

# Offshore CO<sub>2</sub> Storage Resource Assessment of the Northern Gulf of Mexico (Upper Texas-Western Louisiana Coastal Areas)

TX-LA  
DE-FE0026083

Tip Meckel & Ramon Treviño



**TEXAS** Geosciences

*Bureau of Economic Geology*

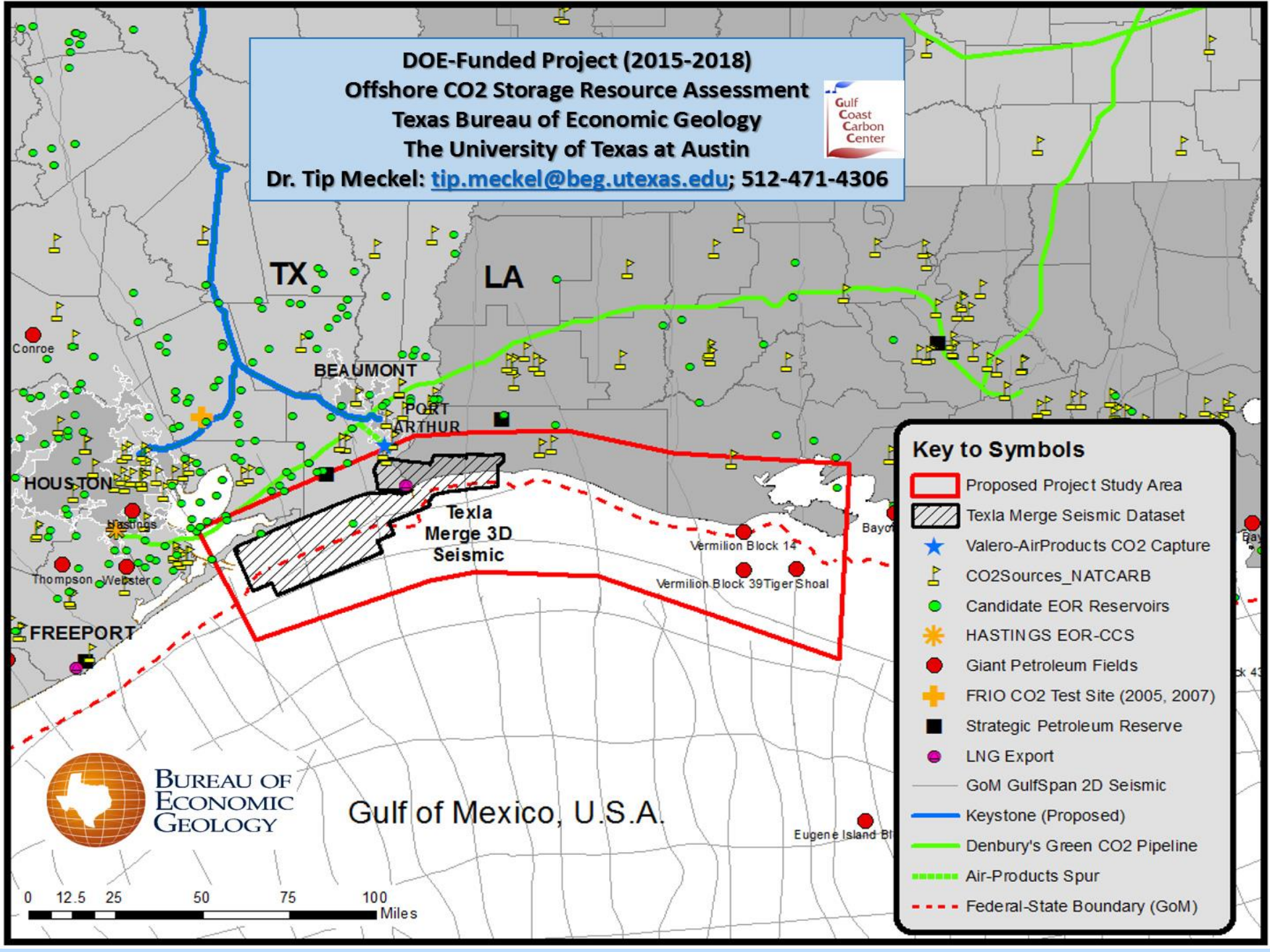
Jackson School of Geosciences

The University of Texas at Austin



U.S. Department of Energy  
National Energy Technology Laboratory  
Mastering the Subsurface Through Technology, Innovation and Collaboration:  
Carbon Storage and Oil and Natural Gas Technologies Review Meeting  
August 16-18, 2016

DOE-Funded Project (2015-2018)  
 Offshore CO2 Storage Resource Assessment  
 Texas Bureau of Economic Geology  
 The University of Texas at Austin  
 Dr. Tip Meckel: [tip.meckel@beg.utexas.edu](mailto:tip.meckel@beg.utexas.edu); 512-471-4306

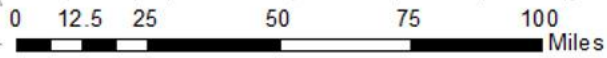


### Key to Symbols

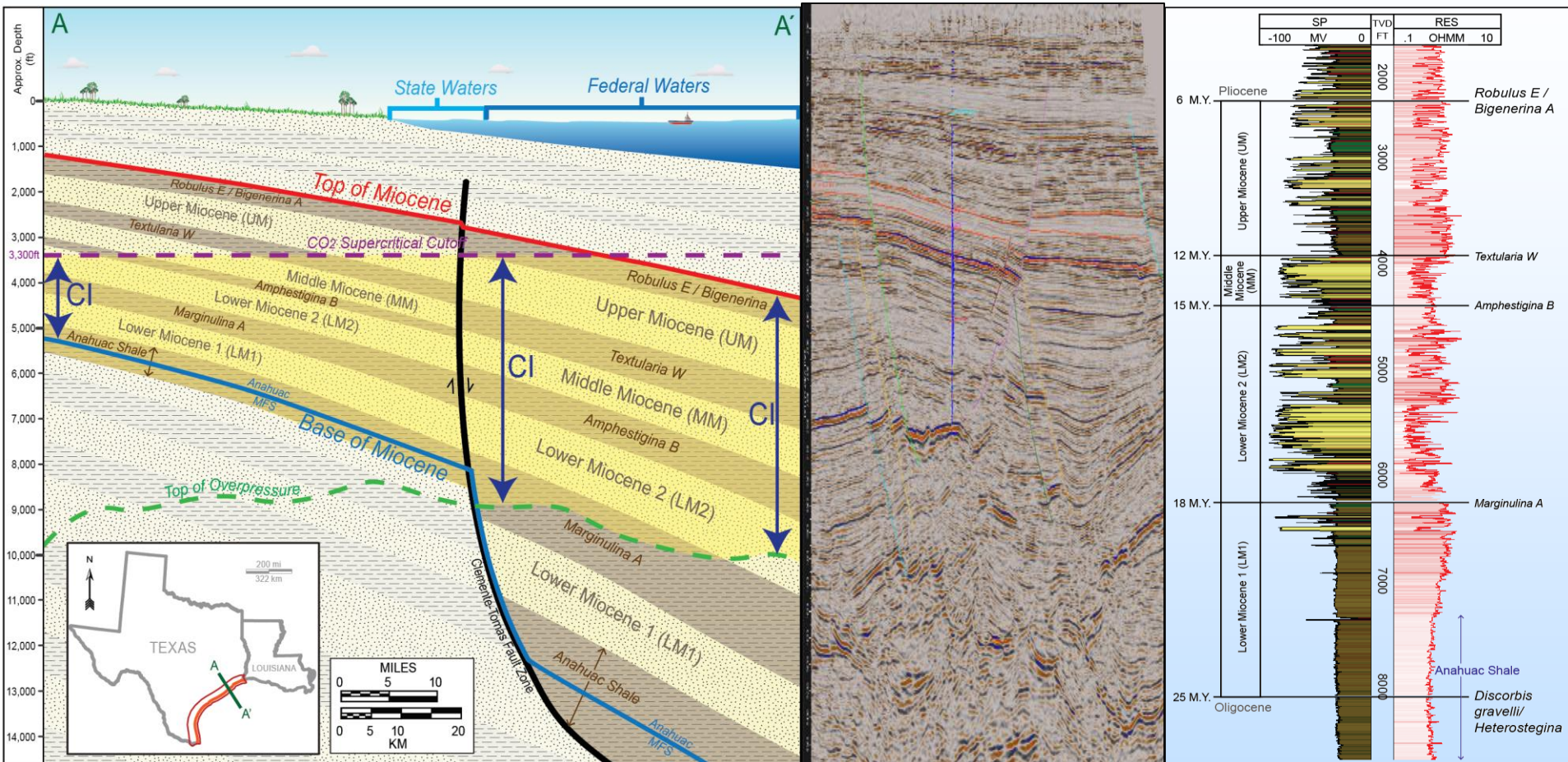
- Proposed Project Study Area
- Texla Merge Seismic Dataset
- ★ Valero-AirProducts CO2 Capture
- ⚡ CO2Sources\_NATCARB
- Candidate EOR Reservoirs
- ✳ HASTINGS EOR-CCS
- Giant Petroleum Fields
- + FRIO CO2 Test Site (2005, 2007)
- Strategic Petroleum Reserve
- LNG Export
- GoM GulfSpan 2D Seismic
- Keystone (Proposed)
- Denbury's Green CO2 Pipeline
- Air-Products Spur
- Federal-State Boundary (GoM)

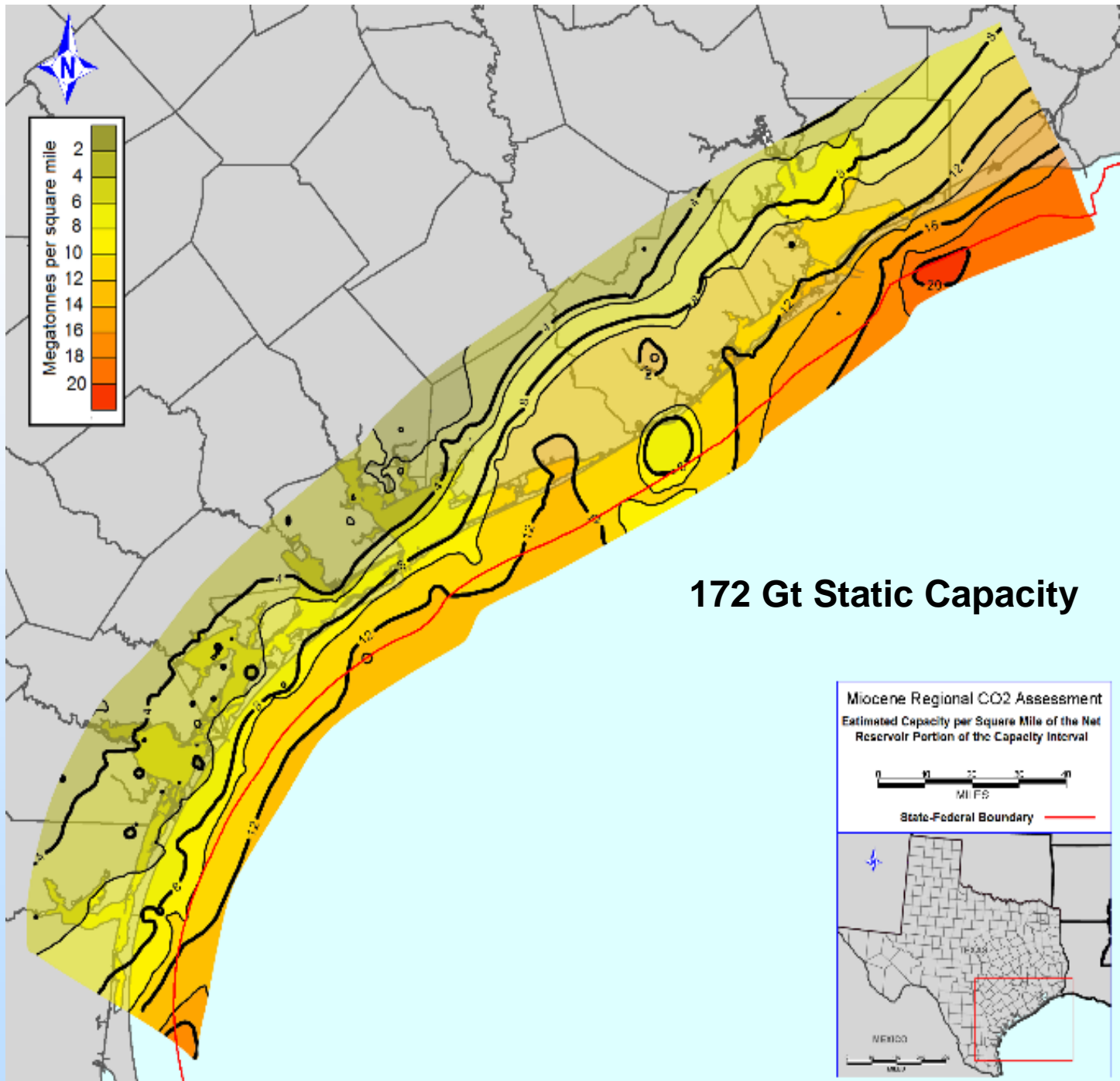


Gulf of Mexico, U.S.A.



# Conceptual Overview





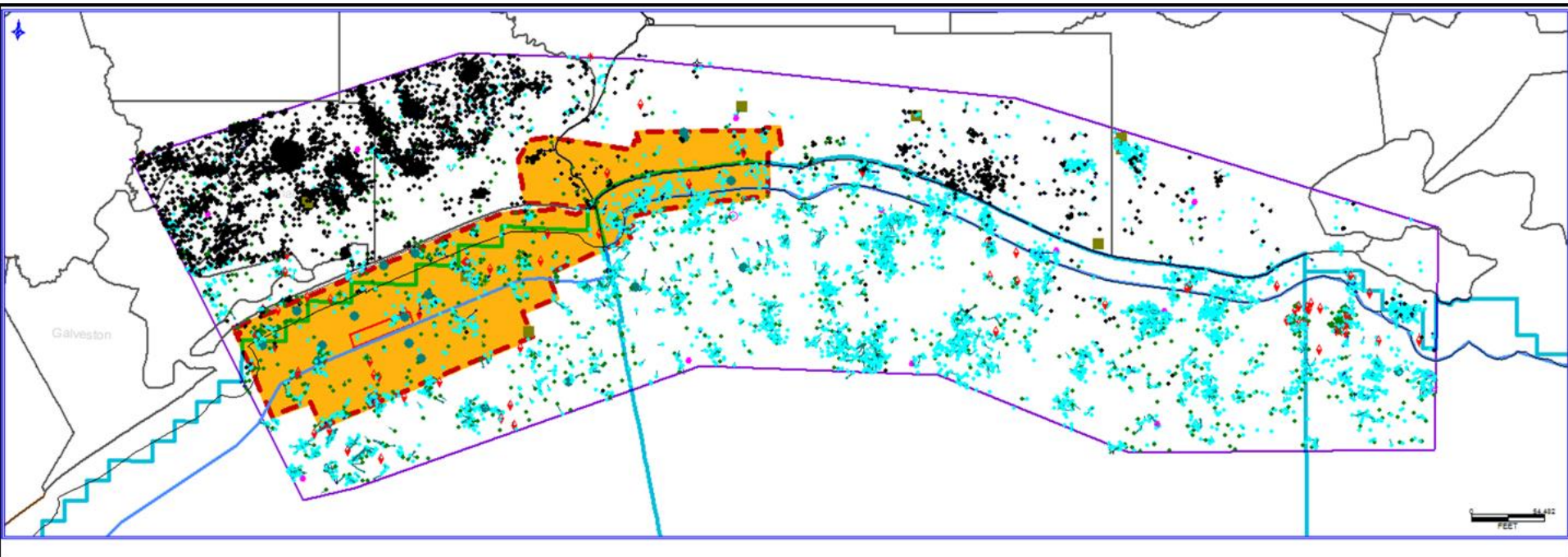
# Project Overview:

## Goals and Objectives

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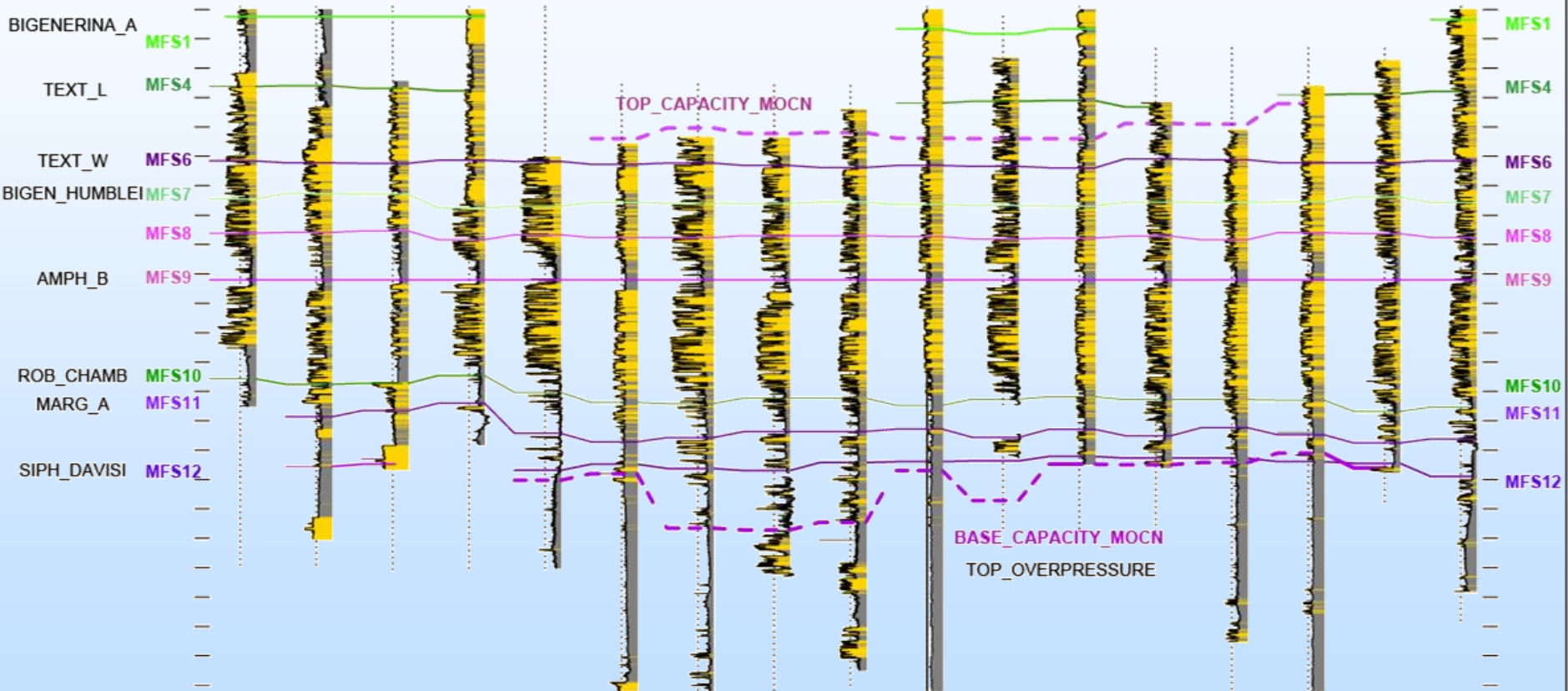
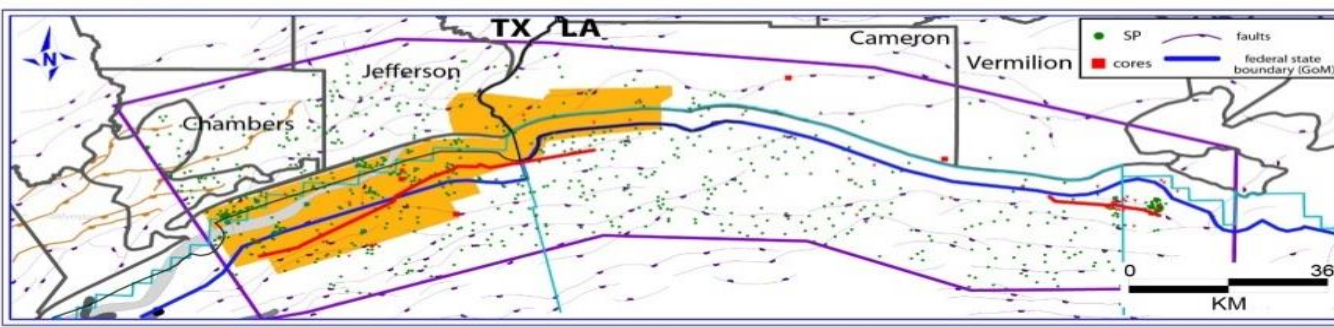
- The objective of this study is to conduct an offshore carbon storage resource assessment of the Gulf of Mexico, Texas – Louisiana study area. This will be completed by:
  - Assessing the CO<sub>2</sub> storage **capacity of depleted oil and natural gas reservoirs utilizing existing data** (well logs, records and sample descriptions from existing or plugged/abandoned wells, available seismic surveys, existing core samples, and other available geologic and laboratory data) from **historical hydrocarbon industry activities in the heavily explored portions of the inner continental shelf** portions of the Texas and Louisiana Gulf of Mexico coastal areas; and
  - Assessing the ability and capacity of **saline formations** in the region to safely and permanently store nationally-significant amounts of anthropogenic CO<sub>2</sub> using existing data. Additionally, **the study will identify at least one specific site with potential to store at least 30 million tons of CO<sub>2</sub> which could be considered further for a commercial or integrated demonstration project in the future.**
  - The project will also **engage the public and other stakeholders** for the region through outreach activities to apprise them of the study objectives and results.

# Milestone D – Quick-Look Report Summarizing the Selection of Well Data for Regional Correlation



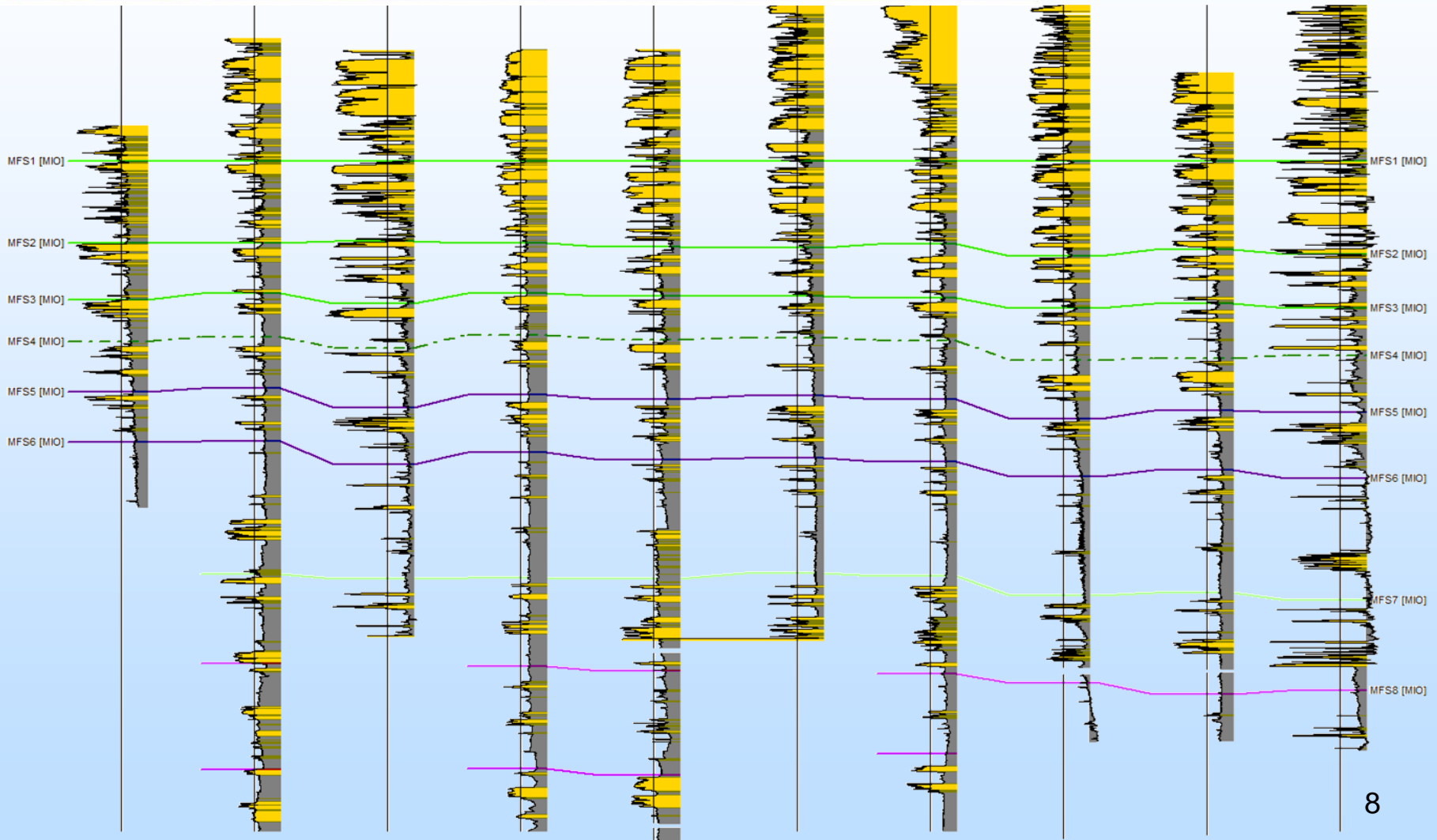
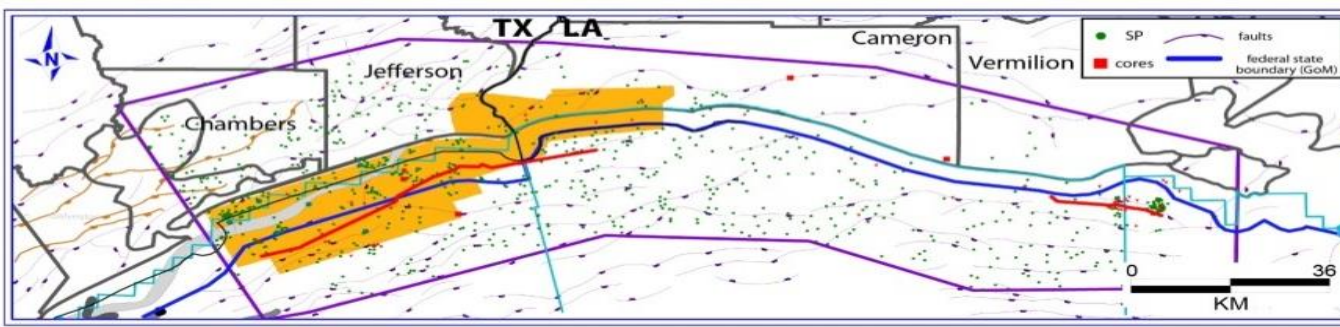
Map of the study area including wells and primary 3D seismic dataset.  
Location of the primary 3D seismic dataset (“TexLa Merge”) is highlighted in orange.

- 11,817 wells in the study area, 5250 of which have wireline well log raster data only (black dots);  
Of those, 4337 raster logs were purchased from vendor, MJ Systems.
- 900 wells have digital SP curves (green dots);
- 74 have digital gamma ray (red rhombs) and
- 7 wells have whole core (olive-green squares).
- The cyan colored dots represent wells currently without raster or LAS data.



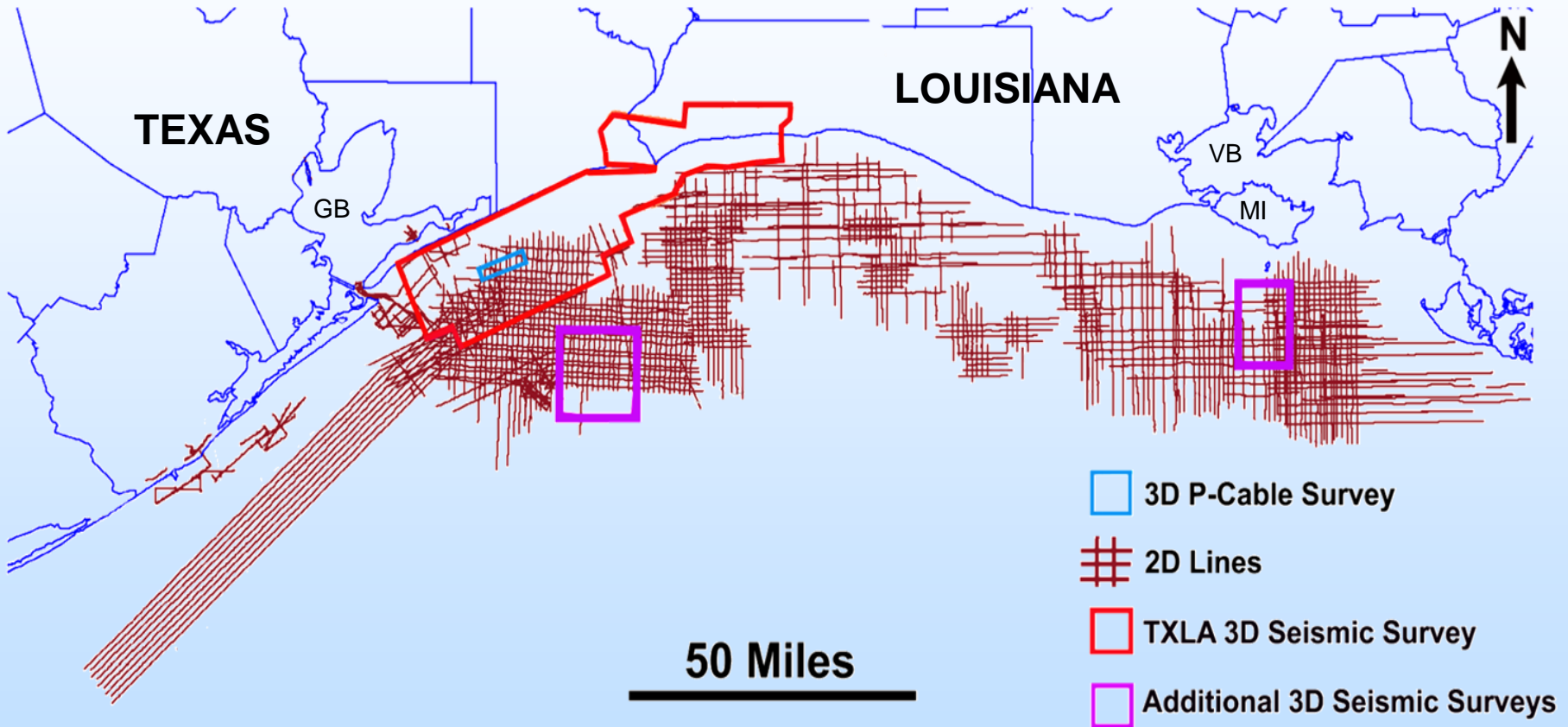
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Vertical Scale = 100.0  
Vertical Exaggeration = 16.0x

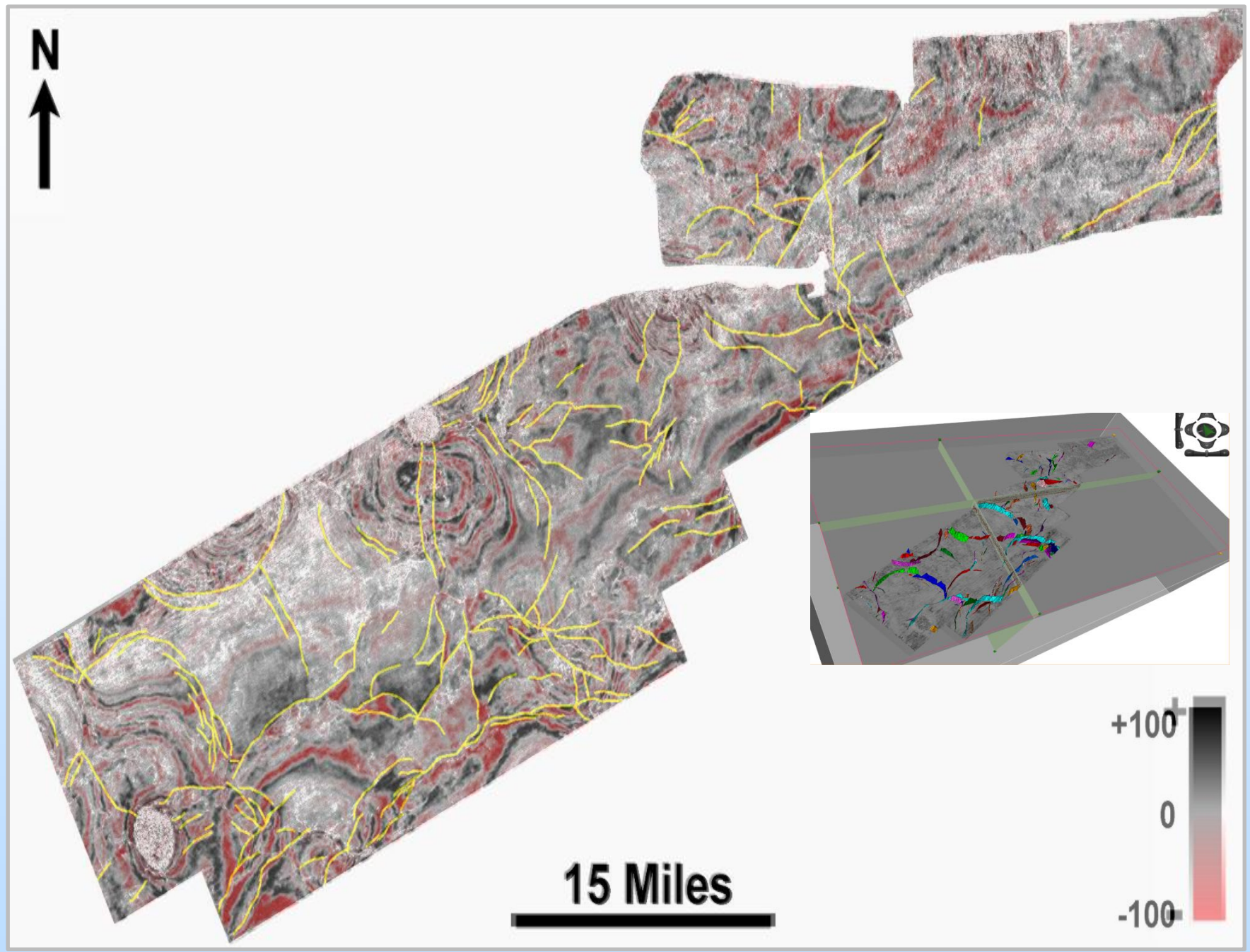
LOG CURVES  
-80 20  
SP\_NRM for normalization



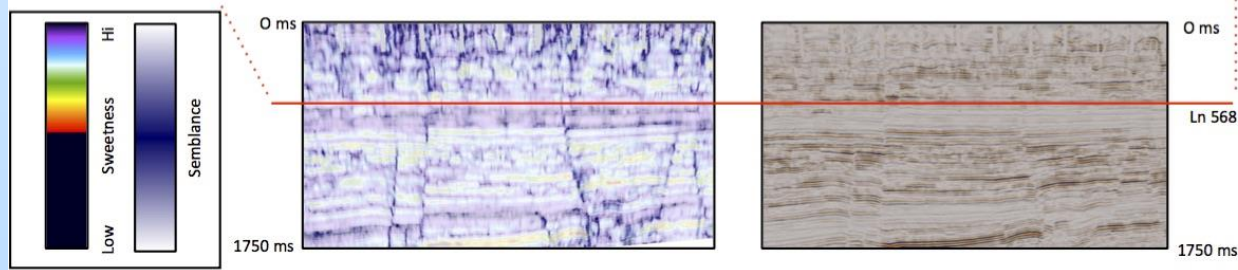
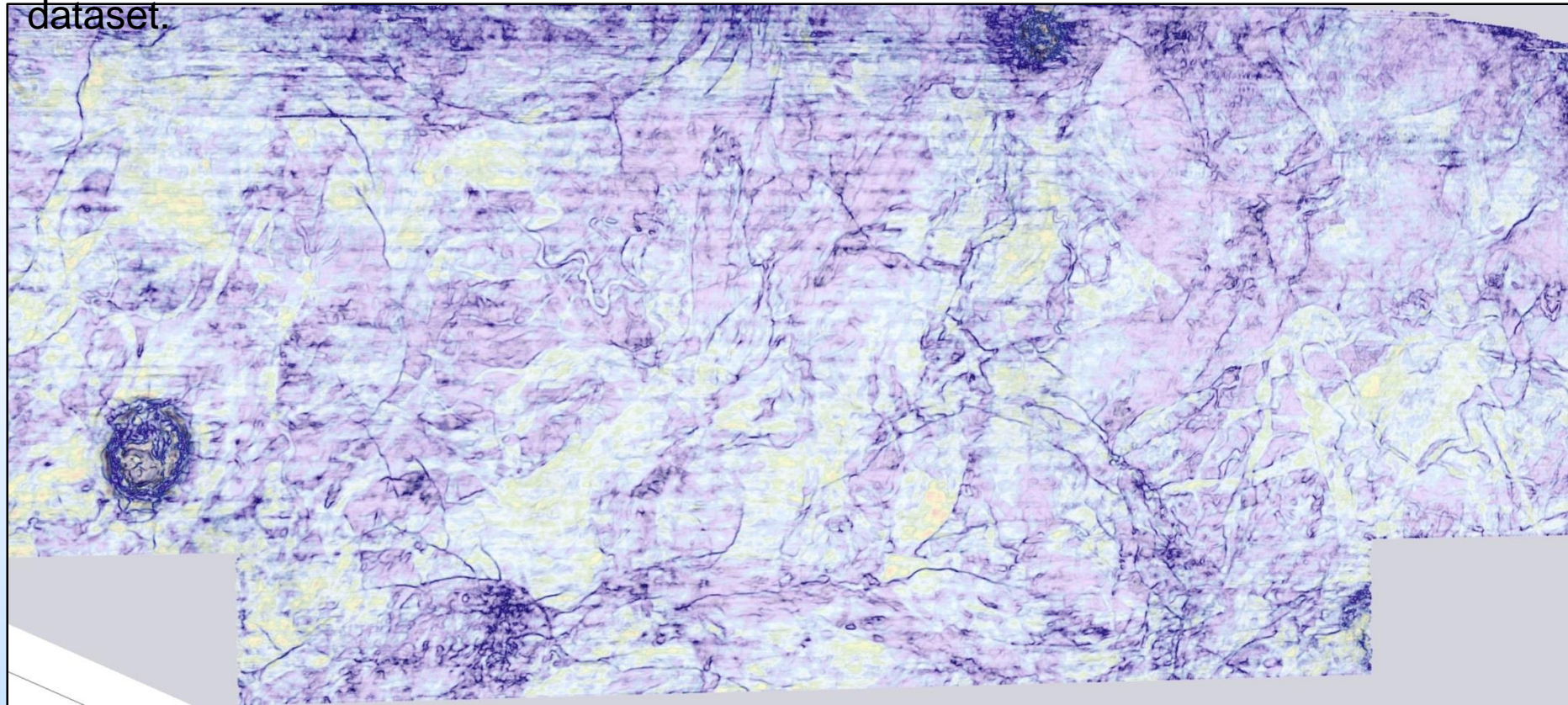


# Milestone C - Map of Completed Selection of Seismic Data for Regional Correlation





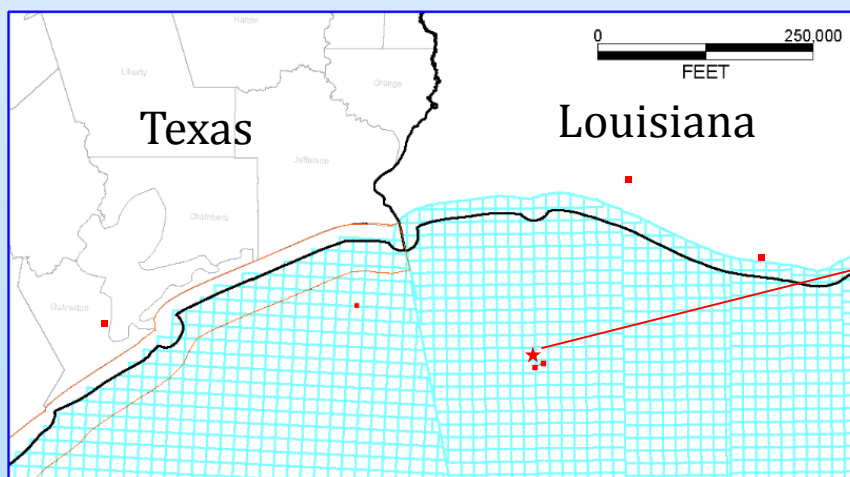
Co-rendered sweetness and semblance timeslice (532 ms below MSL) of the sothern portion of the 3D volume showing the complex geomorphology preserved in the dataset.



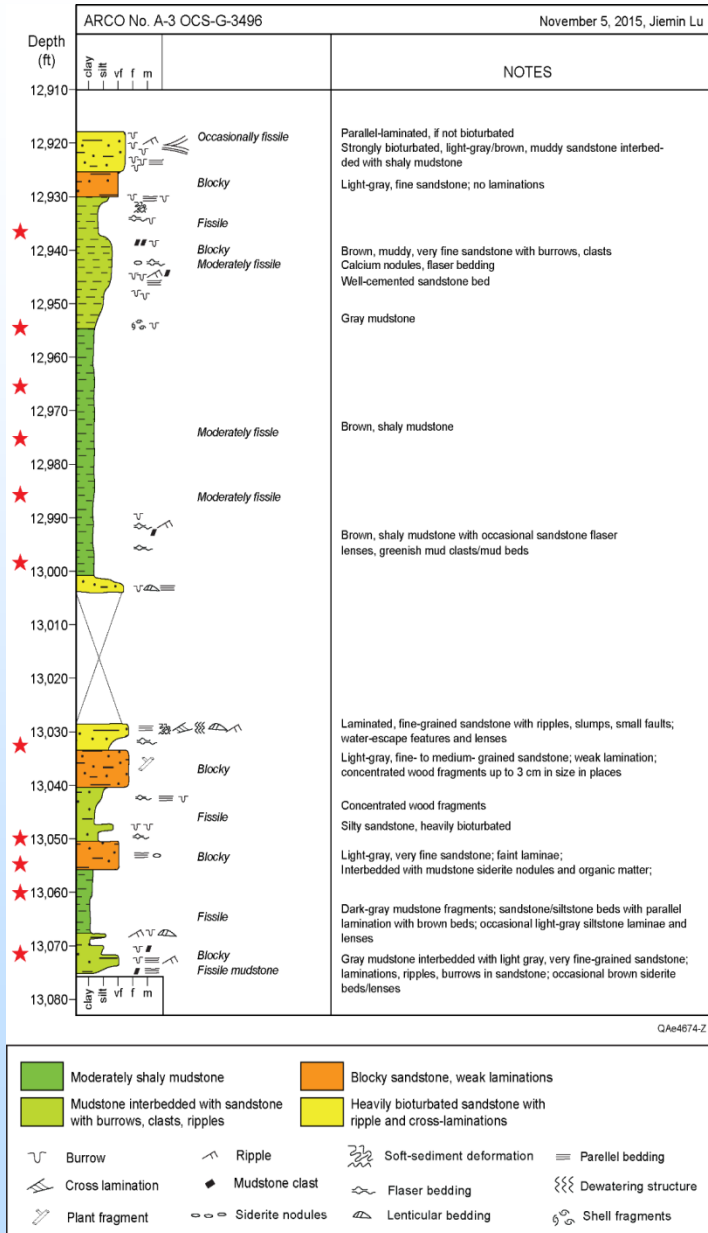
Semblance highlights edges and continuity.  
Change in sweetness signals a change in lithology or fluid.

# CORE

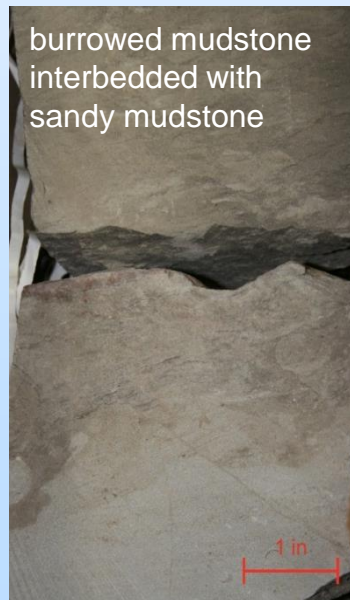
API Number	Well ID	Location	Lease Name	Top Depth (ft)	Bottom Depth (ft)	Sample Type	Reservoir	LON	LAT
177004040000	A-3	County: WEST CAMERON State: LOUISIANA	OCS-G-3496	12918	13074	SLABBED CORE	WEST CAMERON	-93.3312	29.25 97
177004063100	C-4	County: WEST CAMERON State: LOUISIANA	OCS-G-4392	13100	13160	SLABBED CORE	198	-93.3317	29.22 87
427084032600	1	County: HIGH IS-L B State: TEXAS	OCS-G-10266	10722	10748	SLABBED CORE	Unknown	-93.9890	29.41 99
177004061700	C-5	County: WEST CAMERON State: LOUISIANA		11409	11415	SLABBED CORE	WEST CAMERON 212	-93.3317	29.22 87
170230234500	02345	County: CAMERON State: LOUISIANA		17846	17870	SLABBED CORE	WILDCAT 17	-92.6487	29.60 35
170232205700	D-1	County: CAMERON State: LOUISIANA	MIAMI CORP	16264	16298	SLABBED CORE	HIGH ISLAND	-93.0782	29.87 00
421673064500	30645	County: GALVESTON State: TEXAS	SOUTH GILLOCK UNIT #94	9163	9181	SLABBED CORE	GILLOCK S	-94.9674	29.39 10



# Core description of OCS-G-3496 A-3, West Cameron Block 205, Louisiana



Sample ID	Well	Sample depth (ft)	Lithology
1	OCS-G-3 496 A-3	12937	Mudstone
2	OCS-G-3 496 A-3	12954.2	Argillaceous silty claystone
3	OCS-G-3 496 A-3	12966.8	Mudstone
4	OCS-G-3 496 A-3	12975.5	Mudstone
5	OCS-G-3 496 A-3	12984.9	Mudstone
6	OCS-G-3 496 A-3	12999.5	Argillaceous silty claystone
7	OCS-G-3 496 A-3	13033	Mudstone
8	OCS-G-3 496 A-3	13050	Siliceous siltstone
9	OCS-G-3 496 A-3	13056	Fine-grained sandstone
10	OCS-G-3 496 A-3	13060.5	Argillaceous silty claystone
11	OCS-G-3 496 A-3	13071.5	Mudstone

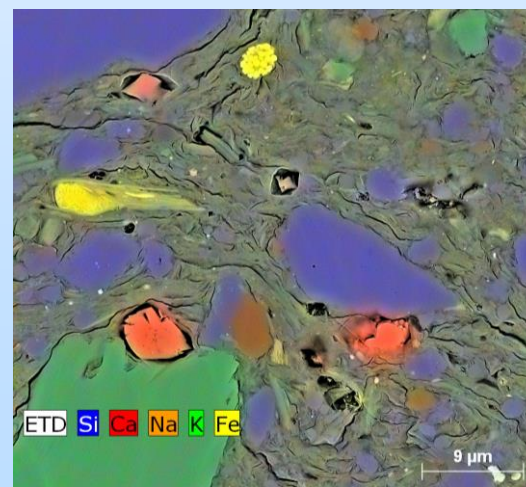
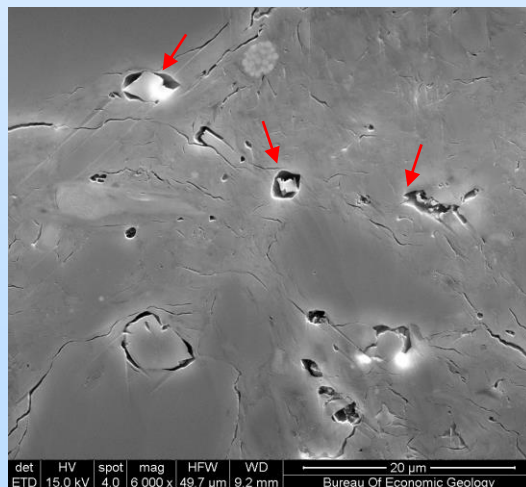
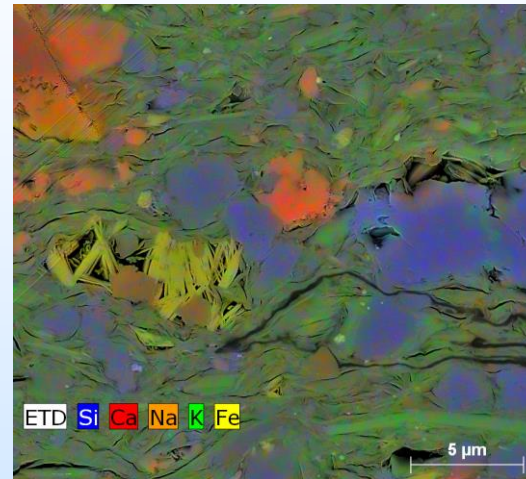
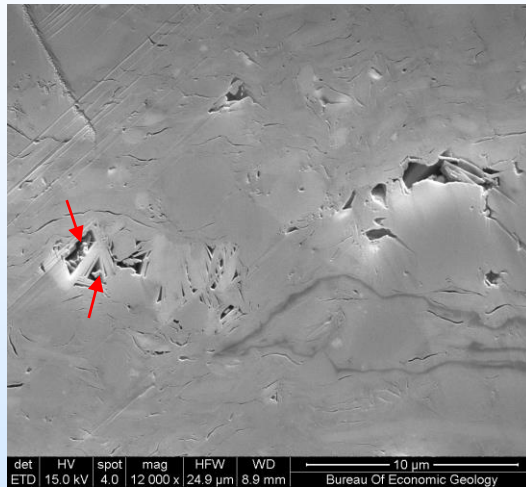


Eleven samples (above) were taken from the core for further analyses, such as scanning electron microscope (**SEM**), X-ray diffraction (**XRD**), mercury intrusion capillary pressure (**MICP**), etc.

Four have been polished by state-of-the-art ion milling and examined using SEM.

The silty claystone is dominated by extra-basinal siliciclastic detrital grains of quartz, illite, chlorite, mica, and small amounts of plagioclase and K-feldspar

The majority of the observed pores are secondary pores derived from mineral dissolution and later partially filled with diagenetic minerals (chlorite, calcite)



# Accomplishments to Date

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- A website, was established for the project:  
<http://www.beg.utexas.edu/gccc/osra.php>
- **Map of Completed Selection of Seismic Data for Regional Correlation**
- **Quick-Look Report Summarizing the Selection of Well Data for Regional Correlation**
- **List of Identified Core/Wells for Analyses**
- **Initial Structural Map of the LM2 Surface**
- **Initial 3D Fault Network Mapping**
- **Core identified, sampled, analyzed**

# Summary

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- **Key Findings:** LM2 surface, Fault polygons, Seal Characterization.
- **Lessons Learned:** Integration of 2D-3D seismic and well logs; Seal material scarce but useful.
- **Future Plans:**
  - Local Prospect Resource Assessment
  - Development of Comprehensive Data Set of Reservoir Properties
  - (Sub)Regional Capacity Assessment
  - Structural Closure Mapping for Reservoirs
  - Pressure Decline Analysis