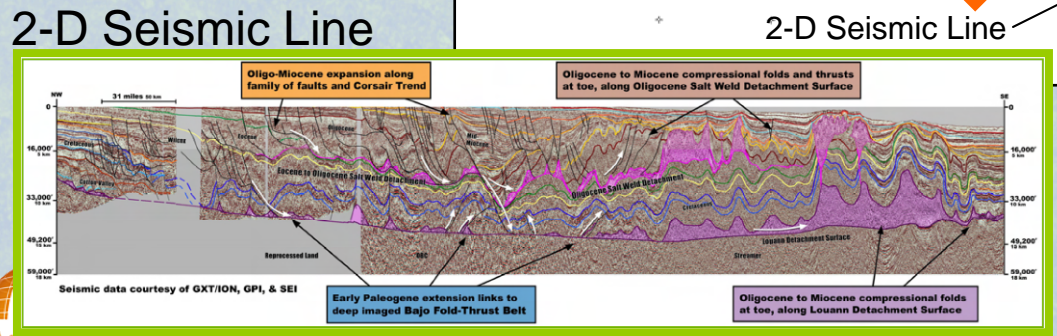
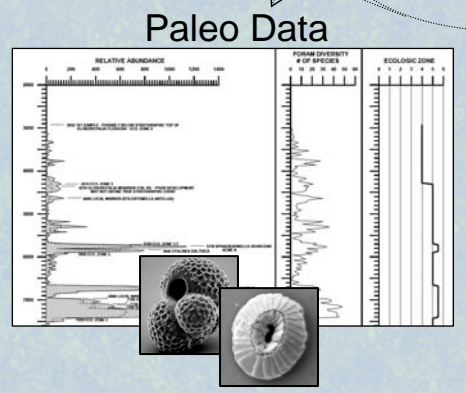
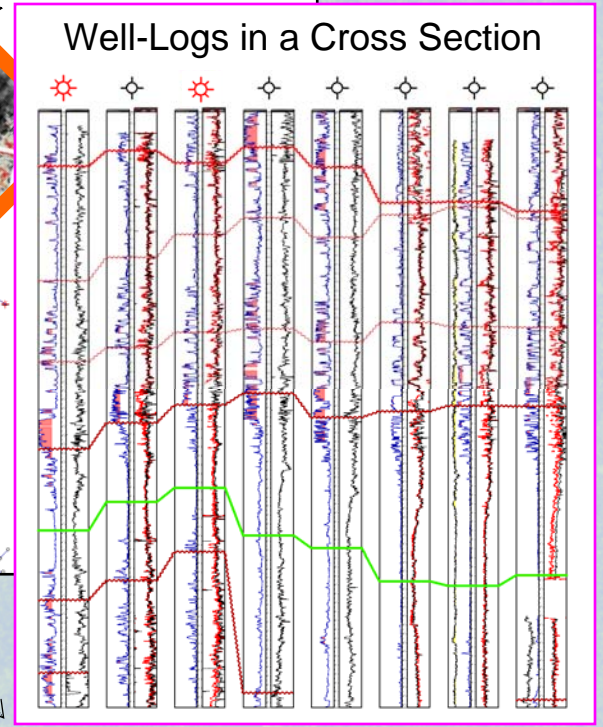
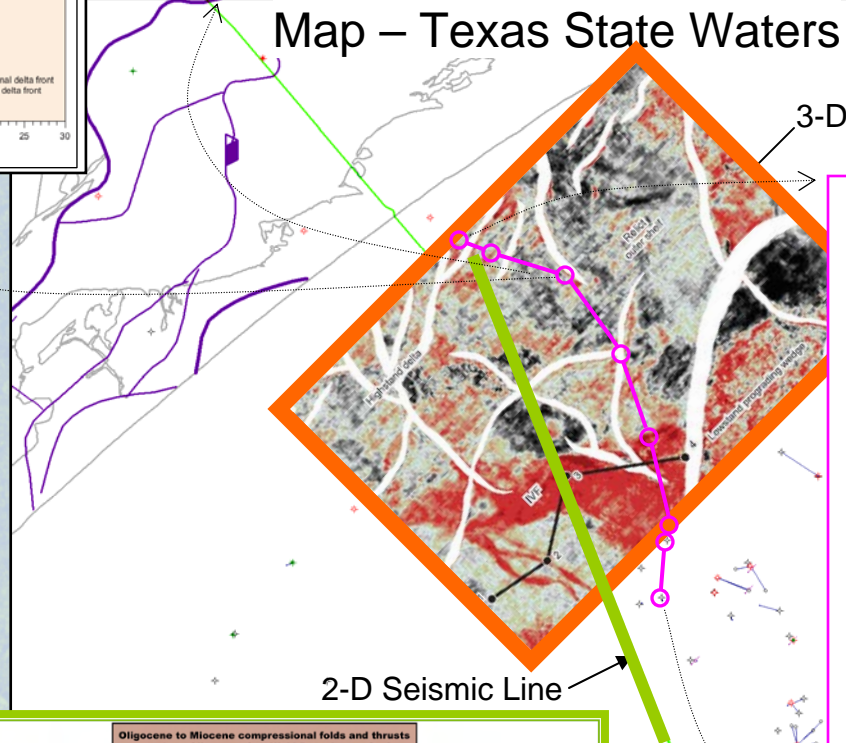


# Examples of Characterization Data

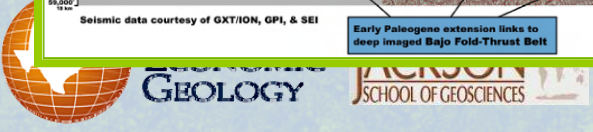


AMOCO PROD CO  
APACHE CORPORATION  
**ST TR 00487-L SW/4 #2**  
MATGORD IL B 519L  
42703303400000

  
**16,000**  
654MOCN  
654MOCN  
**68,373,087 MCF**  
**103,239 BBLs**  
**149,670 BBLs**



\* From Dutton and Hentz (2002)  
\*\* From Zeng and Hentz (2004)





# Research Development

## AIMS:

- Identify uncertainties
- Characterize and collect data
- Reduce uncertainties
- Facilitate near-term commercial utilization.

Years 1-2: Characterization effort  
& Site Identification

- Capacity
- Injectivity
- Stratigraphic containment
- Caprock seal capacity
- Brine containment
- Mineralization containment
- Leakage pathways

Year 3: Uncertainty reduction  
via additional data collection

- Test well, core measurements

- Equivalent surface monitoring  
design and demonstration +  
modeling & simulation

- Marine survey (shallow seismic /  
bathymetry / water column)



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# SUMMARY

- Building on Past Research / Results
- Current Gulf of Mexico Research Aims:
  - Better Quantify Static Capacity
    - Large Volume Brine Saturated Sandstones
  - Understand Limits
    - Leakage Risks
    - Compartmentalization & Pressure Build-up
  - Prepare “Storage Ready” Sites
    - Incentivize Use



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