

# Large-Scale Subsurface Models

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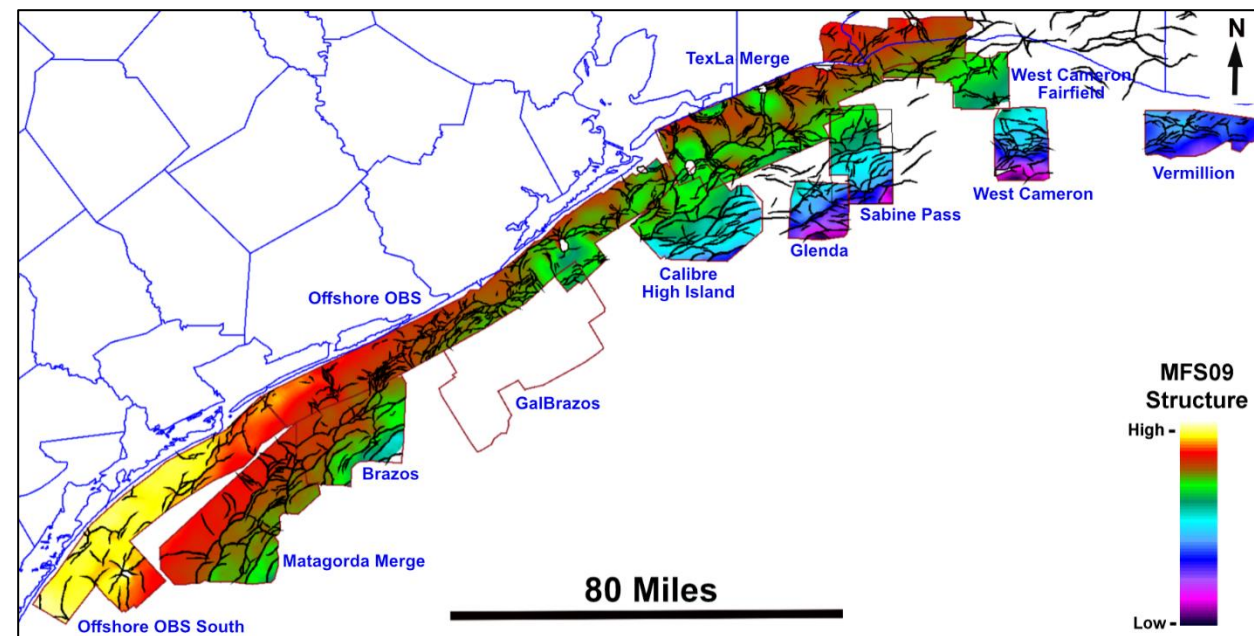
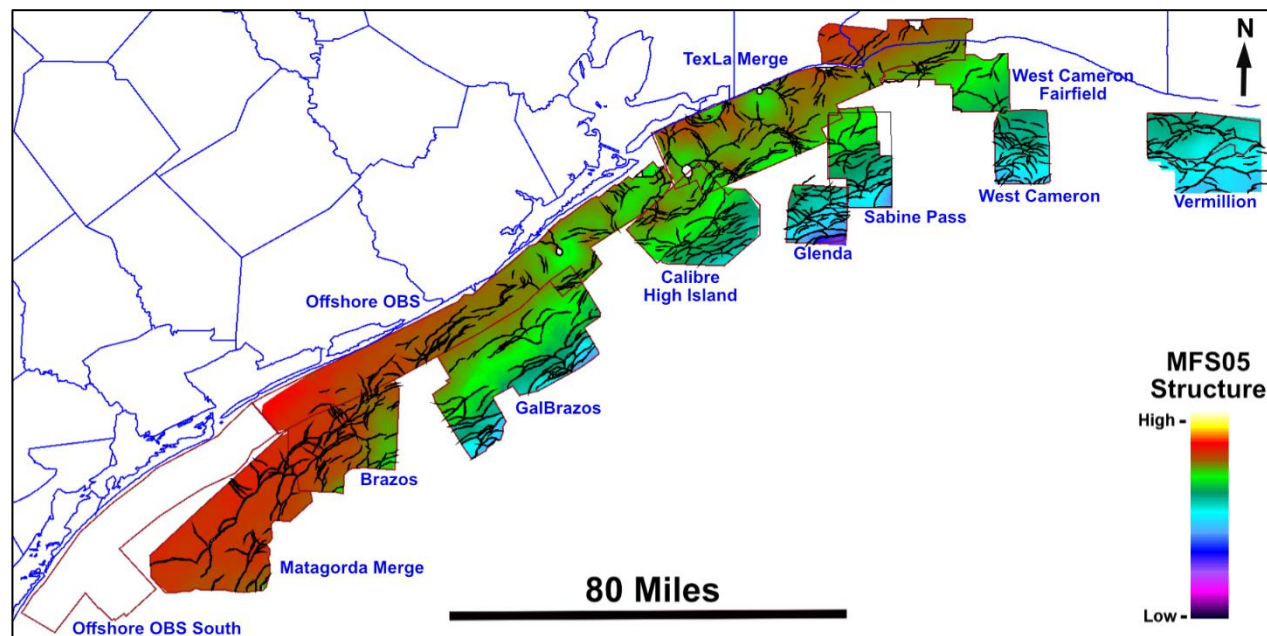
**April 6, 2023**



# Introduction

We have regionally interpreted over 7,500 mi<sup>2</sup> of 3D seismic data volumes. Over 750 major fault planes have been interpreted and correlated, and over 2,900 fault polygons from five Maximum Flooding Surfaces (MFS) have been identified and mapped. The MFS time horizons add up to over 22,000 mi<sup>2</sup> of areal coverage in the subsurface, and 13,200 mi<sup>2</sup> converted depth horizons, respectively.

**Regional interpretations for the MFS05/MFS09 horizons. Fault polygons are in black.**

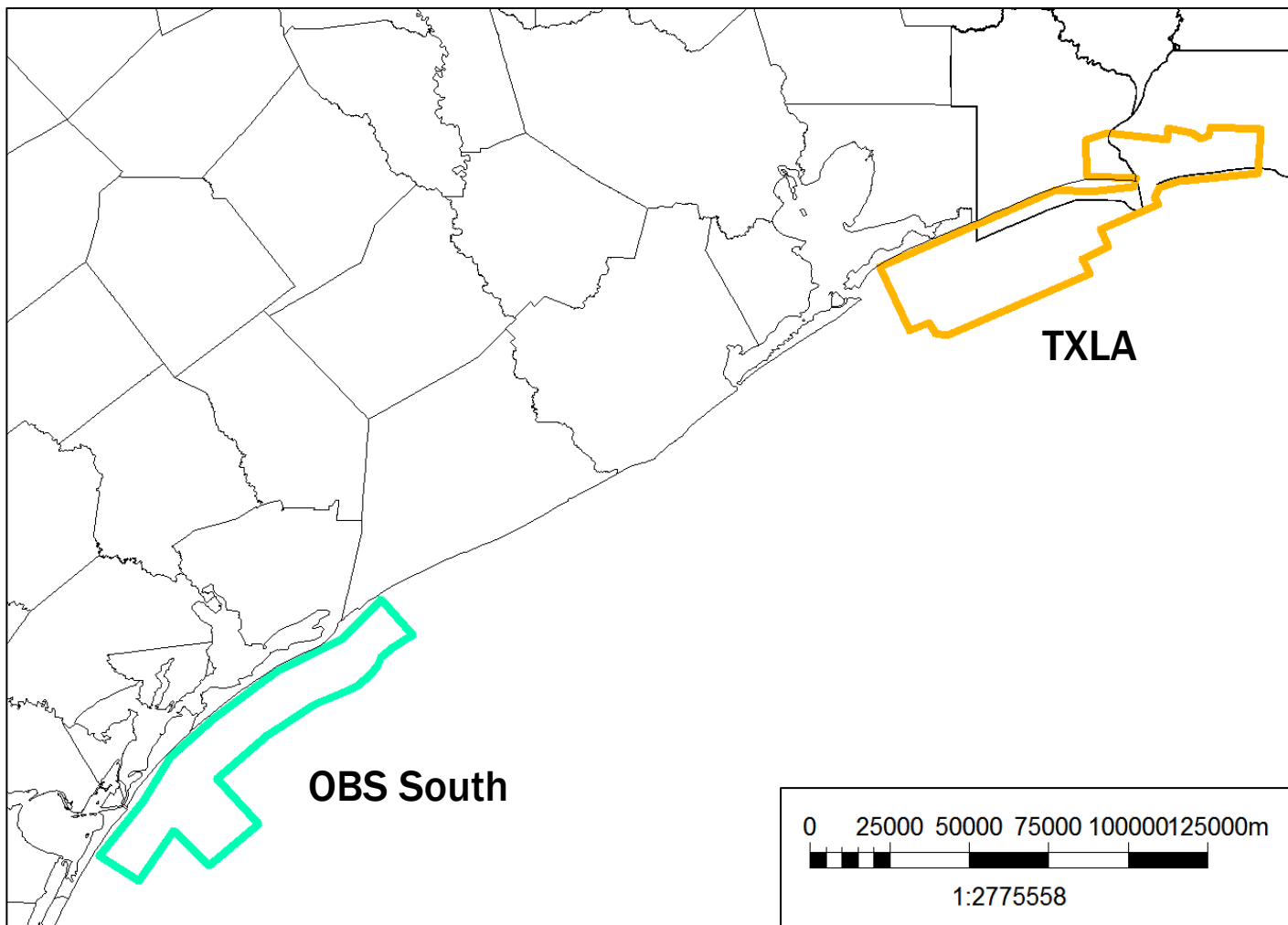


(Courtesy of Mike DeAngelo)

# Introduction

## Static Models:

- TXLA:
  - Pre & Post Stack Seismic Data
  - Well Data
- OBS South:
  - Post-Stack Seismic Data
  - Well Data



# TXLA Geological Model

**Area: 1000 miles<sup>2</sup>**

**Number of cells: 99517200**

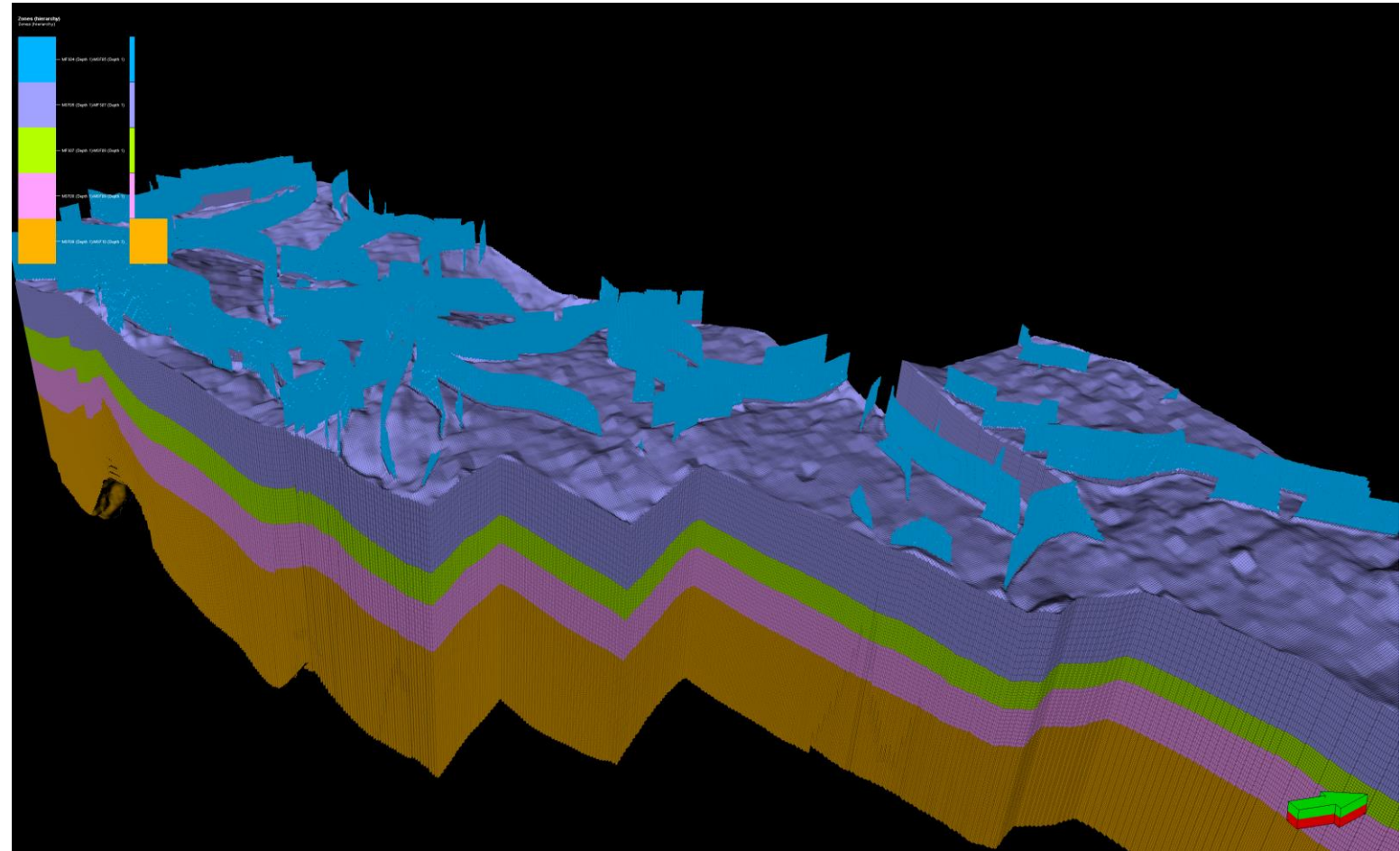
**Number of Faults: 147**

**Horizons:**

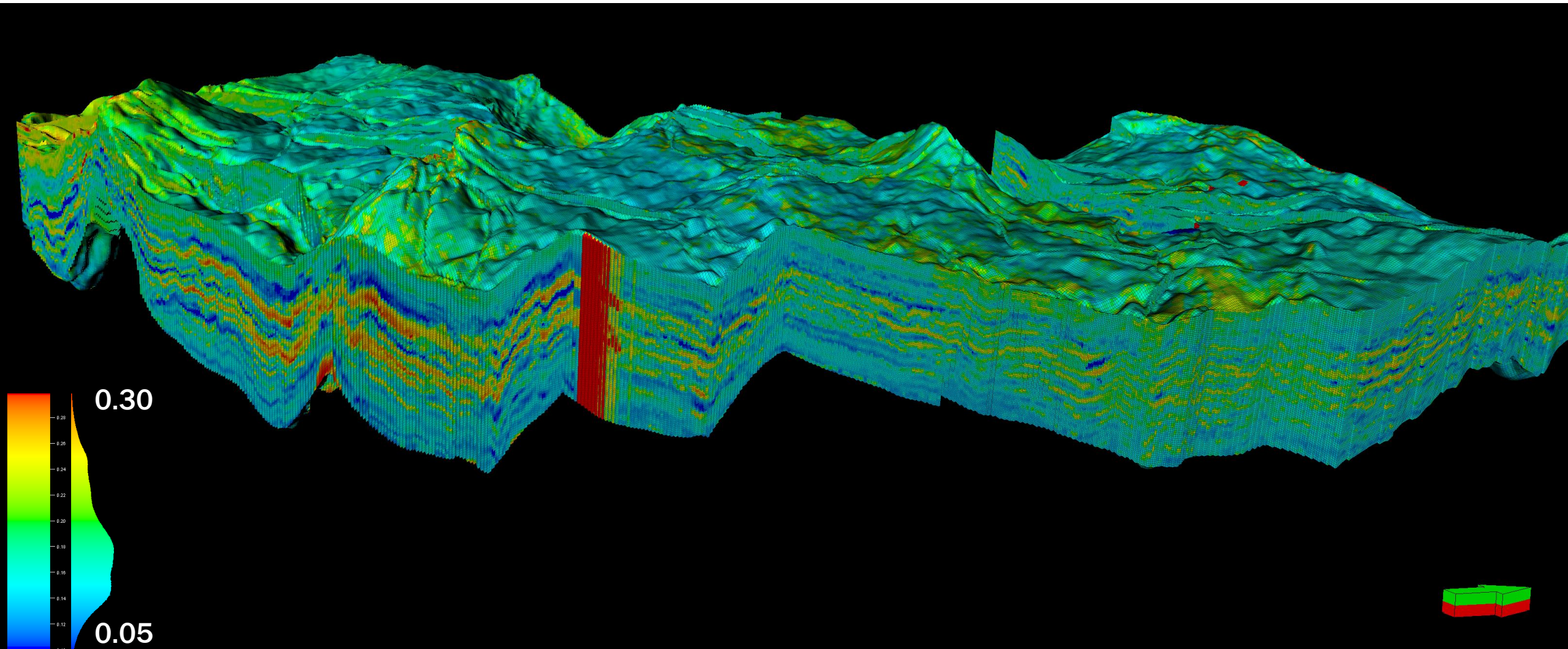
- MFS04
- MFS05
- MFS07
- MFS08
- MFS09
- MFS010

**Properties:**

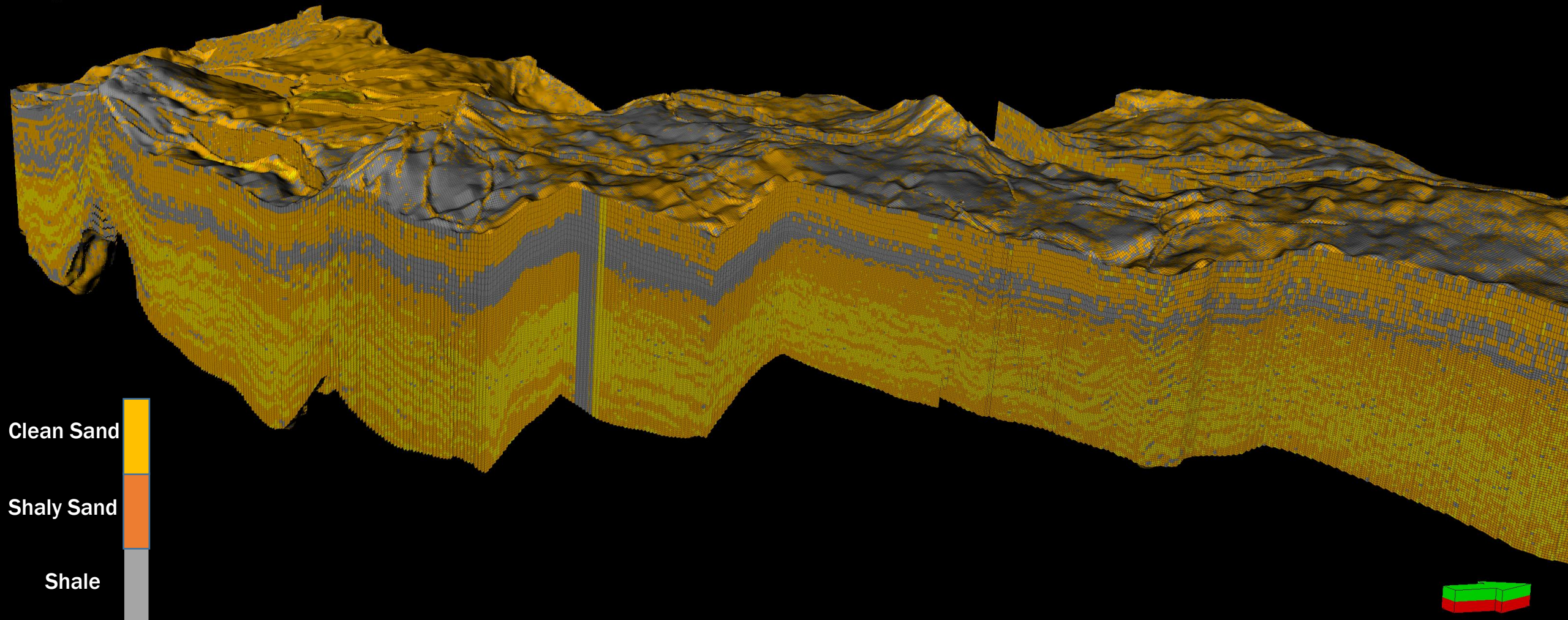
- Lithology
- Porosity



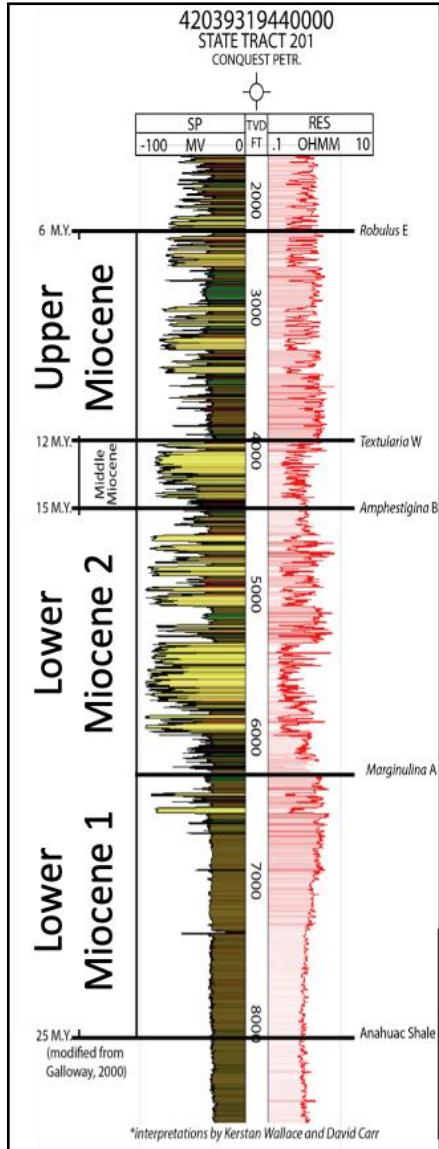
# Porosity – TXLA Geological Model



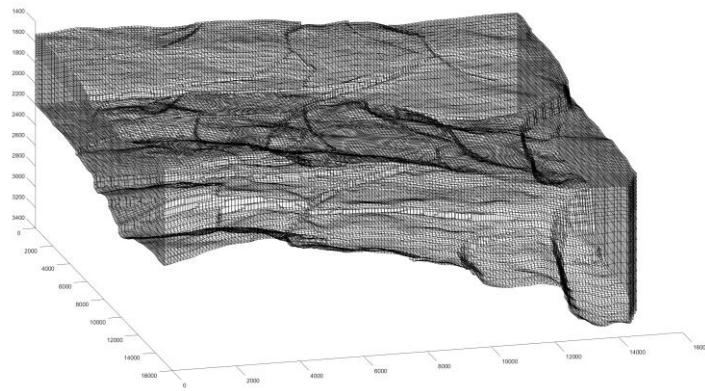
# Facies – TXLA Geological Model



- GOM Stratigraphy**



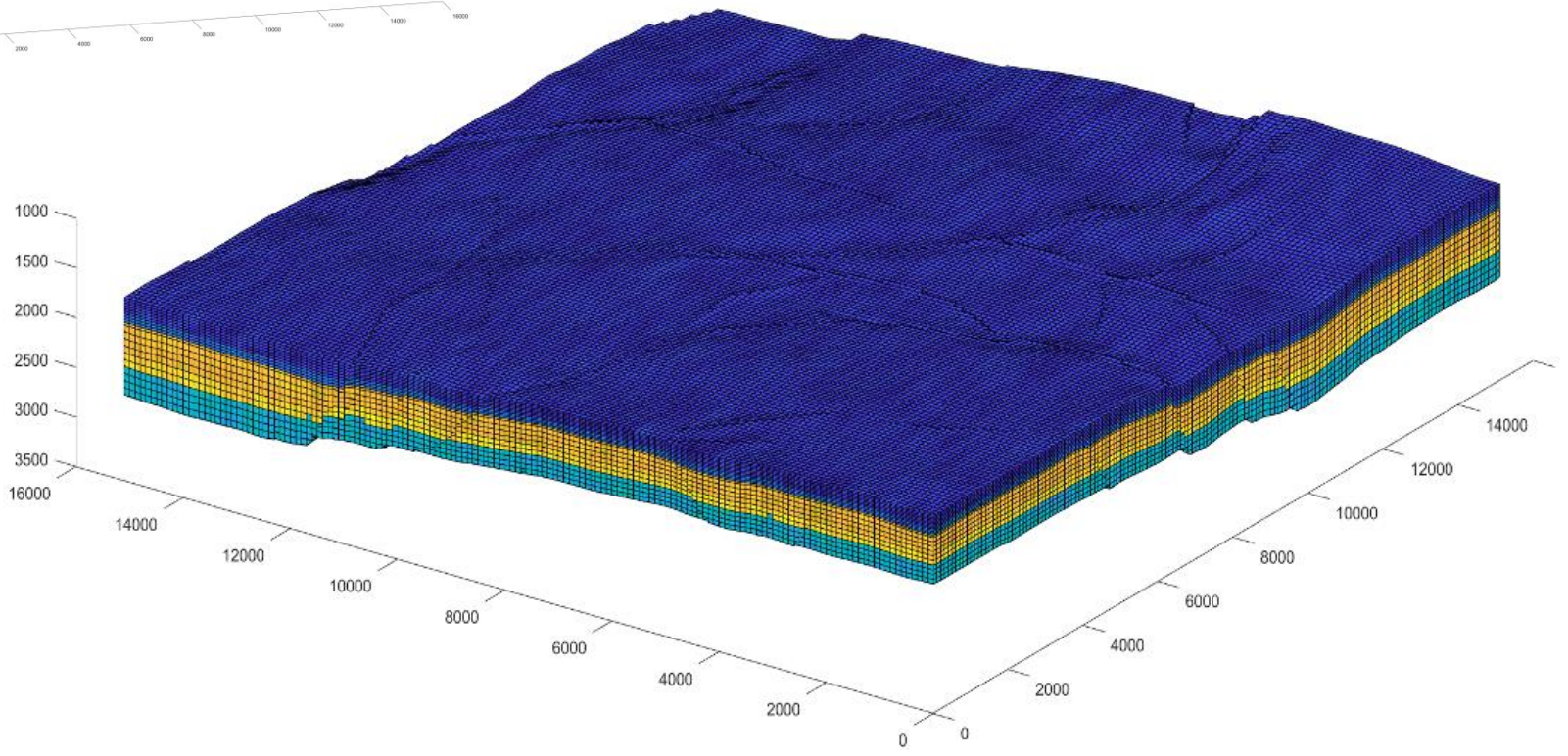
- Grid of the sector model**



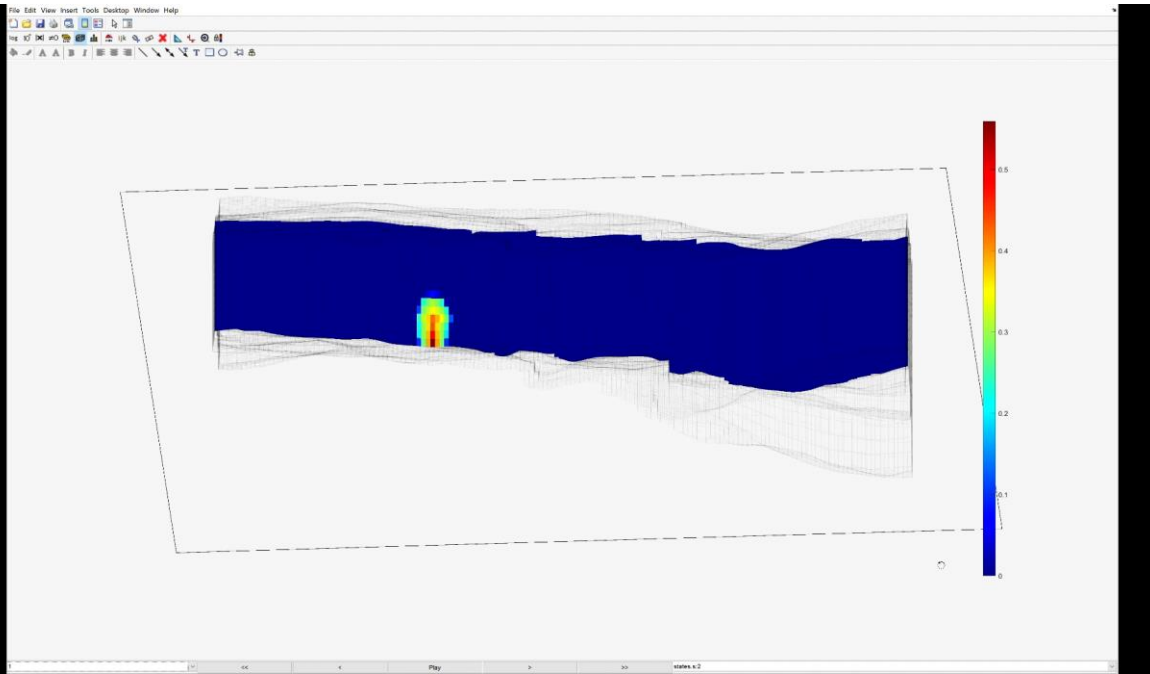
- Model Properties**

	Cap rock	Reservoir	Underburden
Permeability (md)	0.1	450	10
Porosity	10%	25%	10%

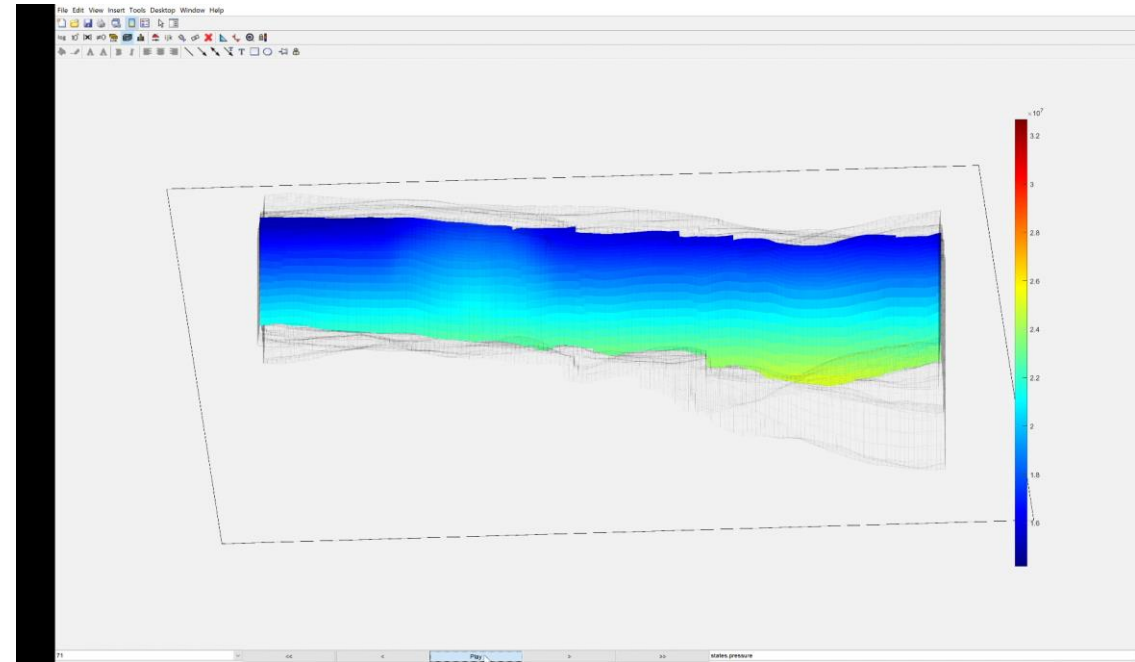
- Permeability**



## • CO2 Saturation



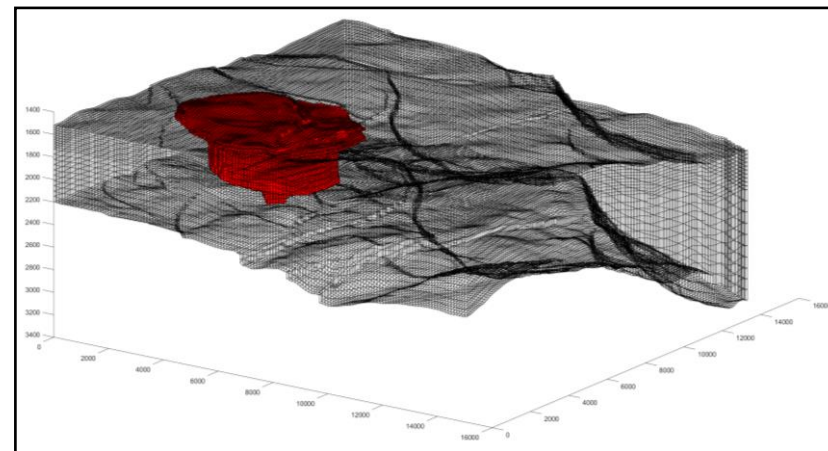
## • Pressure



### Injection Rate :

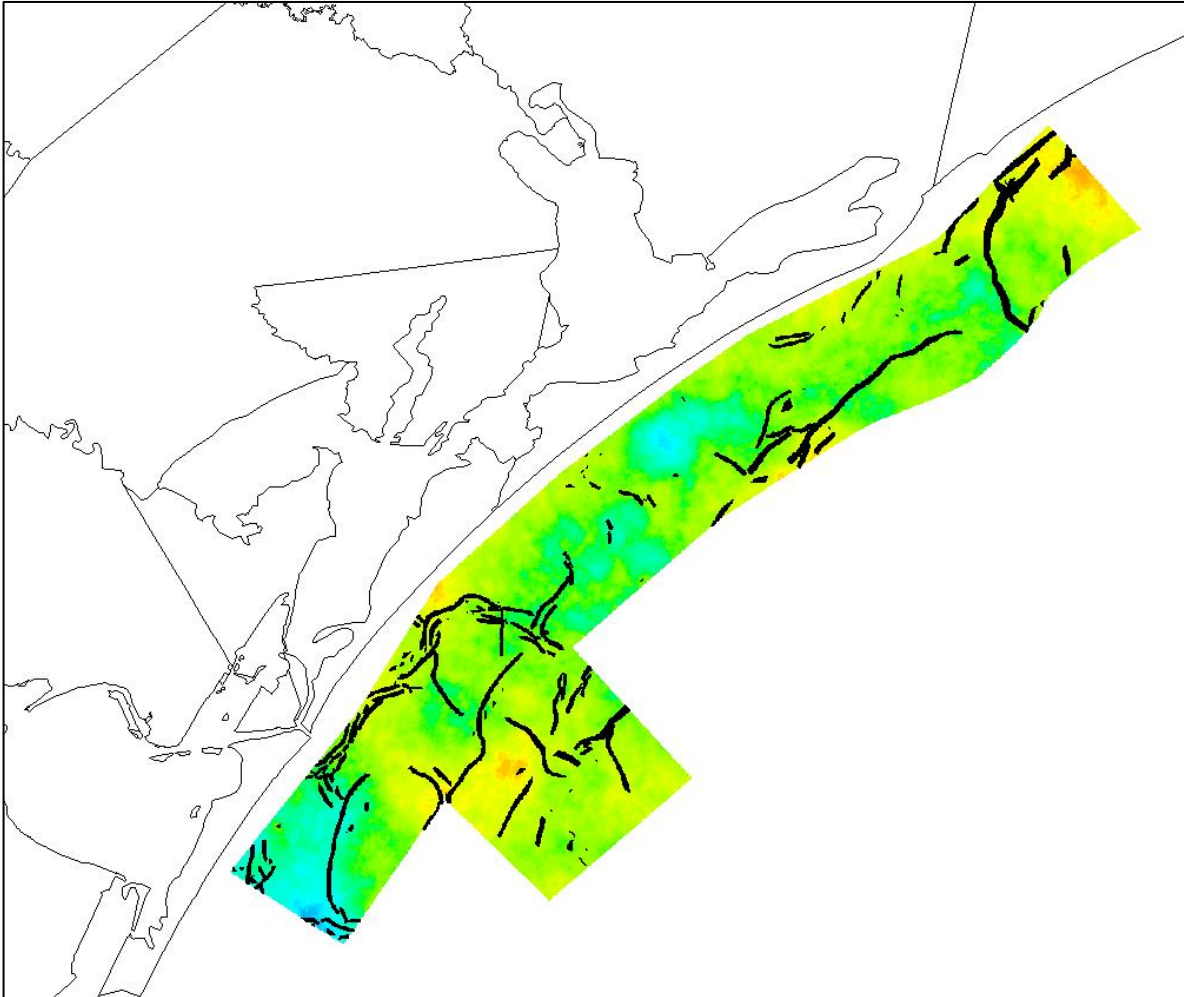
- Injection of 3.5 Megatonnes of CO2 a year
- 100 years of injection
- 1000 years of post-injection

## • CO2 Plume





# OBS South Geological Model



Area: 810.6 mi<sup>2</sup>

Number of cells: 49901733

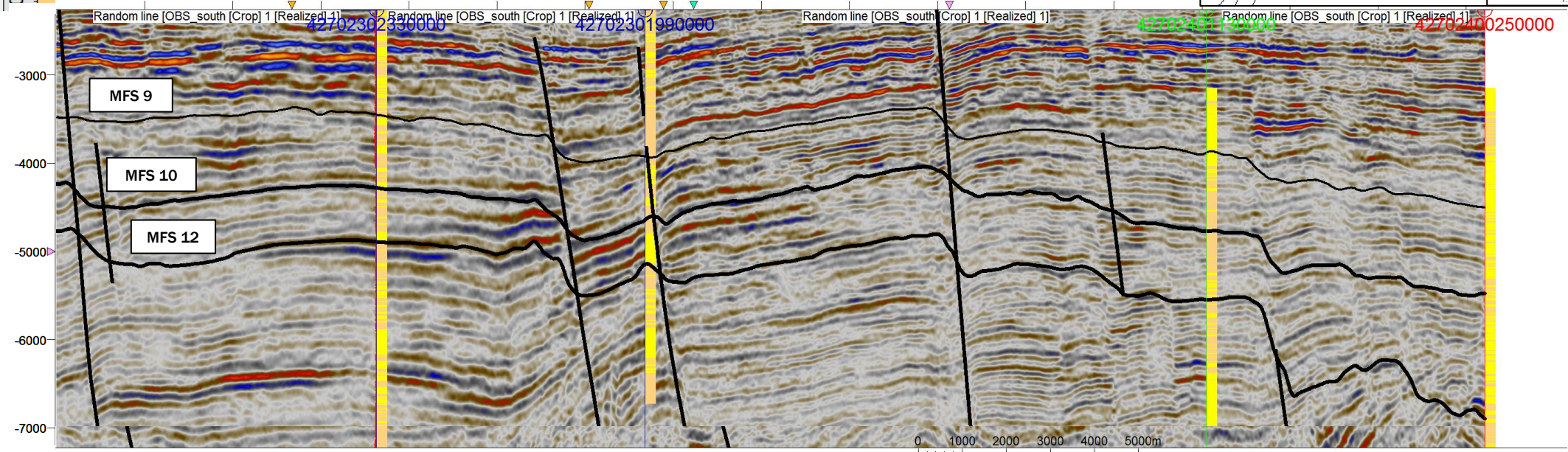
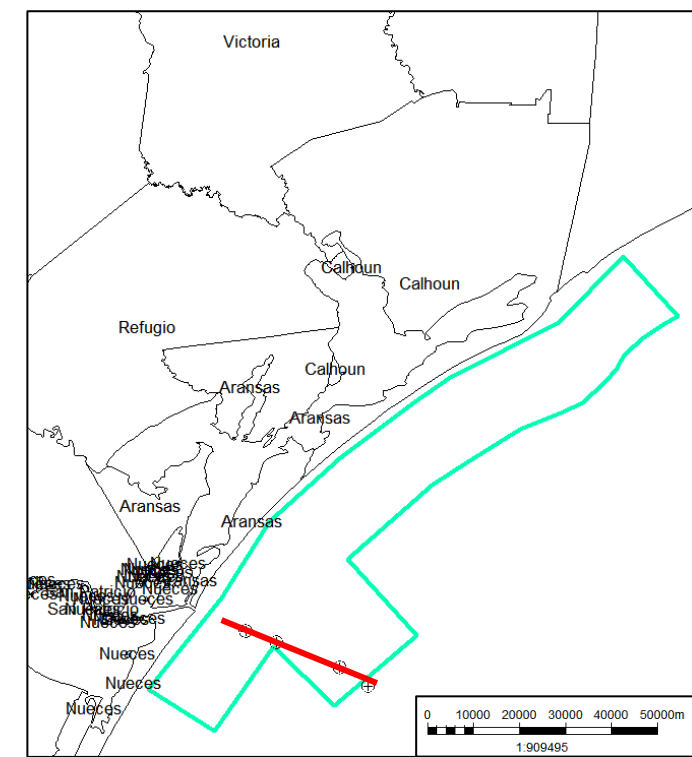
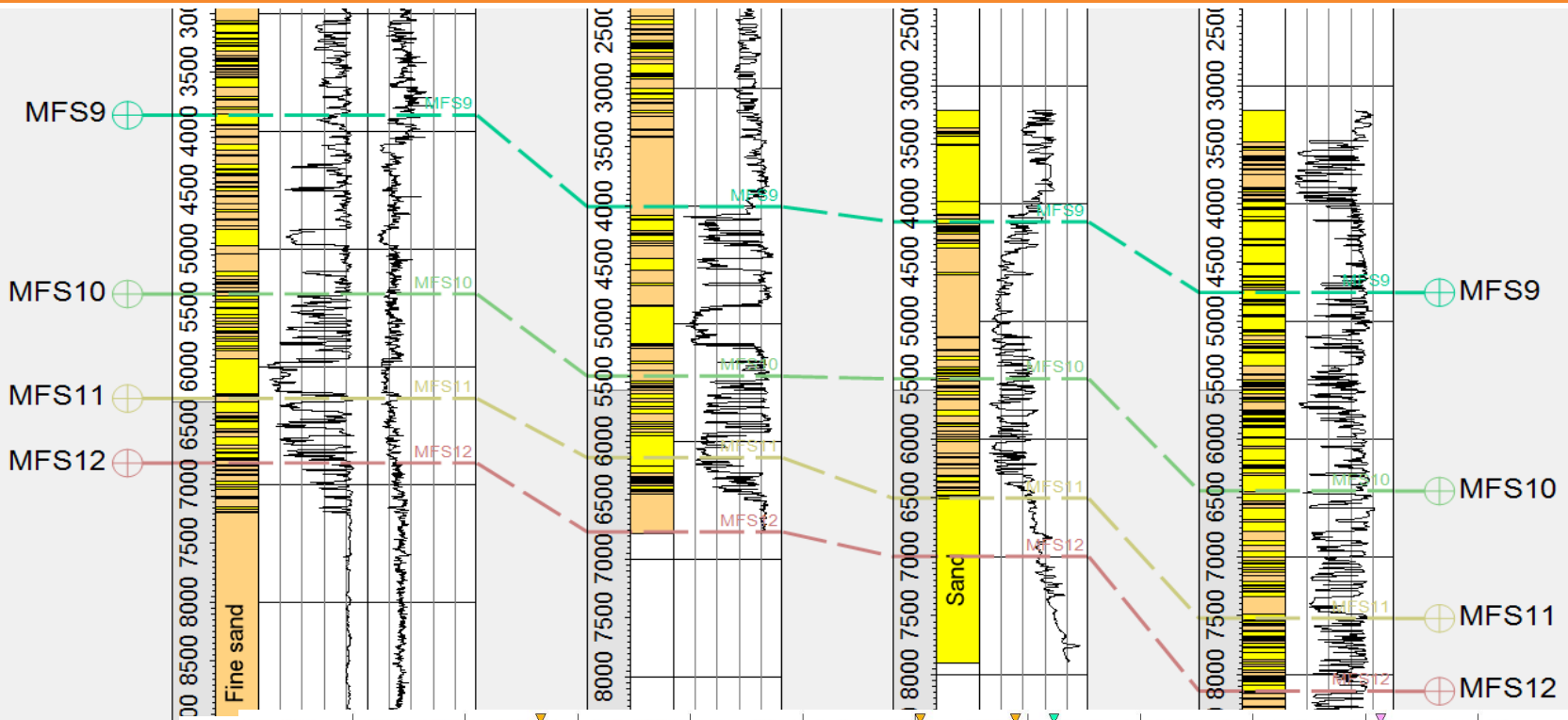
Wells:

- 213 Lithofacies interpretation
- 26 Porosity logs
- 26 Sonic logs
- 11 Density logs

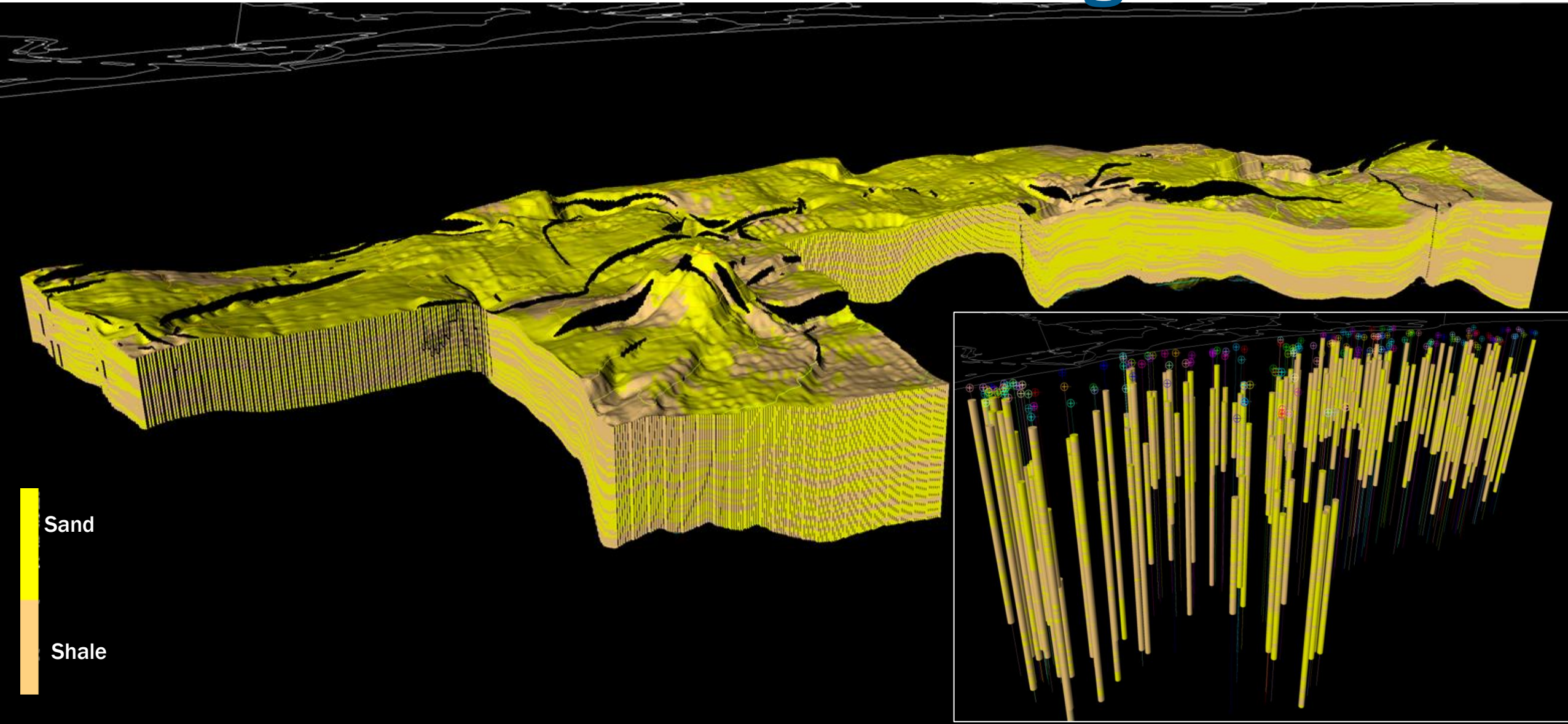
Surfaces:

- MFS 9
- MFS 10
- MFS 12

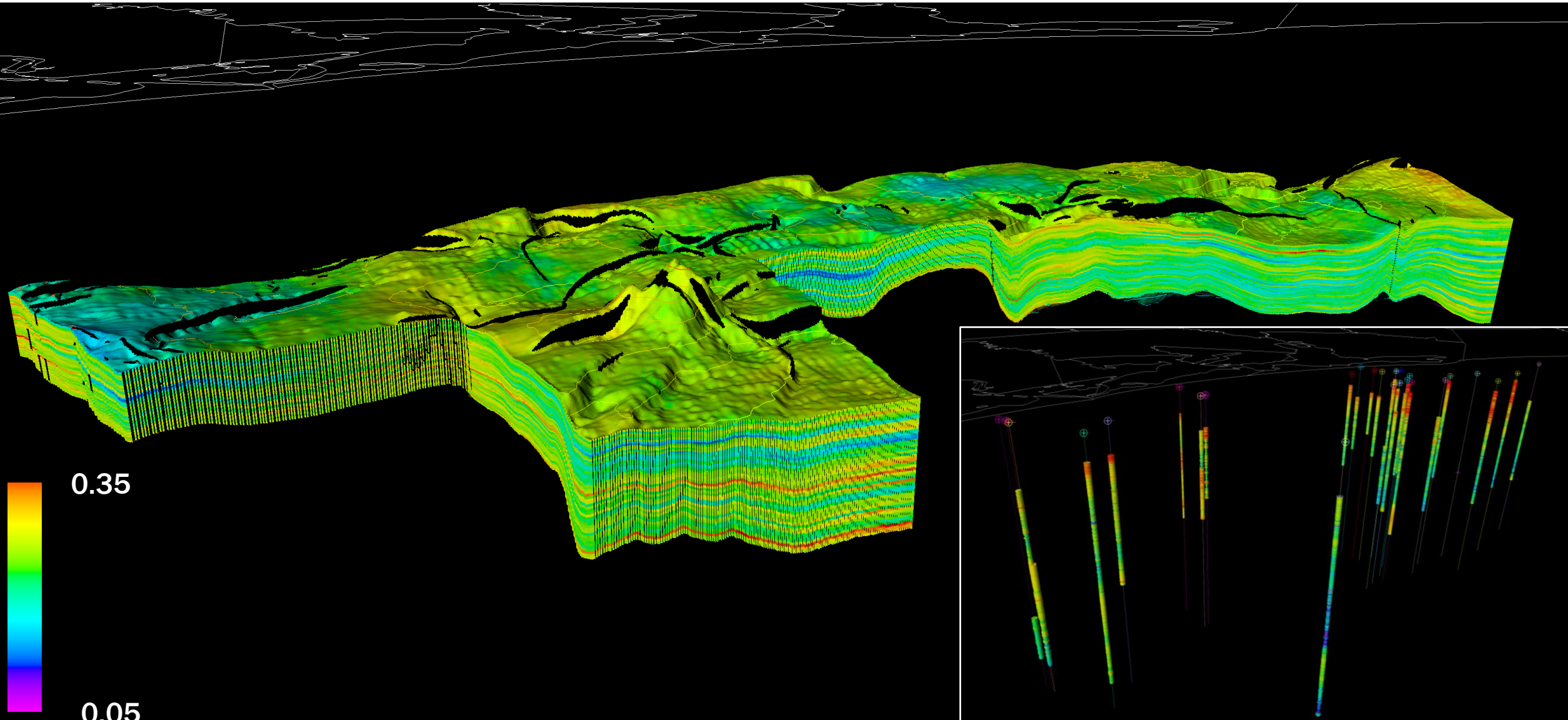
Number of faults: 171



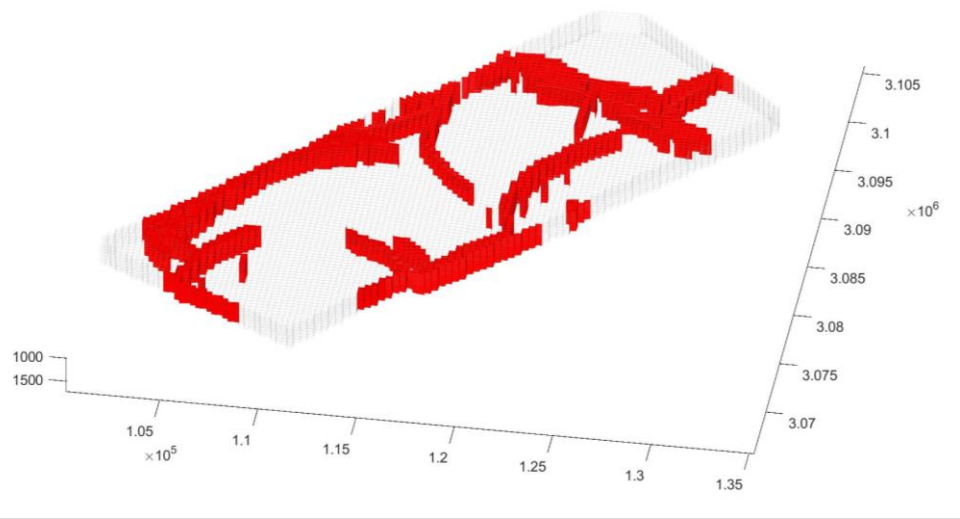
# Lithofacies – OBS South Geological Model



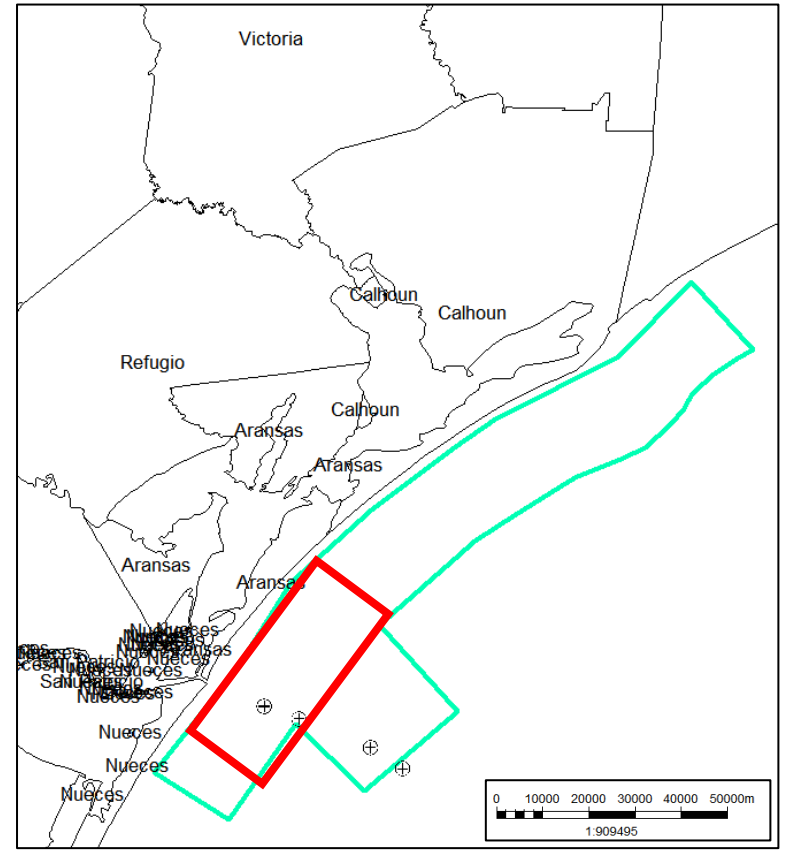
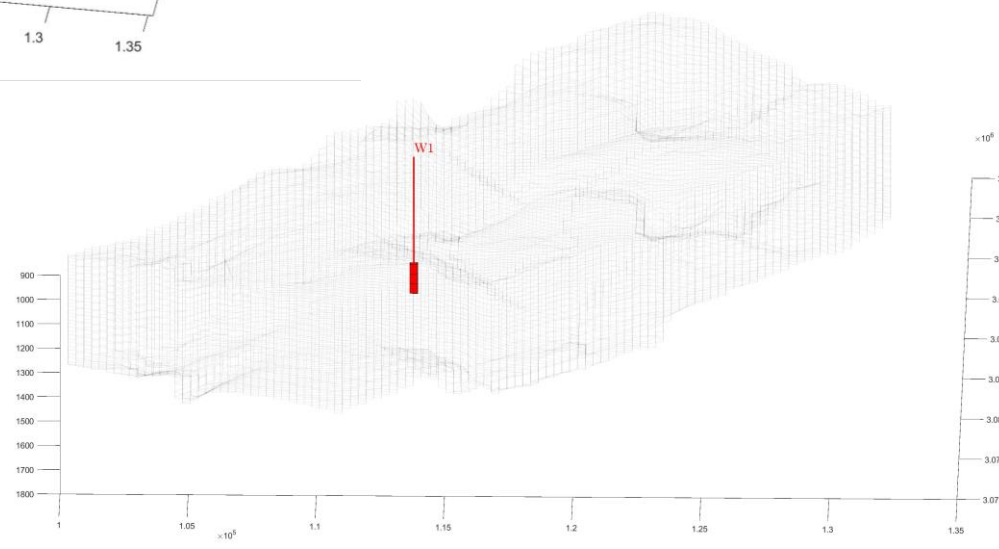
# Porosity – OBS South Geological Model



- Faults

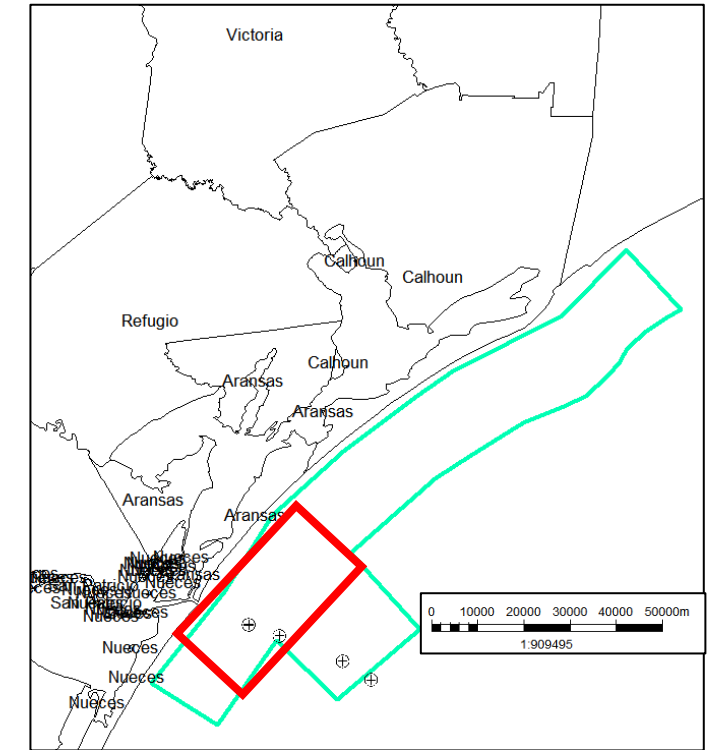
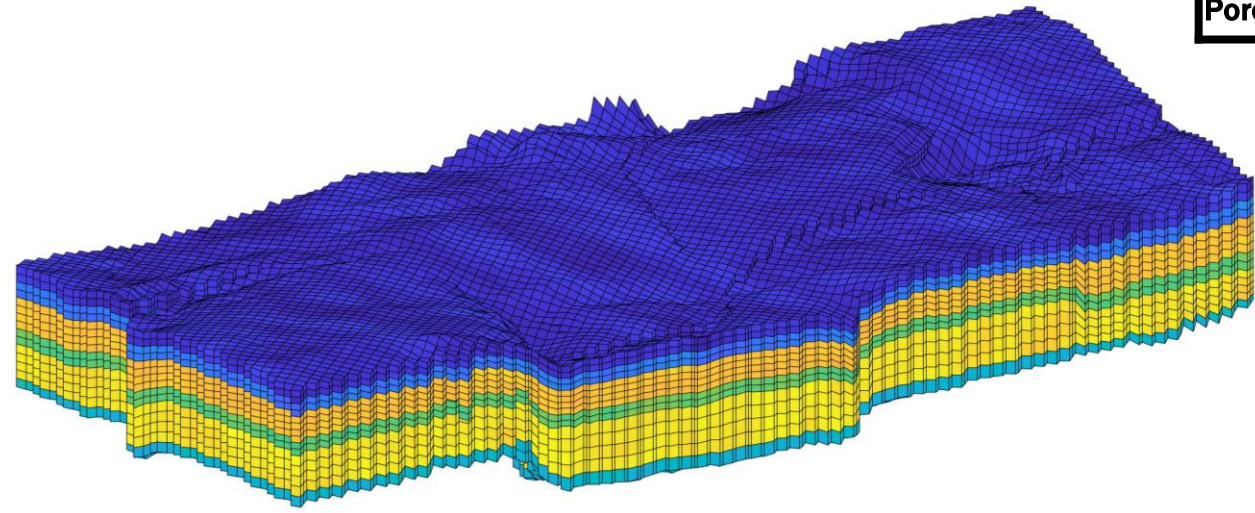


- Injection Well Location



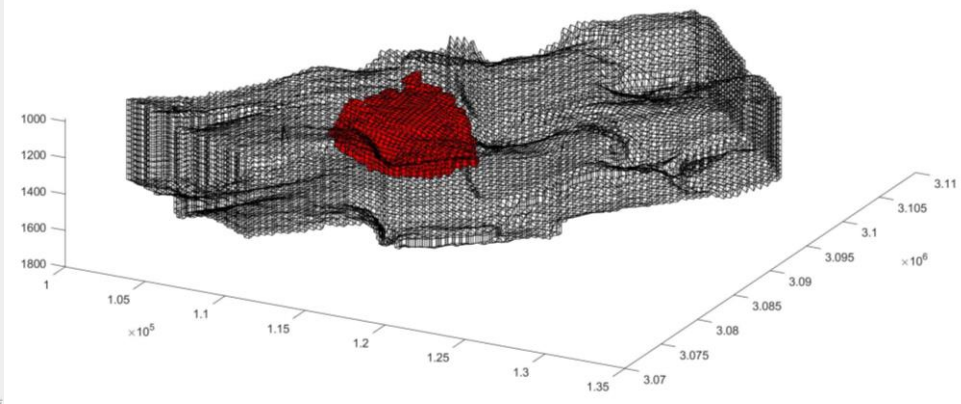
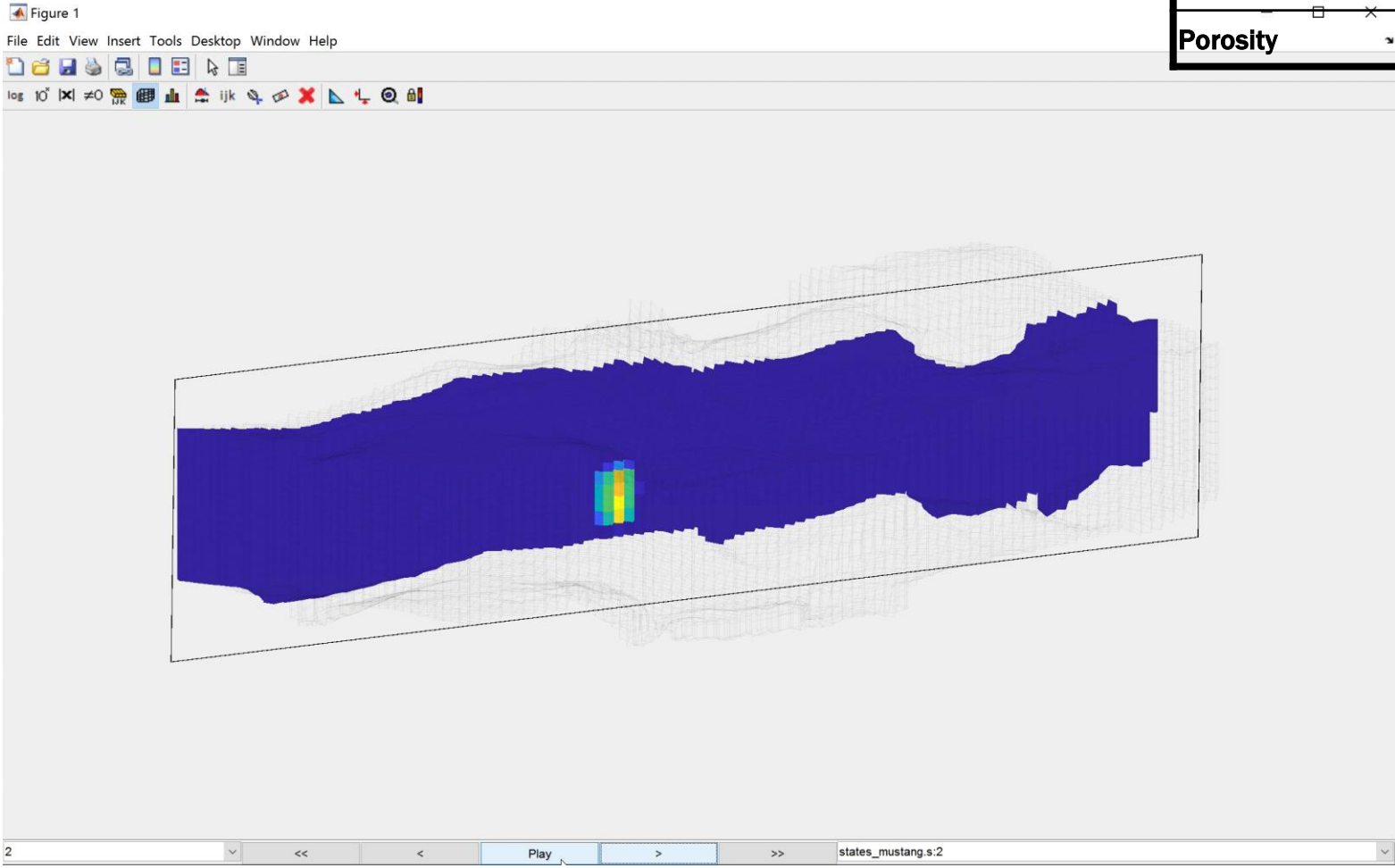
- Permeability

	Cap rock	Reservoir I	Layer	Reservoir II	Underburden
Permeability (md)	0.1	150	10	450	1
Porosity	10%	25%	14%	25%	10%



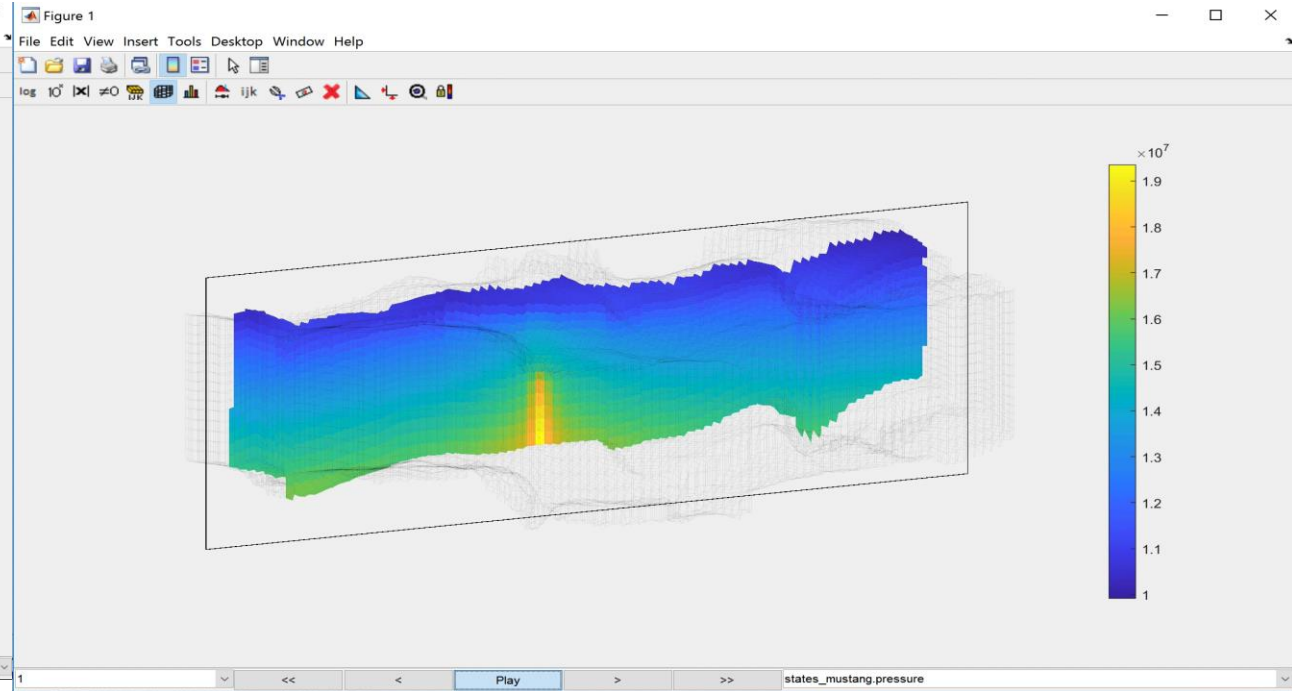
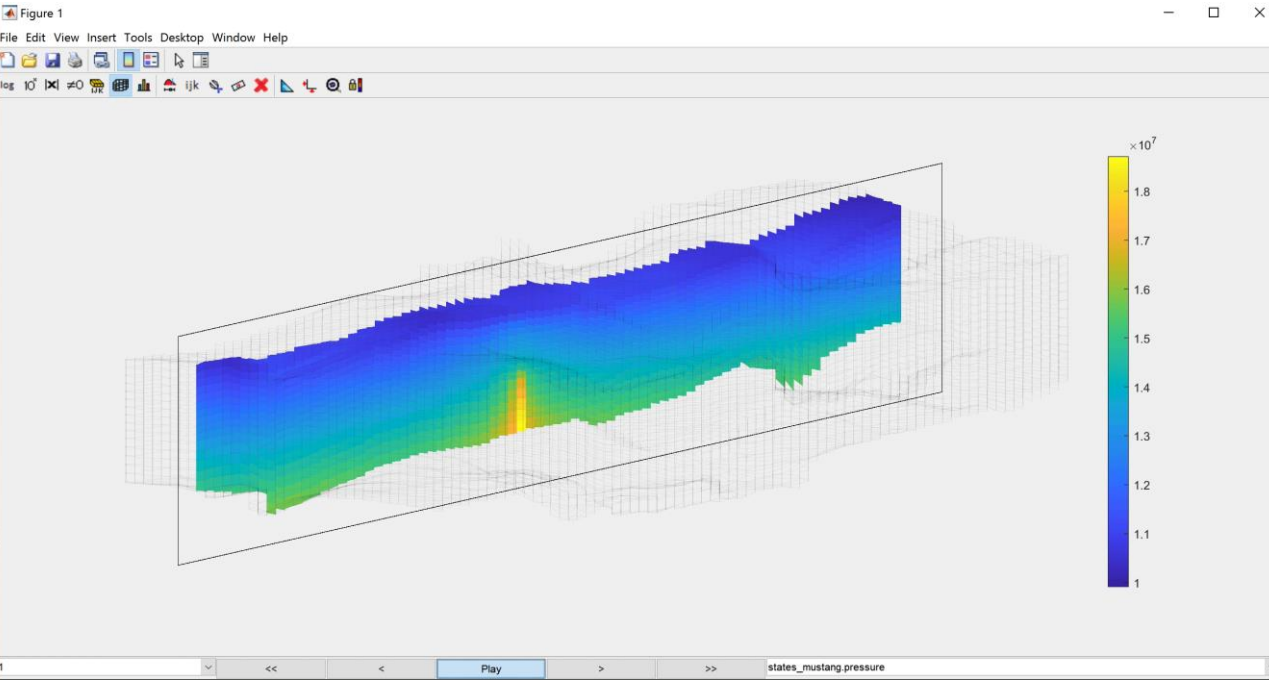
- Saturation

	Cap rock	Reservoir I	Layer	Reservoir II	Underburden
Permeability (md)	0.1	150	10	450	1
Porosity	10%	25%	14%	25%	10%

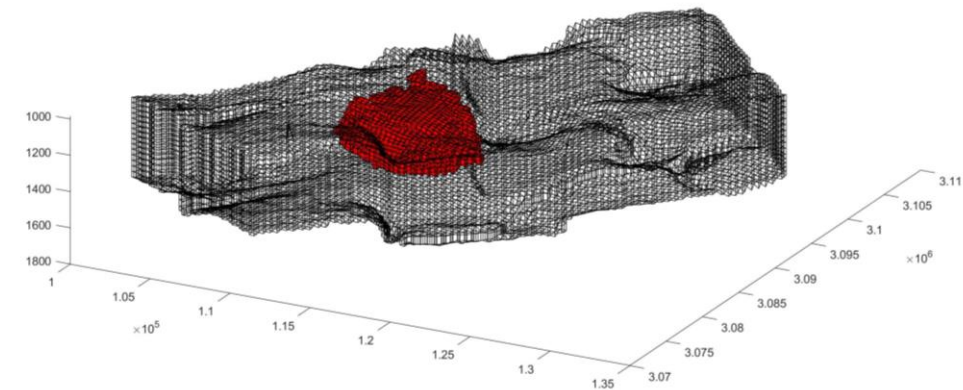


- Pressure (Open Boundary)

- Pressure (Closed Boundary)



	Cap rock	Reservoir I	Layer	Reservoir II	Underburden
Permeability (md)	0.1	150	10	450	1
Porosity	10%	25%	14%	25%	10%

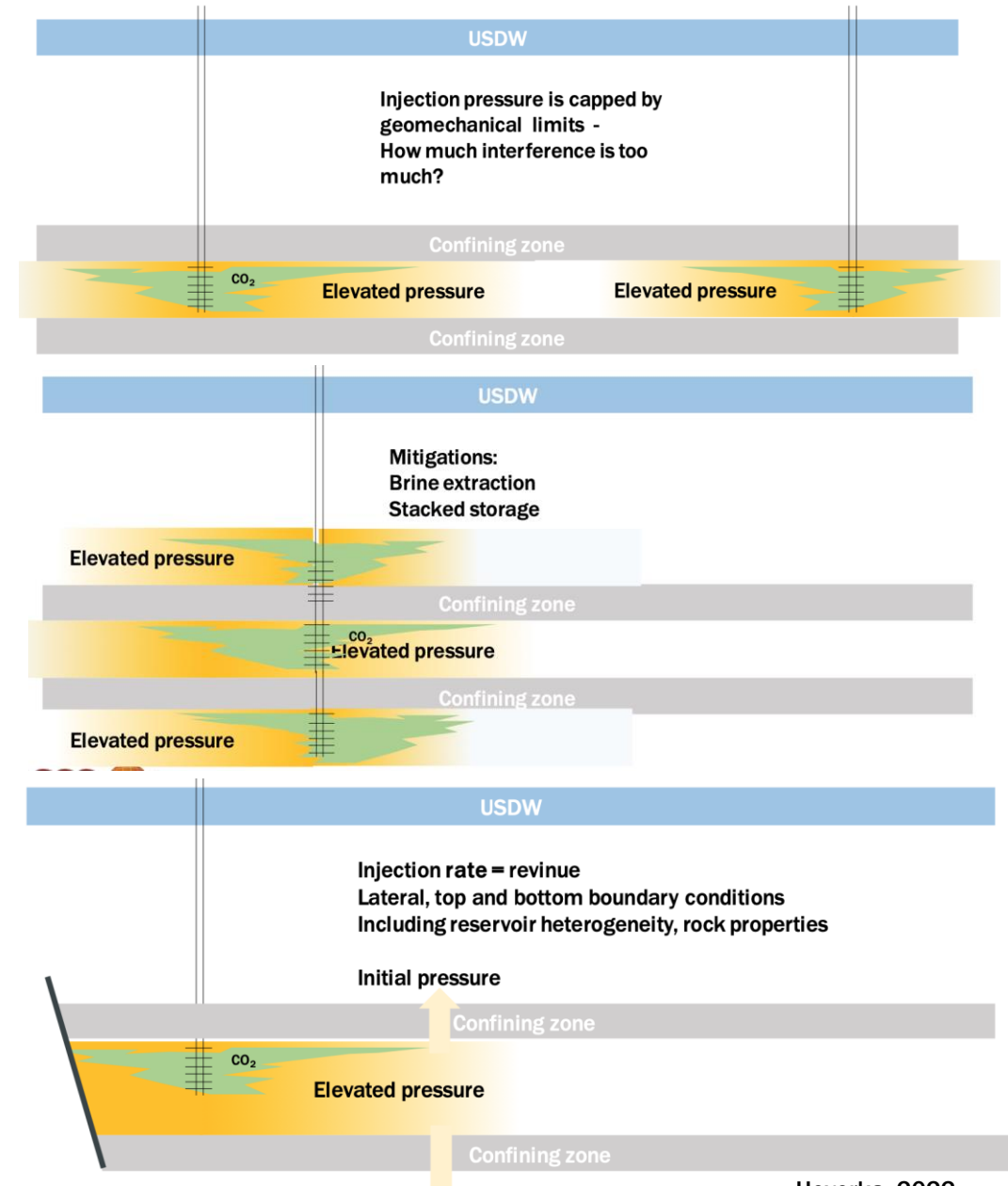




# Future Work

## Research Questions:

- Understand the interference between multiple CO<sub>2</sub> injection projects in the same basin
- Improve capacity estimations considering allowable pressure increases in the reservoir and basin to avoid cap rock failure and leakage



# Questions?