Southeast Offshore Storage Resource Assessment (SOSRA)
Project Number: DE-FE0026086

Feasibility of Alabama's Gulf Coast for Offshore CO_2 Geologic Storage and Enhanced Oil Recovery

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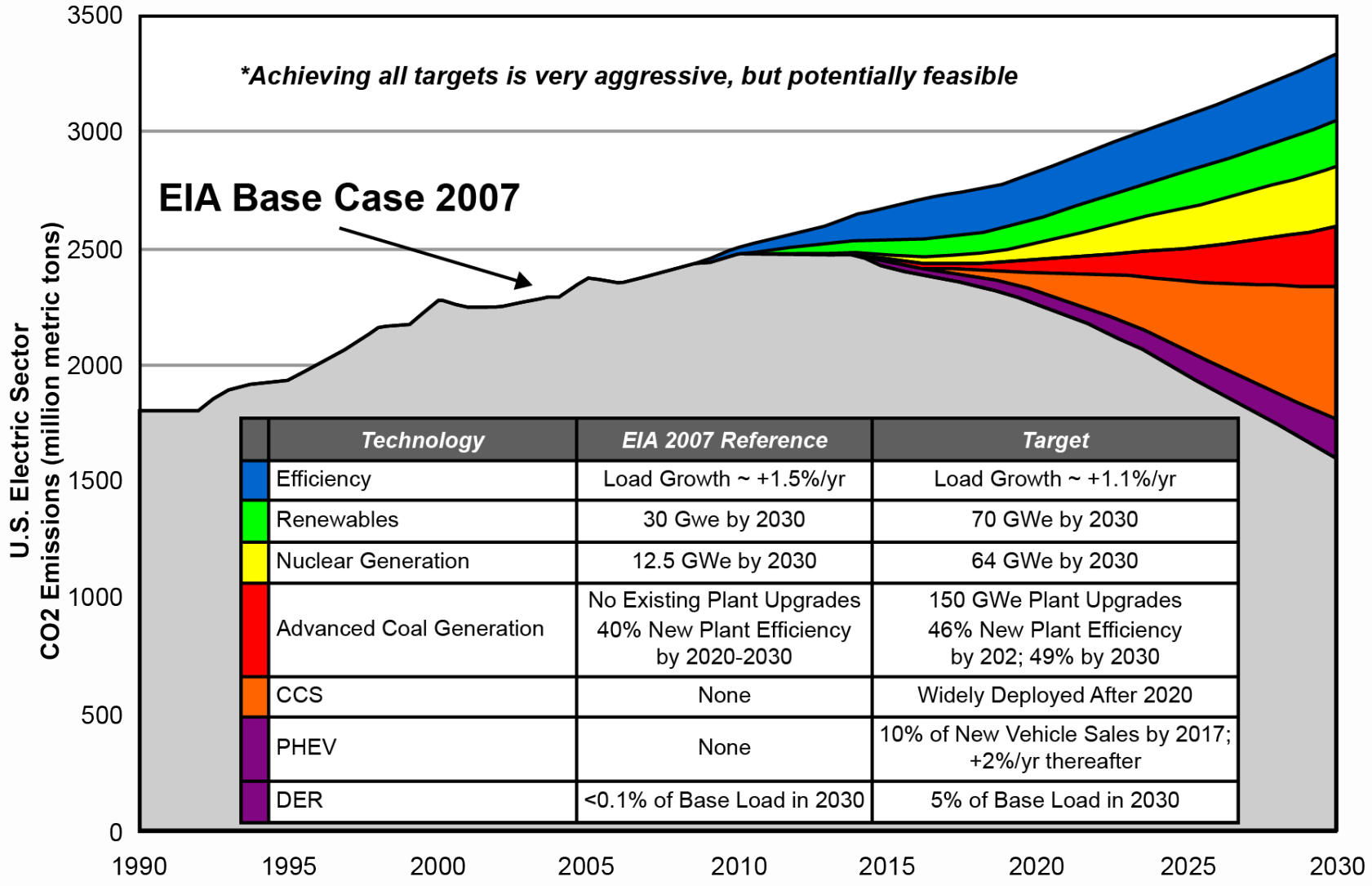
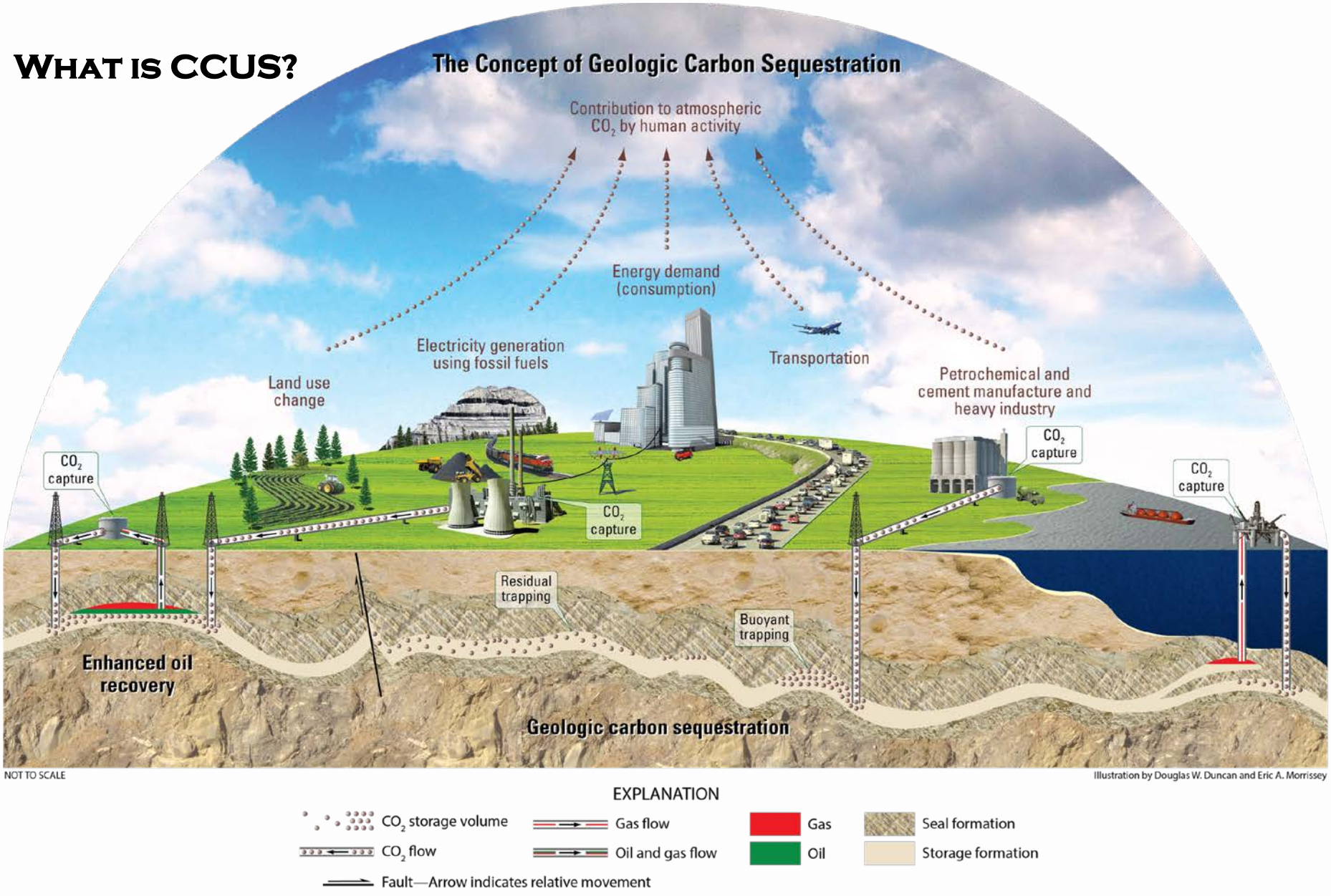
Why CCUS?



Technology	EIA 2007 Reference	Target
Efficiency	Load Growth ~ +1.5%/yr	Load Growth ~ +1.1%/yr
Renewables	30 Gwe by 2030	70 GWe by 2030
Nuclear Generation	12.5 GWe by 2030	64 GWe by 2030
Advanced Coal Generation	No Existing Plant Upgrades 40% New Plant Efficiency by 2020-2030	150 GWe Plant Upgrades 46% New Plant Efficiency by 202; 49% by 2030
CCS	None	Widely Deployed After 2020
PHEV	None	10% of New Vehicle Sales by 2017; +2%/yr thereafter
DER	<0.1% of Base Load in 2030	5% of Base Load in 2030

EPRI “Prism” report: http://mydocs.epri.com/docs/public/DiscussionPaper2007.pdf

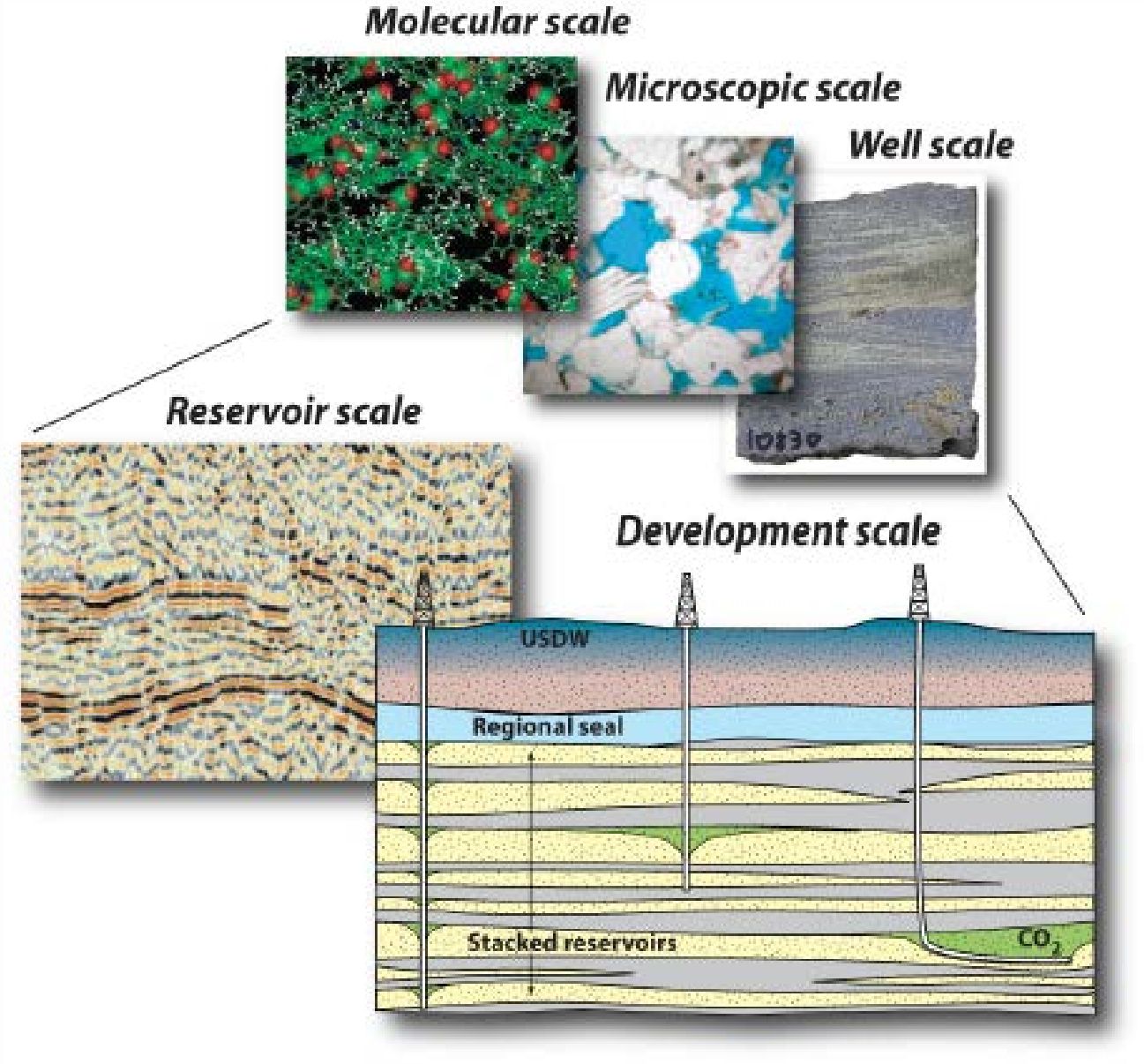
What is CCUS?



U.S Department of the Interior
U.S. Geological Survey

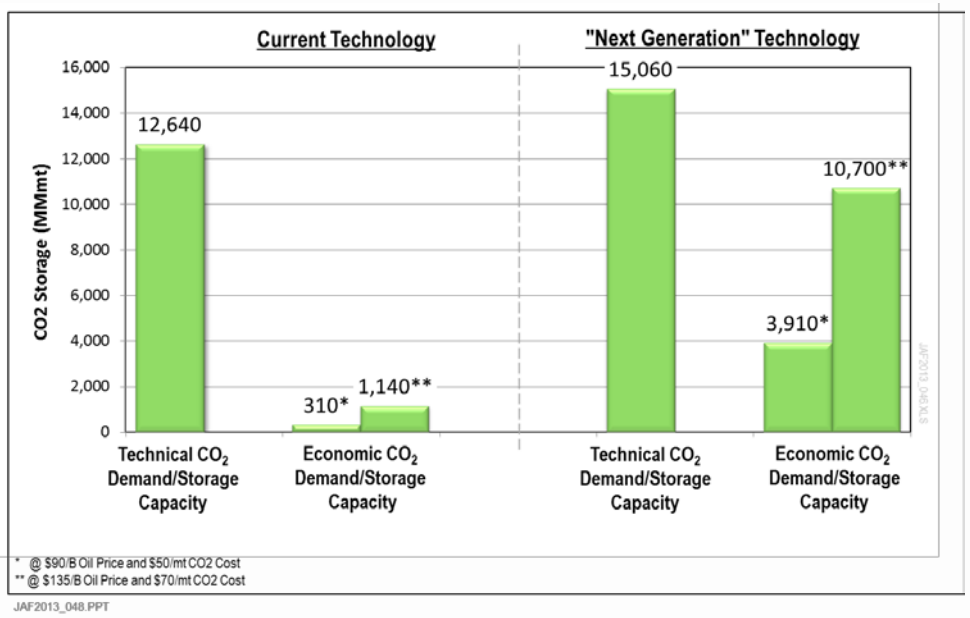
Fact Sheet 2010-3122
(http://pubs.usgs.gov-

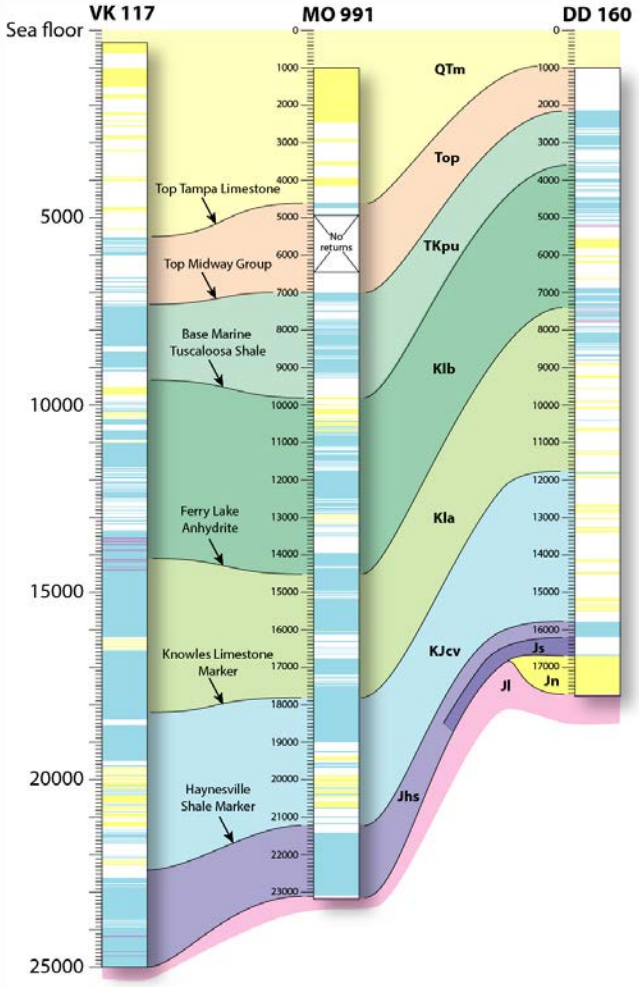
Geological Considerations



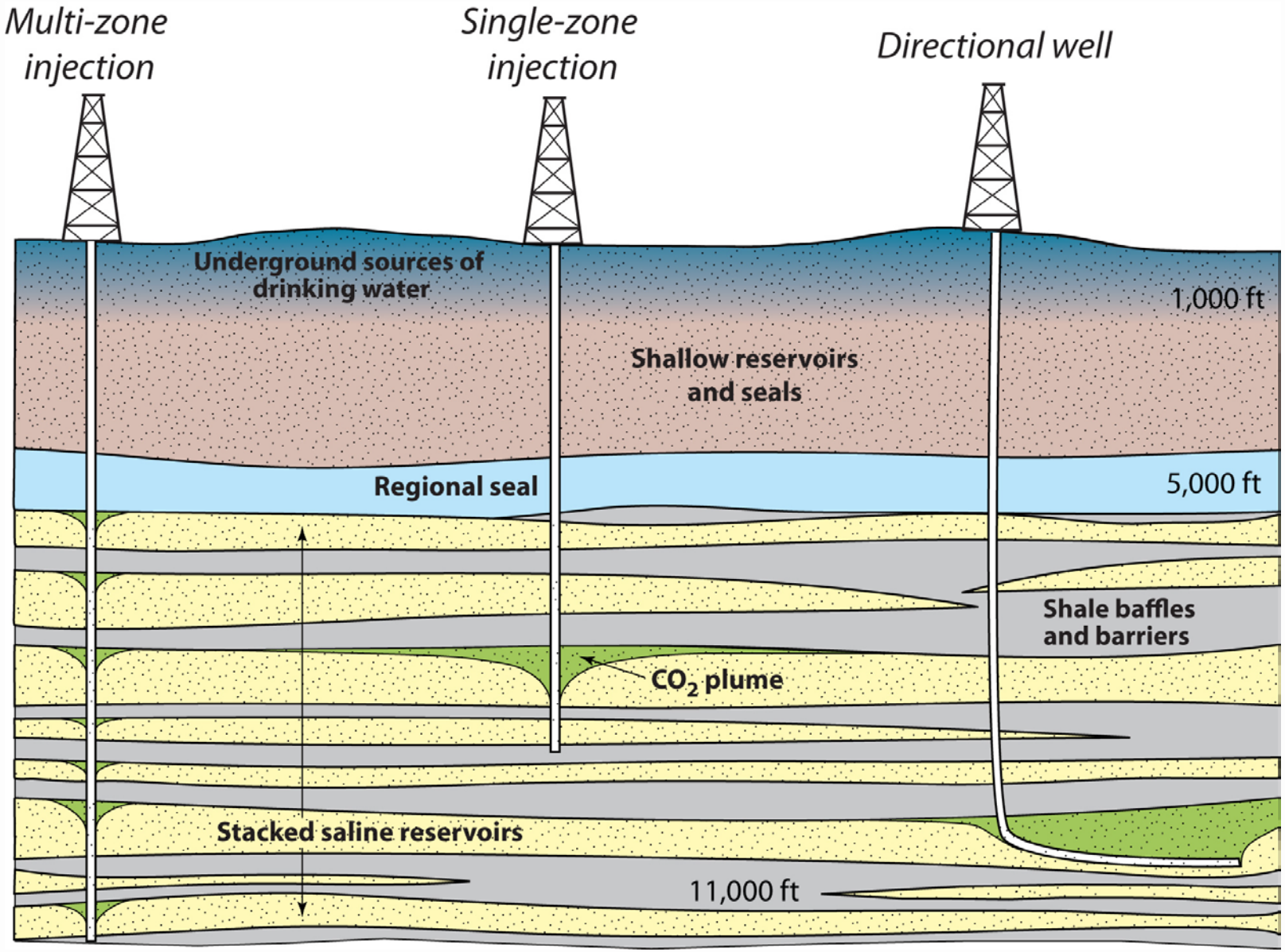
Why Offshore Reservoirs?

- Potentially giant CO_2 capacity
- Abundant stacked saline formations and depleted oil and gas reservoirs
- Significant infrastructure in place
- Proven offshore sequestration technology
- Favorable ownership and access

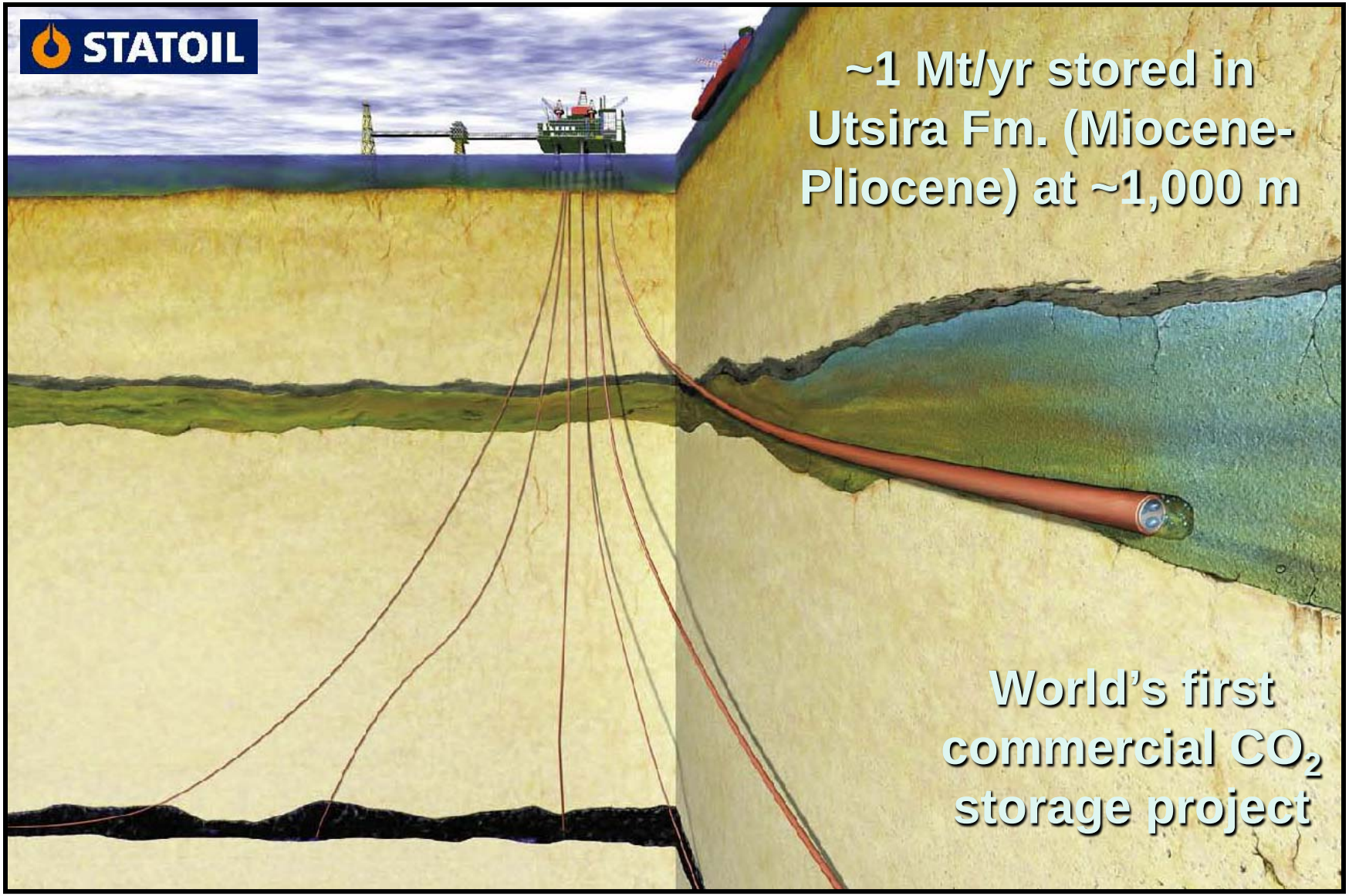




How Do We Adapt Proven Storage Strategies?

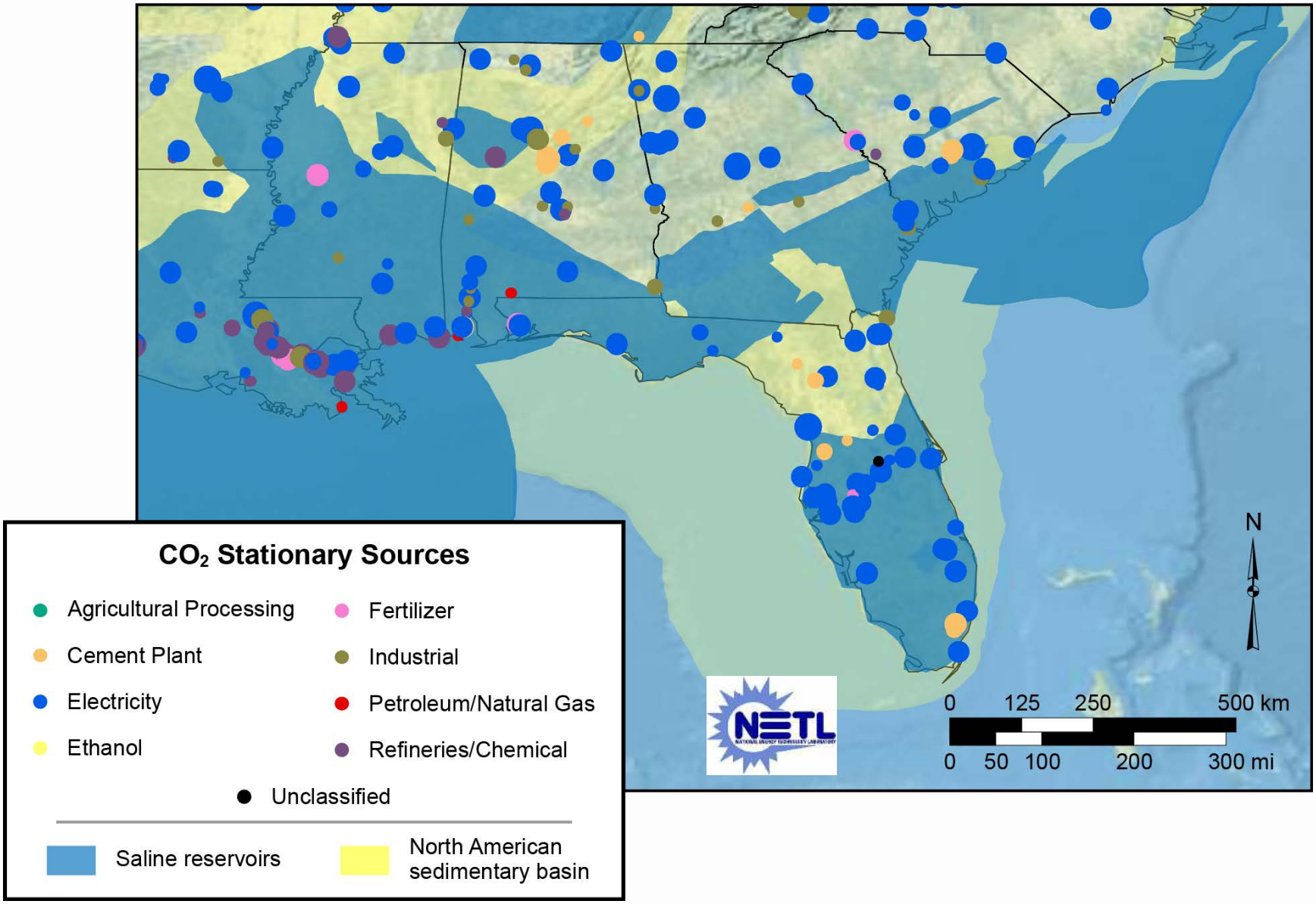


Offshore CO_2 Storage: Sleipner, North Sea

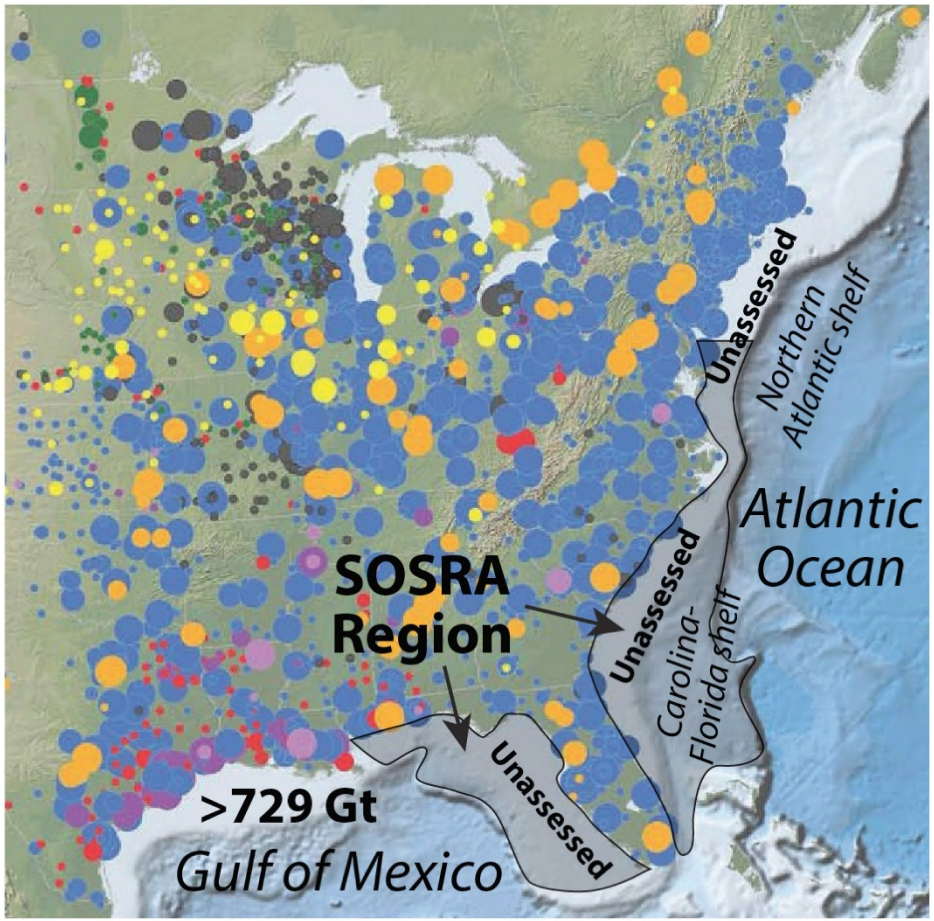


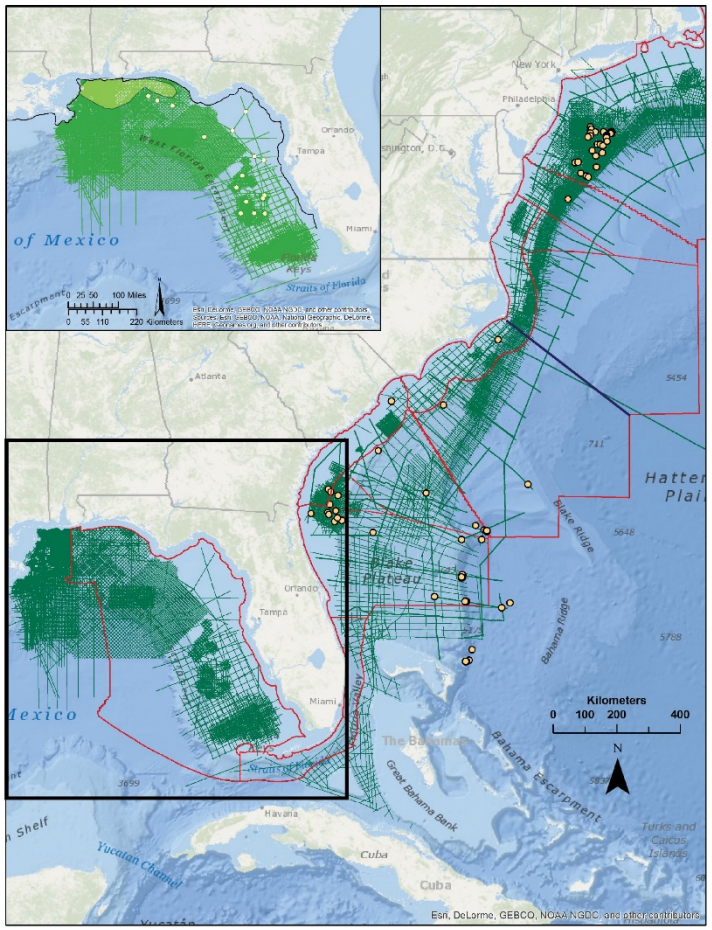
Kaarstad (2004)

US CO_2 EMISSION SOURCES

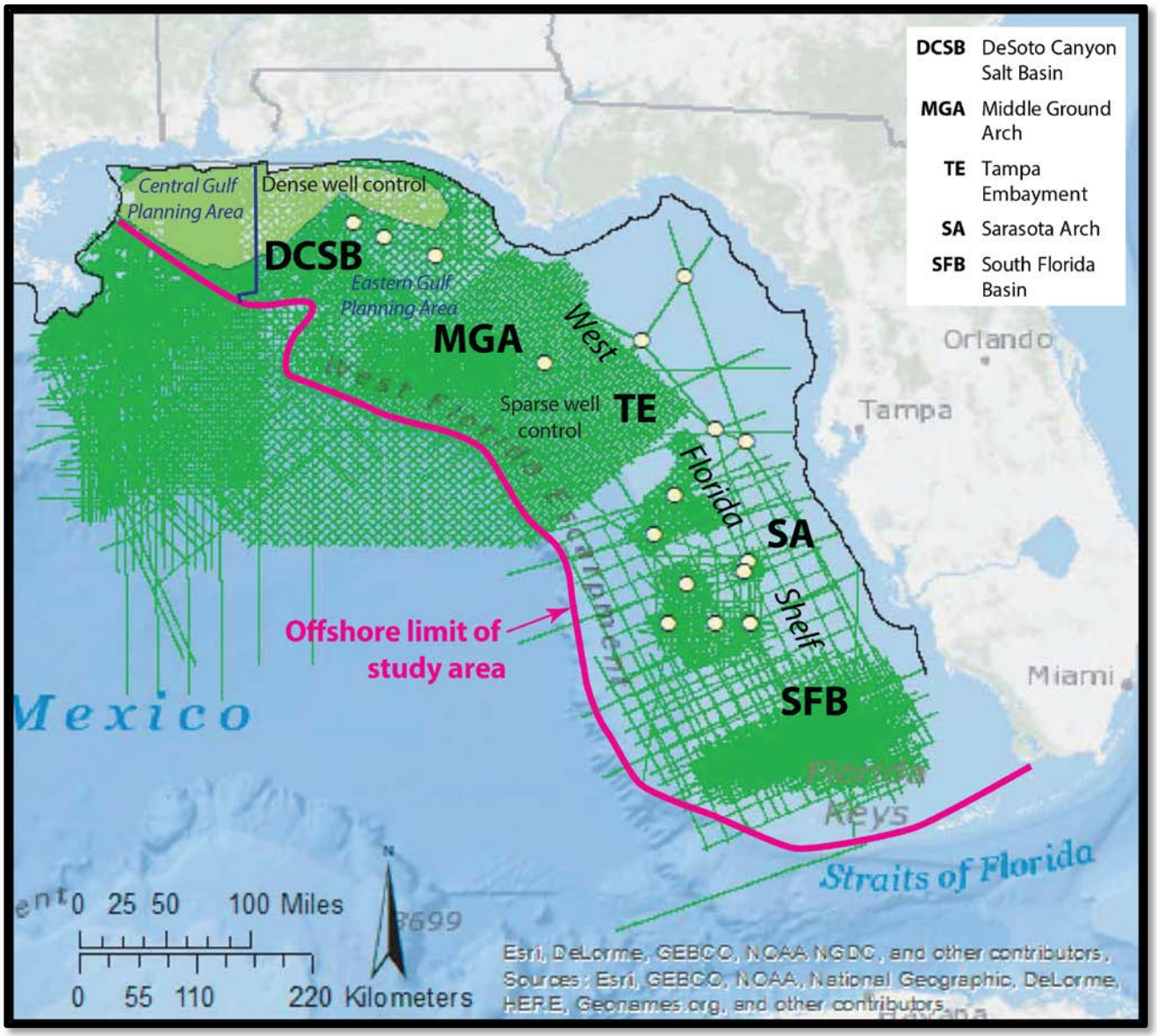


Southeast Offshore Storage Resource Assessment (SOSRA)





Study Area and Subregions



DCSB DeSoto Canyon Salt Basin

MGA Middle Ground Arch

TE Tampa Embayment

SA Sarasota Arch

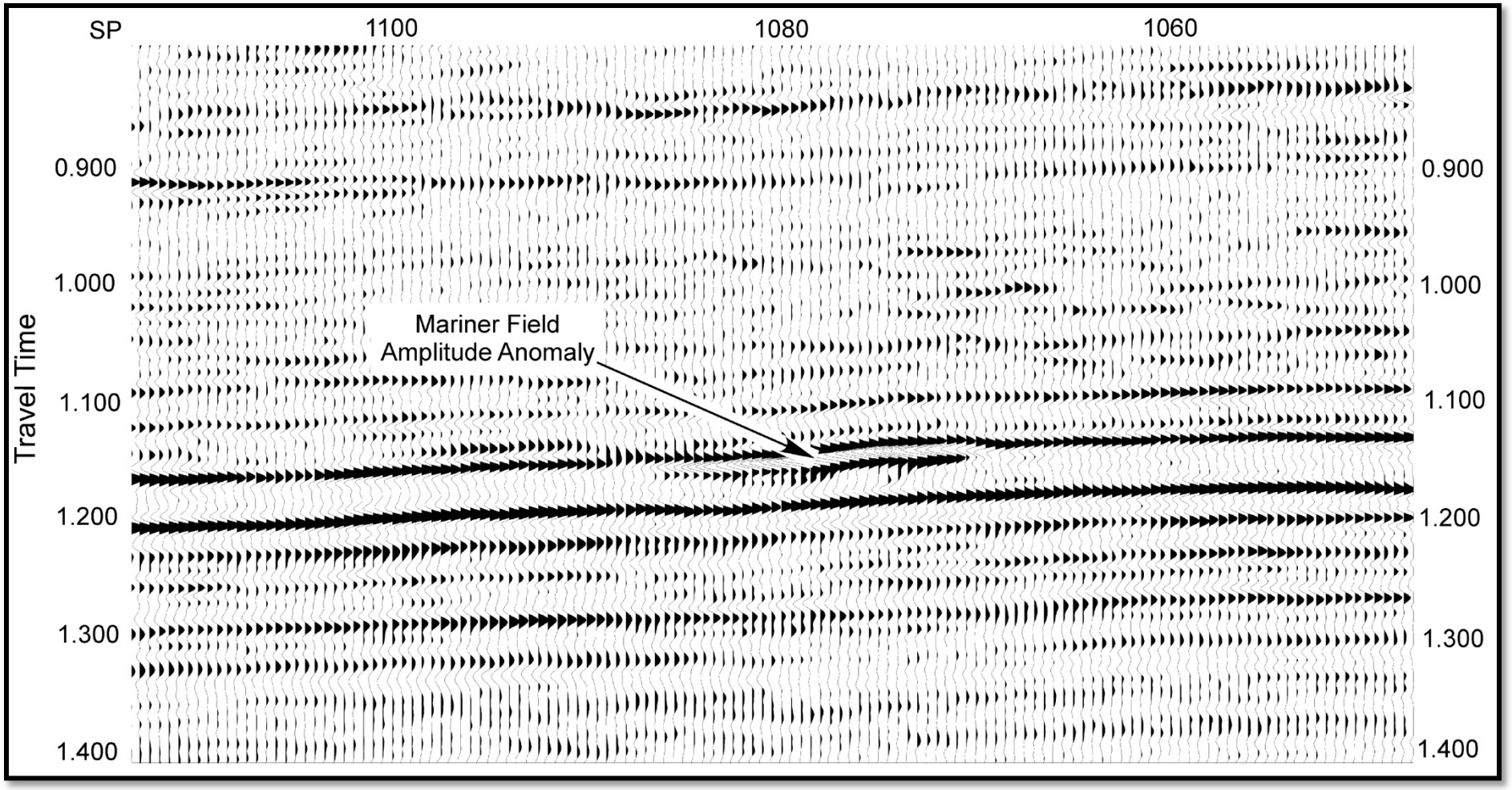
SFB South Florida Basin

A Tale of Two Platforms

Ultradeep gas platform

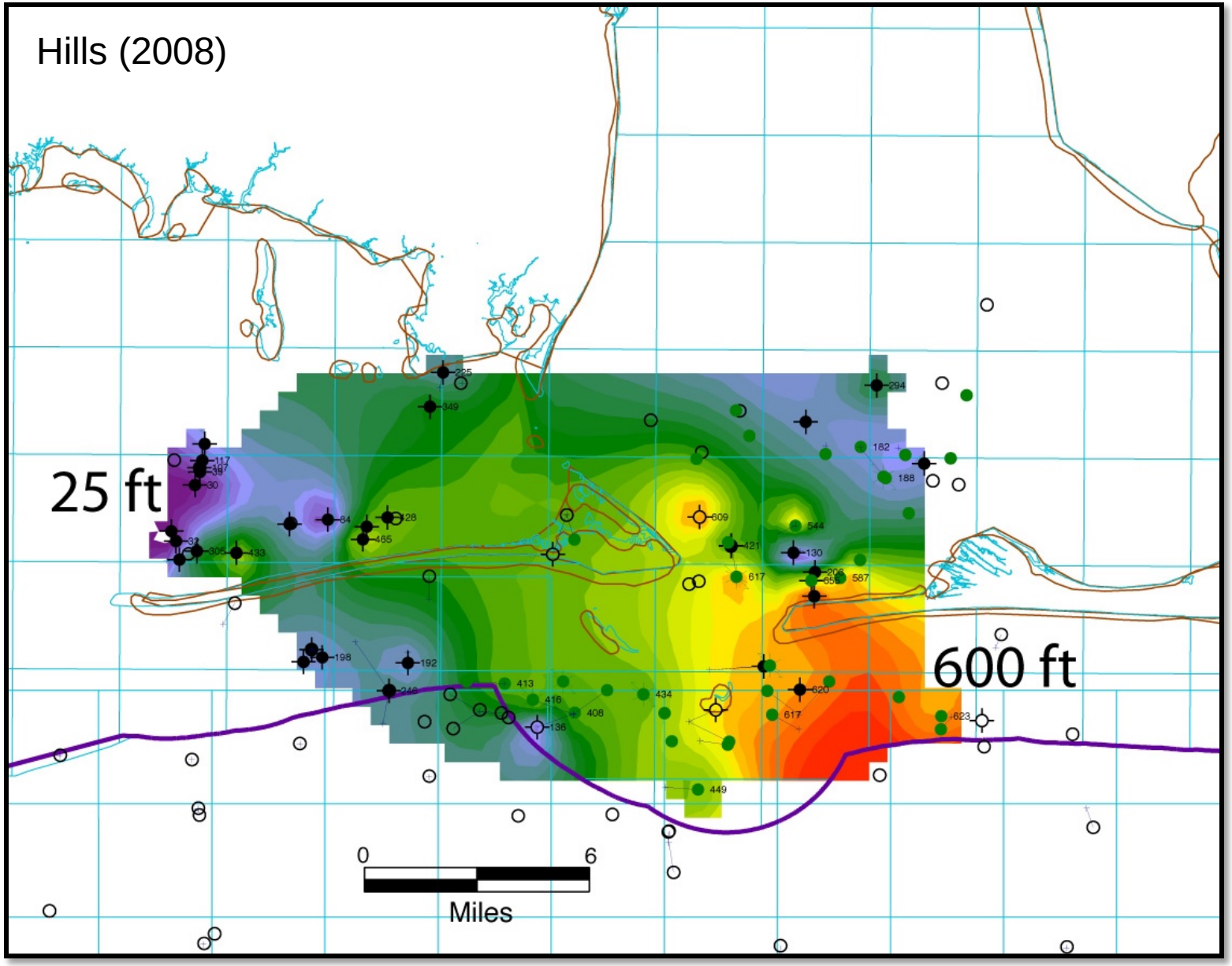
Shallow gas well

Miocene Gas Sands

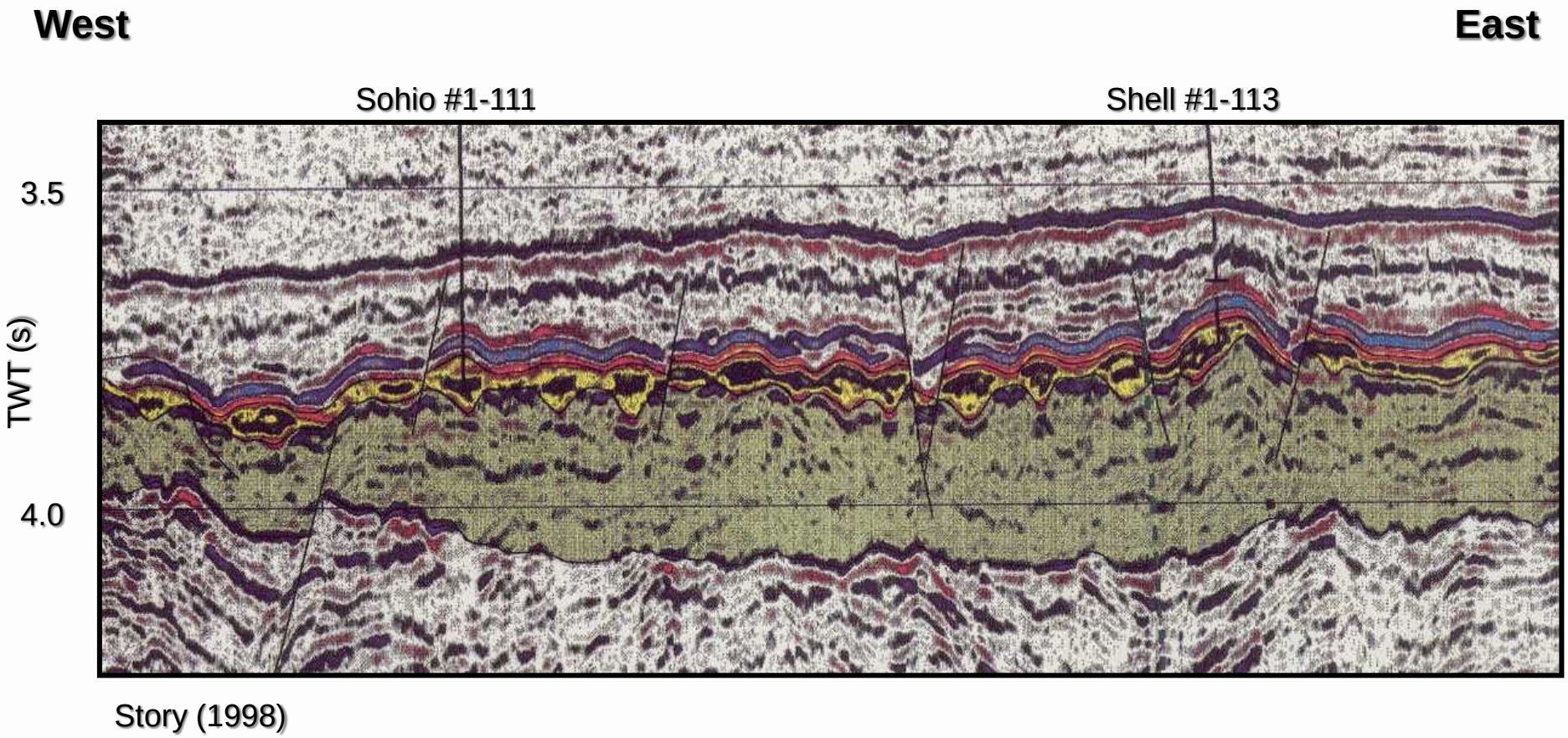


Handford and Baria (2003)

Net Miocene Sand > 2500 ft Deep



Norphlet Sandstone, Mobile Bay Area

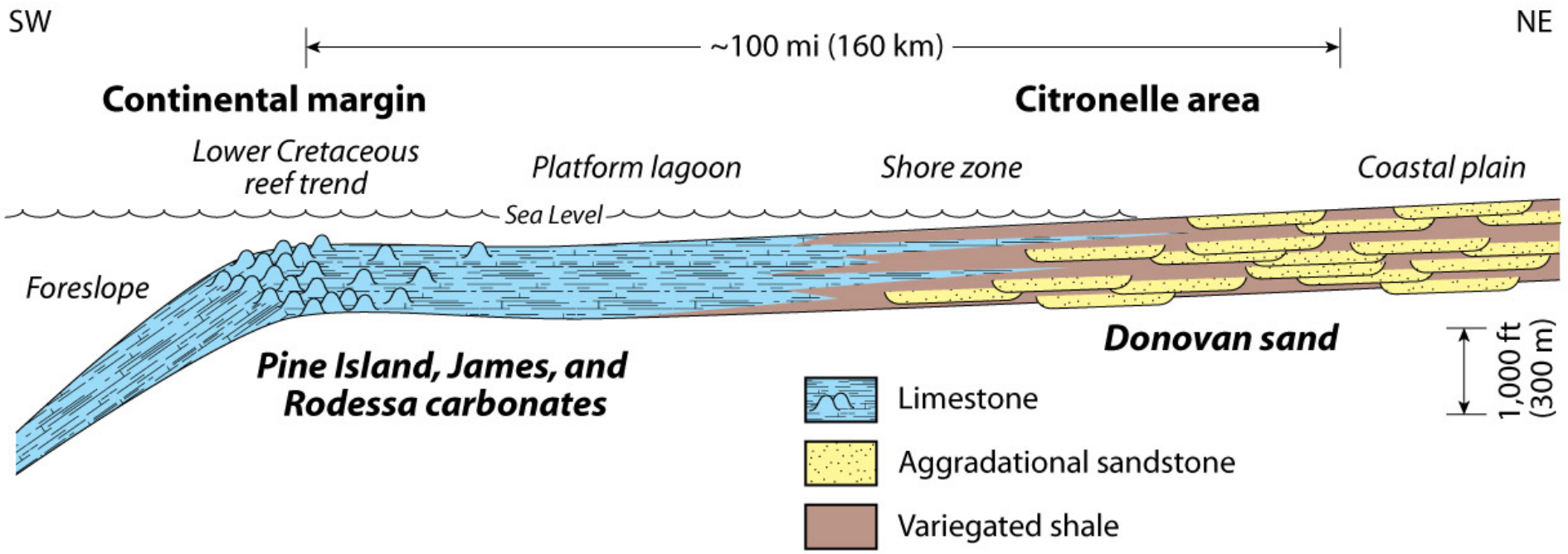


Story (1998)

Cretaceous Facies

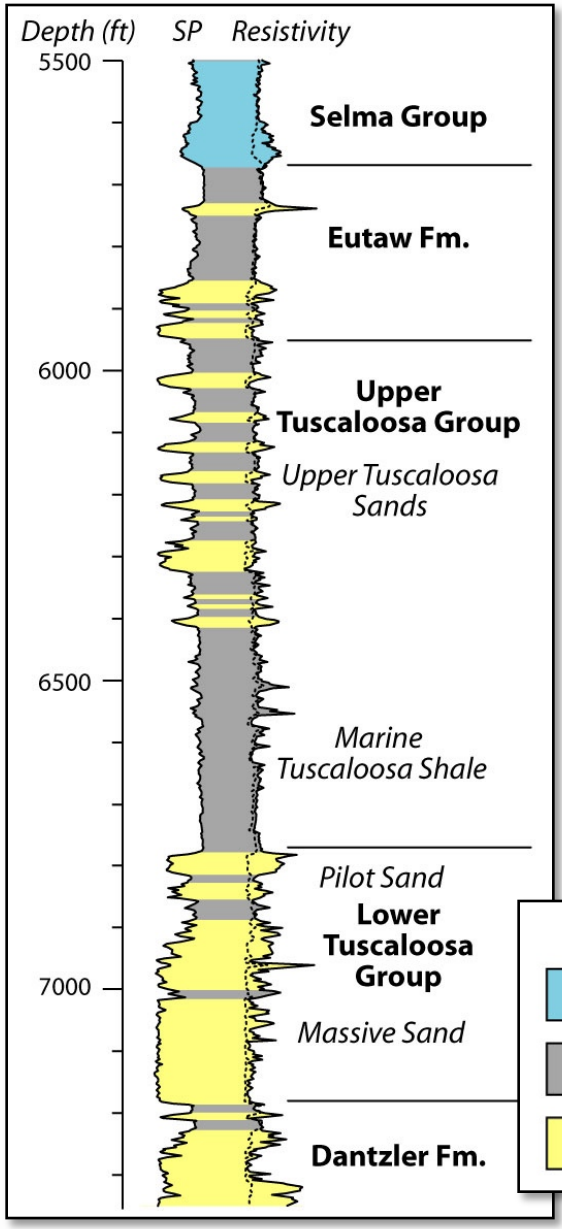
SOSRA REGION

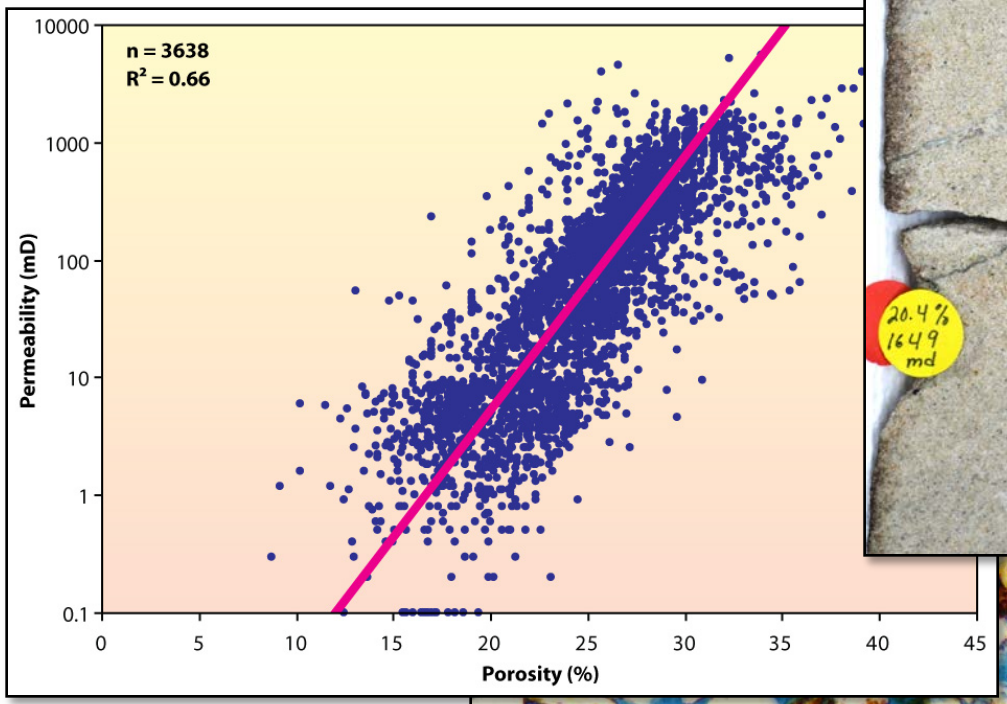
NETL EOR TEST
SECARB ANTHROPOGENIC TEST

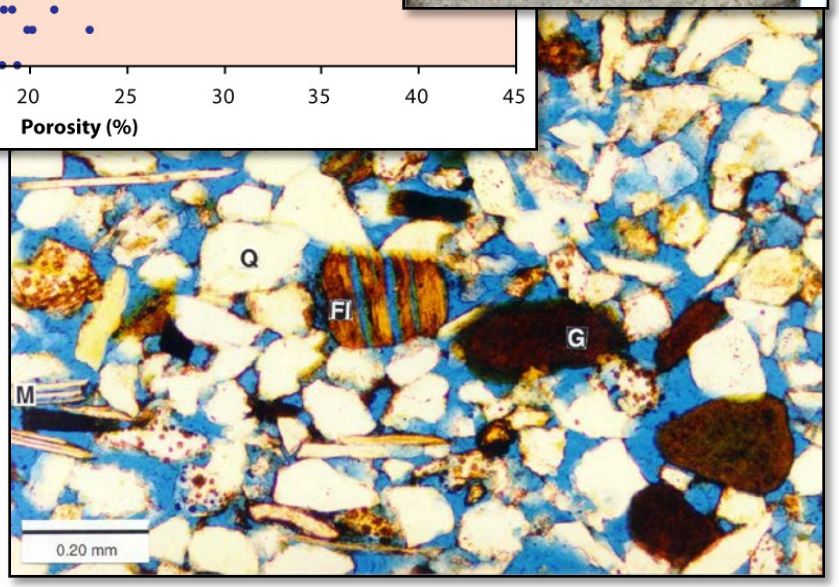


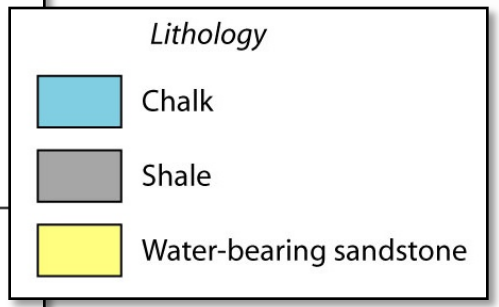
Pashin et al. (2014)

Cretaceous Sandstone

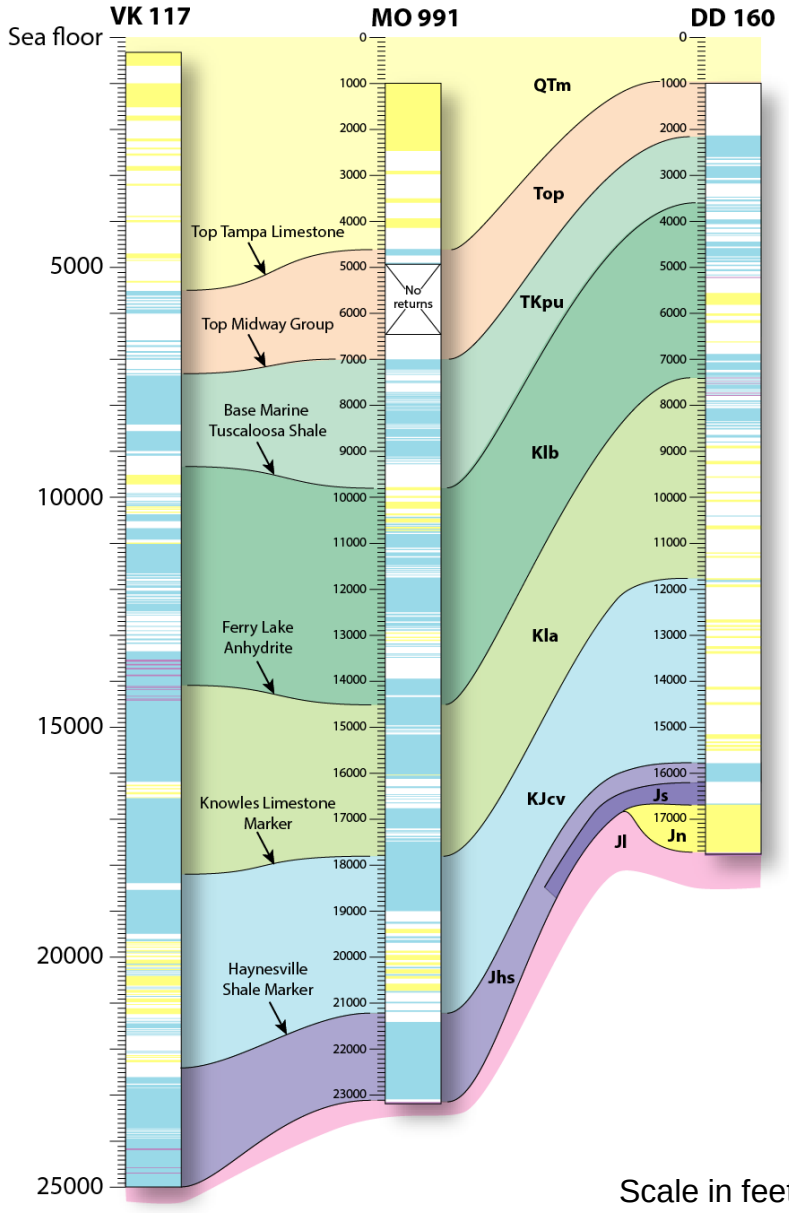








DeSoto Canyon Salt Basin - Lithologic Columns



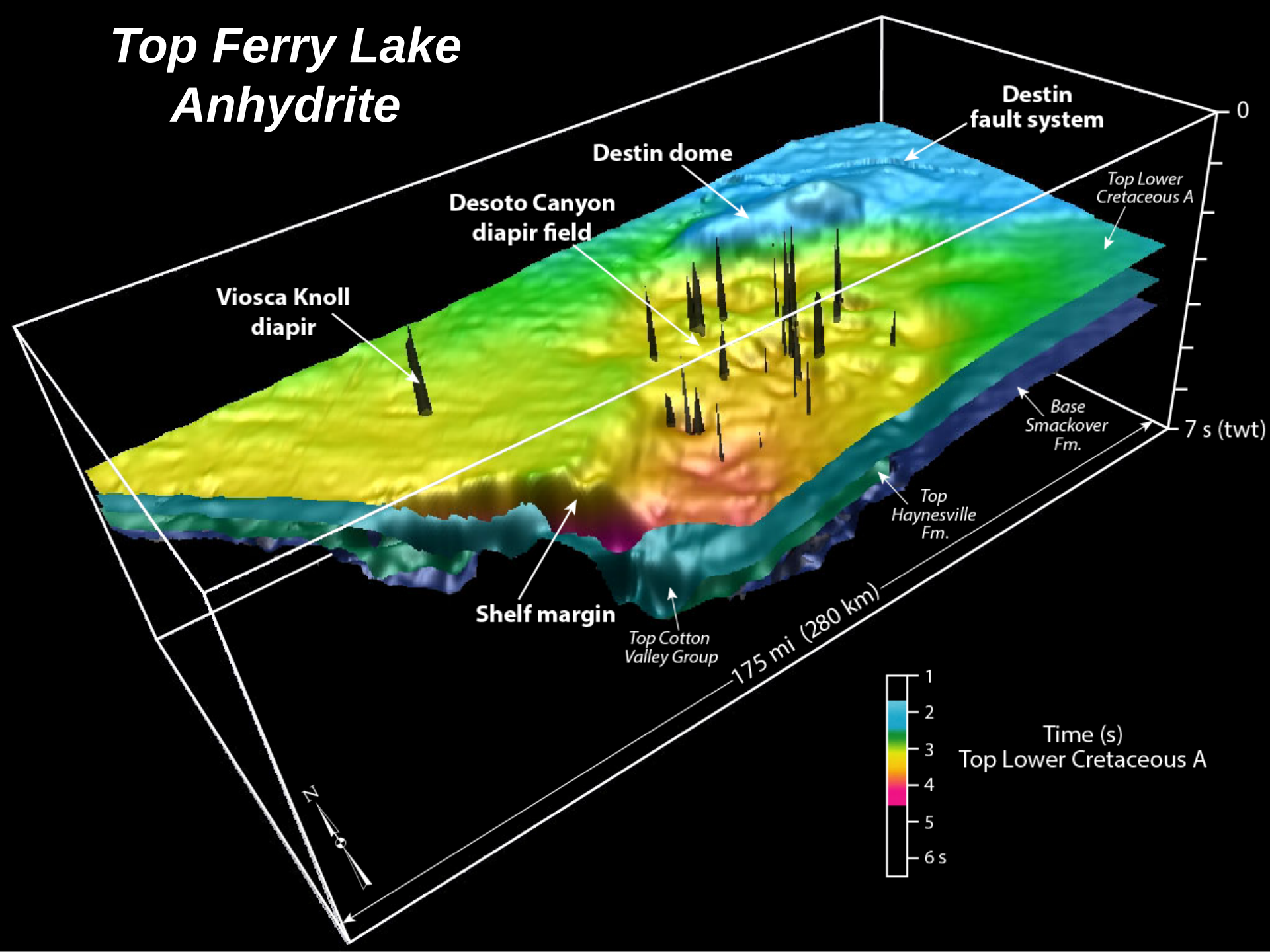
Scale in feet

Lithology

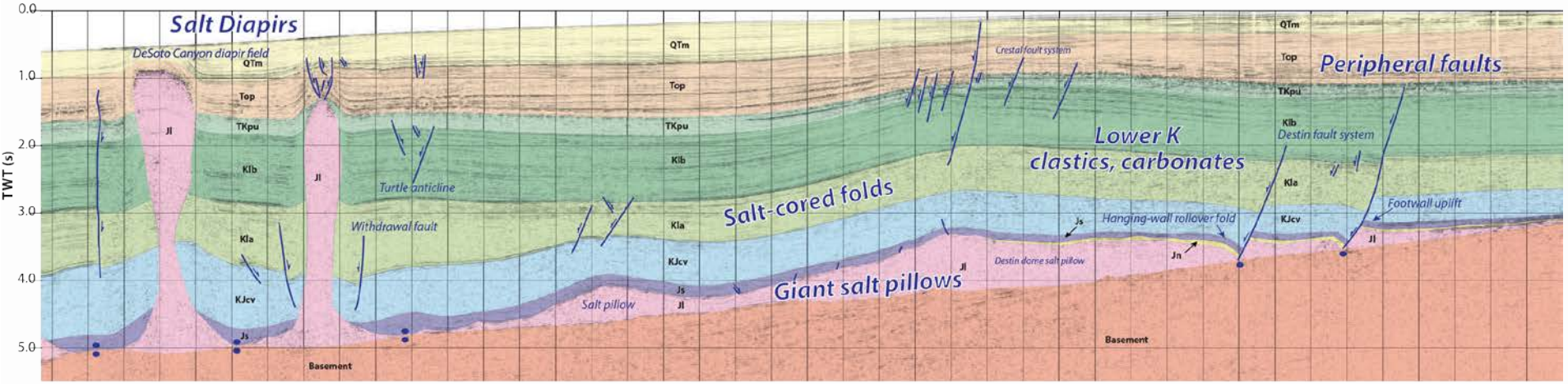
- Shale
- Sandstone
- Limestone
- Anhydrite, Salt

Stratigraphy

- QTm — Quaternary-Miocene
- Top — Oligocene-Paleocene
- TKpu — Paleocene-Upper Cretaceous
- Klb — Lower Cretaceous B
- Kla — Lower Cretaceous A
- KJcv — Cotton Valley Group
- Jhs — Haynesville and Smackover Formations
- Js — Smackover Formation
- Jn — Norphlet Formation
- Jl — Louann Salt


Top Ferry Lake Anhydrite
Destin fault system
Destin dome
Desoto Canyon diapir field
Viosca Knoll diapir
Top Lower Cretaceous A
Base Smackover Fm.
Top Haynesville Fm.
Shelf margin
Top Cotton Valley Group
0
7 s (twt)
175 mi (280 km)
N
1
2
3
4
5
6 s
Time (s)
Top Lower Cretaceous A

DCSB Destin Dome



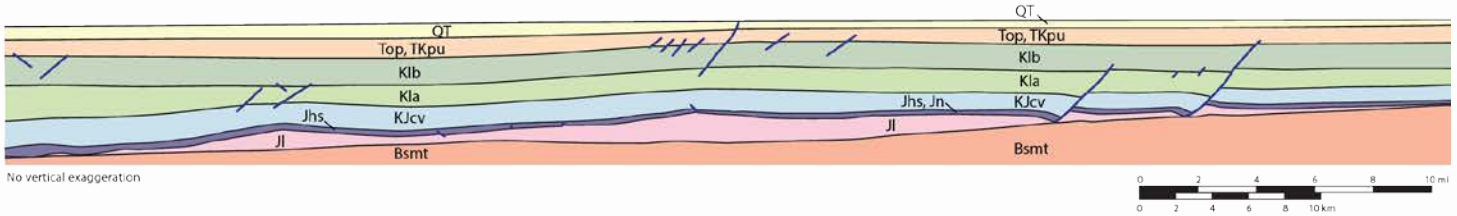
Interpretation

QTm	Quaternary-Miocene
Top	Oligocene-Paleocene
TKpu	Paleocene-Upper Cretaceous
Klb	Lower Cretaceous B
Kla	Lower Cretaceous A
KJcv	Cotton Valley Group
Js	Smackover Formation
Jn	Norphlet Formation
Jl	Louann Salt
Base-ment	Paleozoic and Mesozoic basement

Normal fault; arrow indicates relative motion

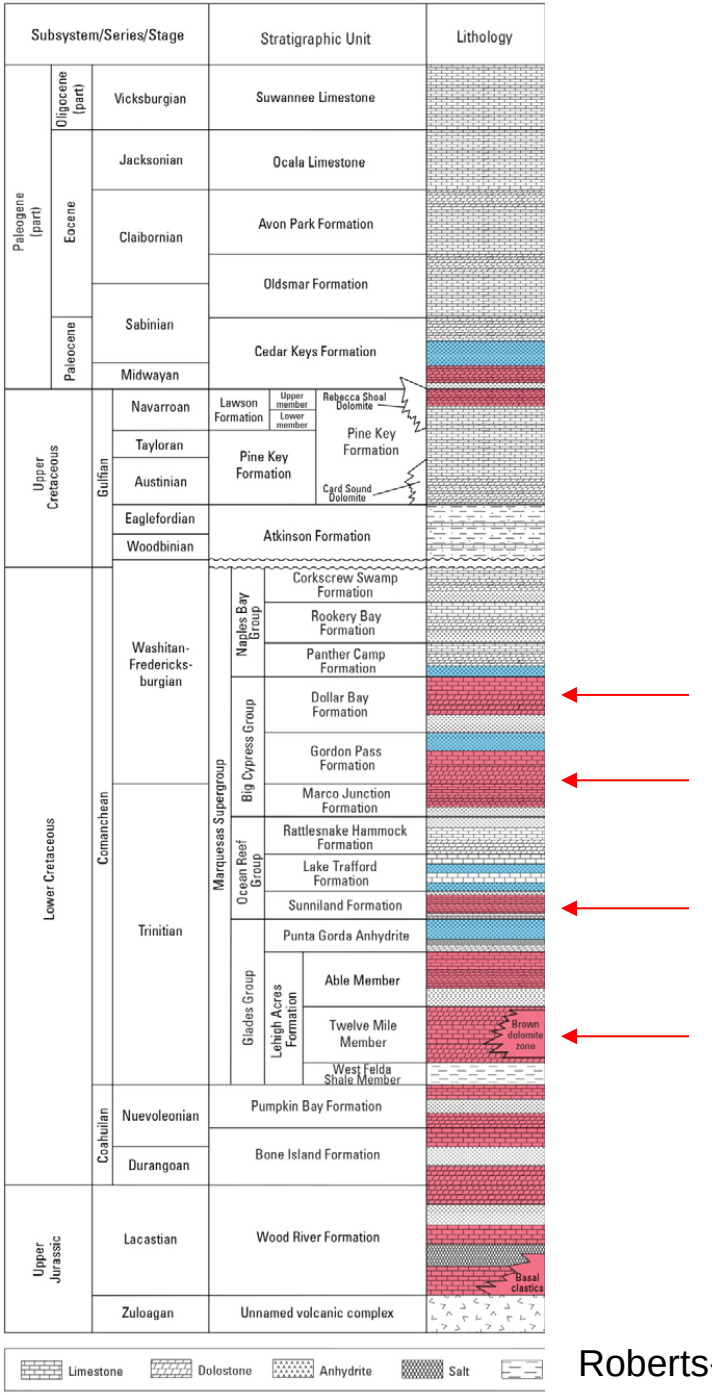
Horizontal weld

Line weld



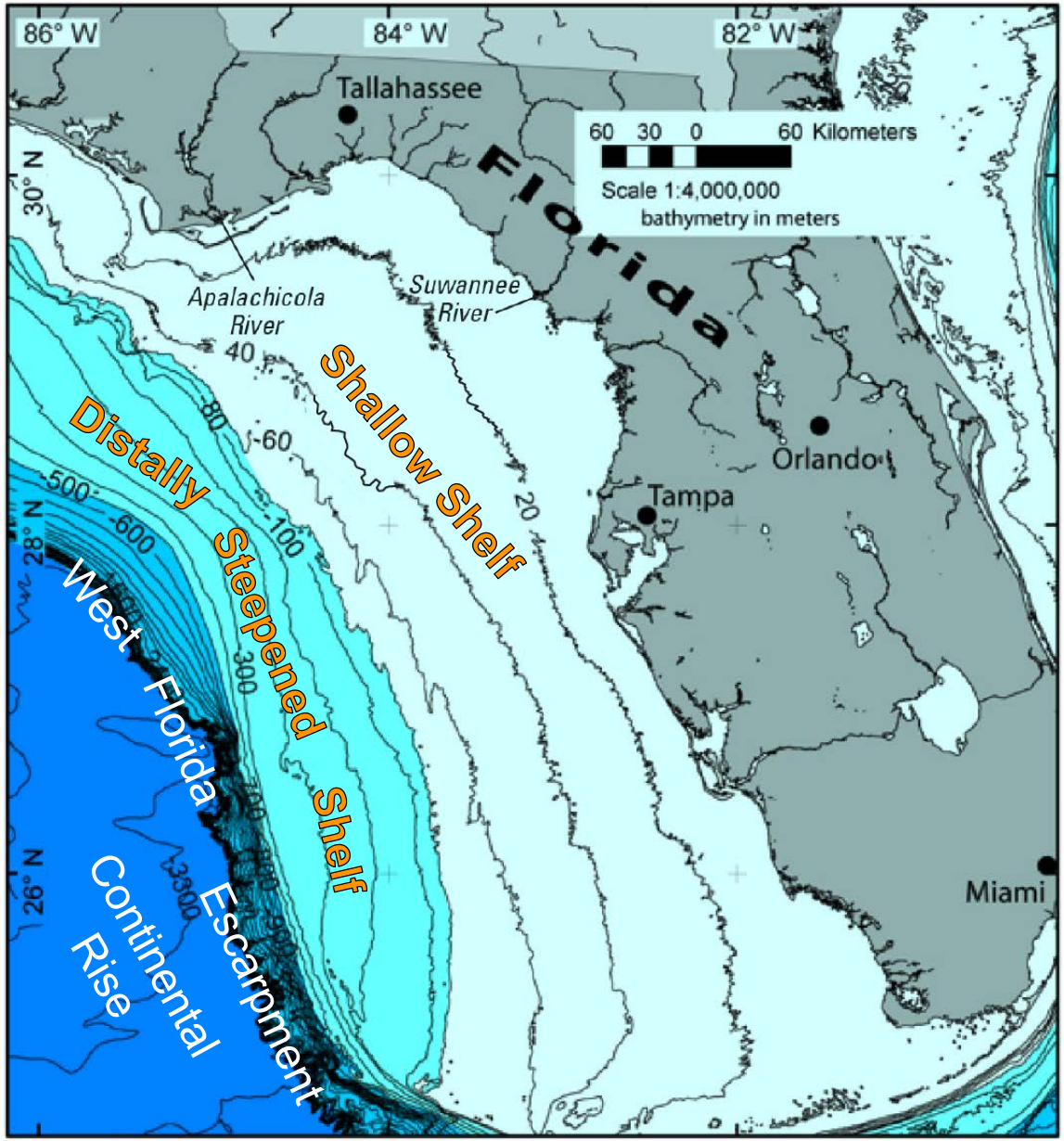
Florida – Lithologic Column

Blue - Seal
Red - Sink



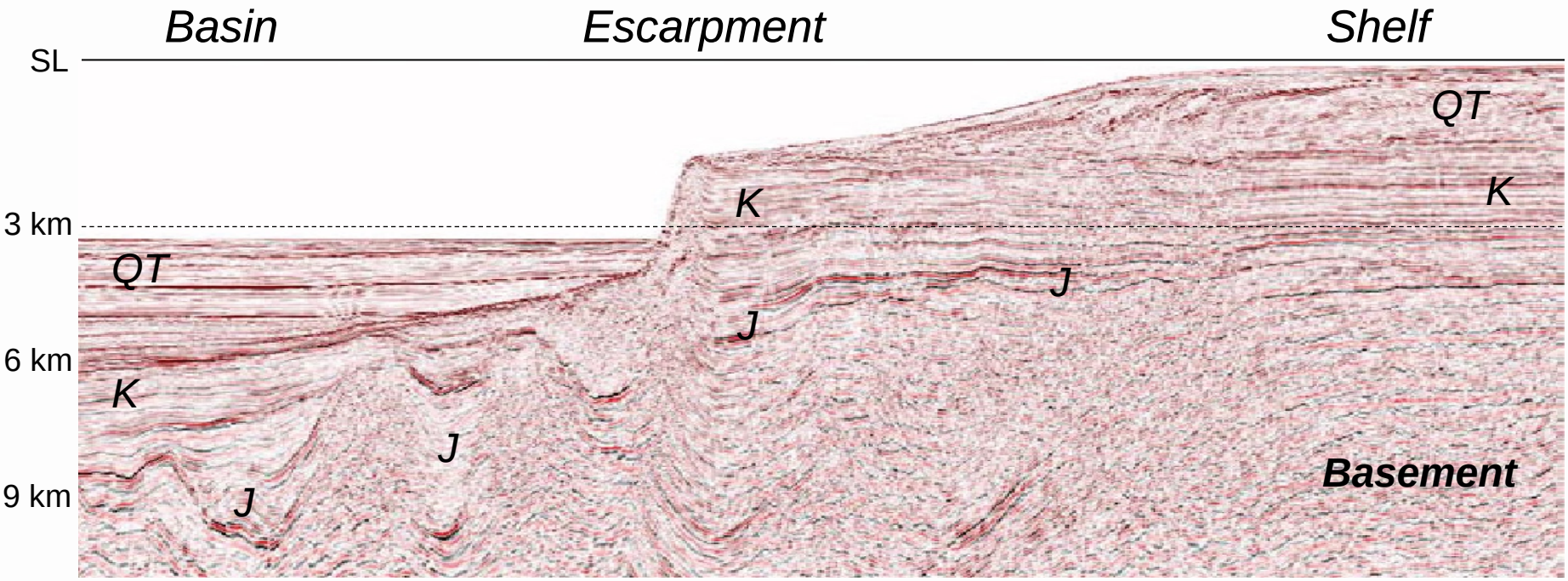
Roberts-Ashby et al. (2015)

West Florida Shelf Bathymetry



- Broad, shallow, region near shore (NE of 80 m contour).
- Distally steepening outer shelf leading to West Florida Escarpment.

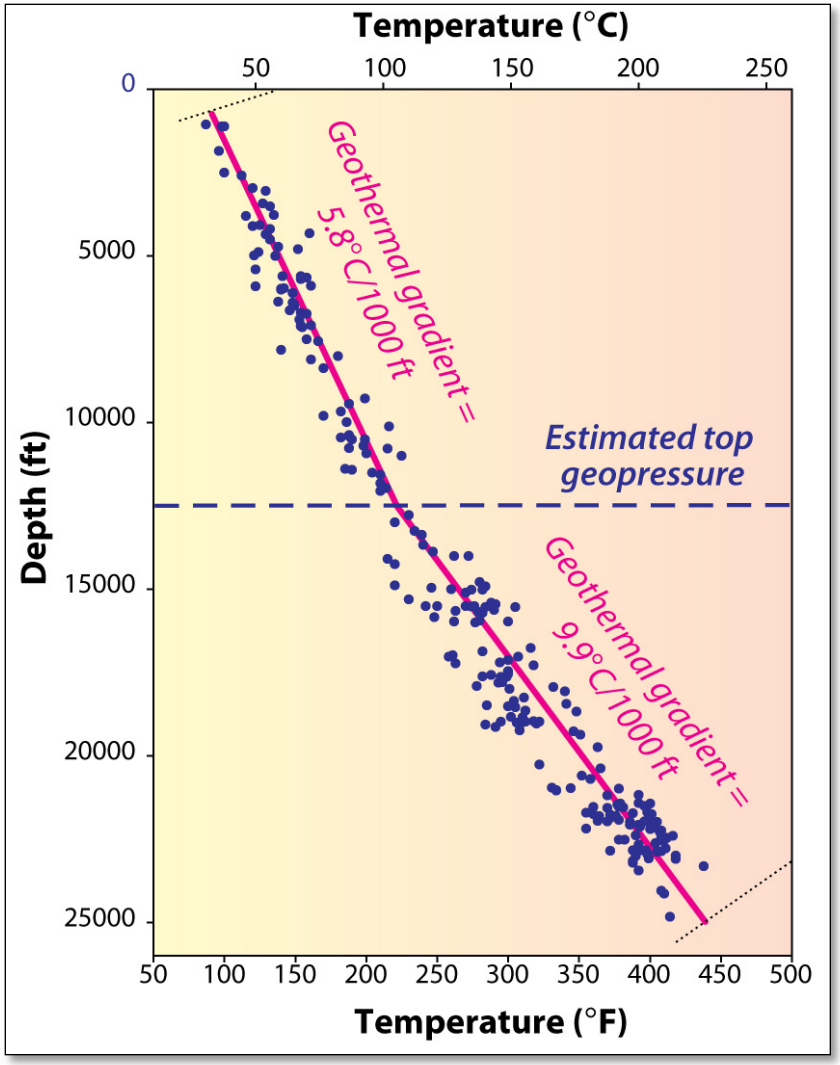
West Florida Shelf-Escarpment



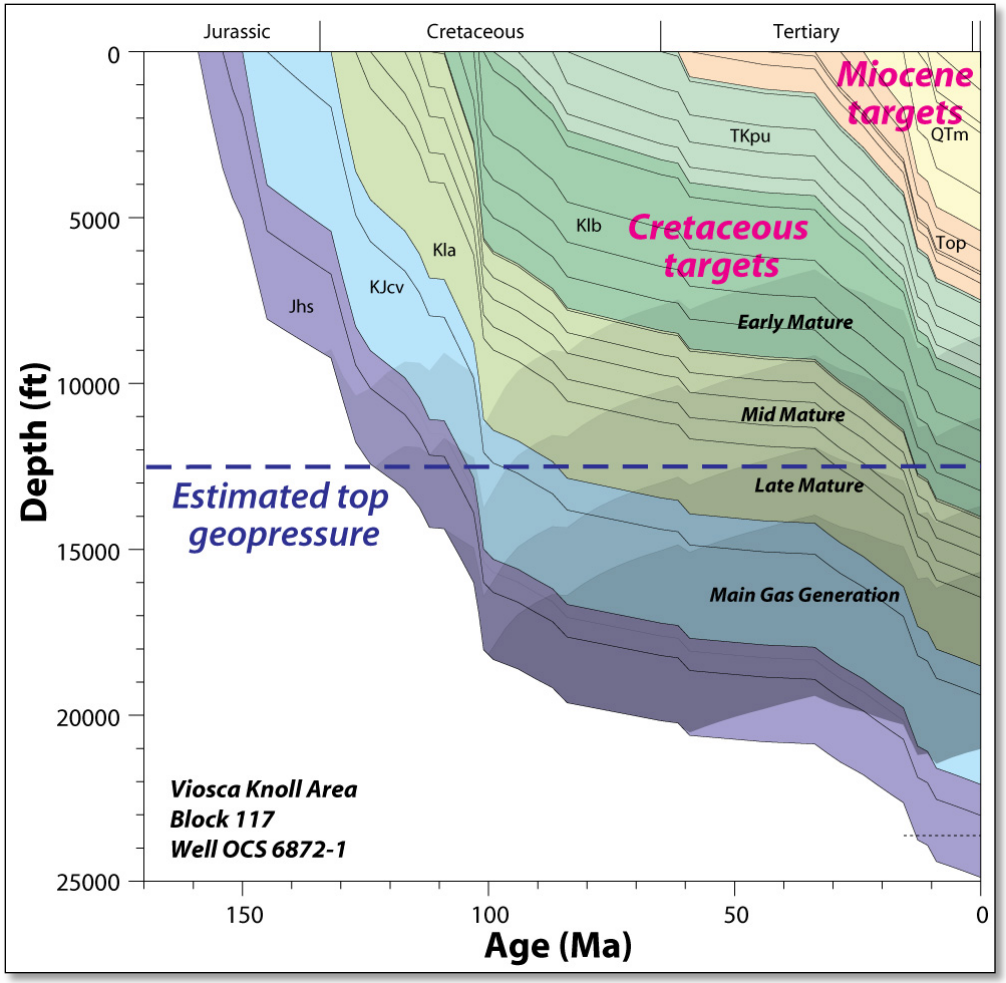
Roberts and Erickson (2009)

Geothermal and Burial Data

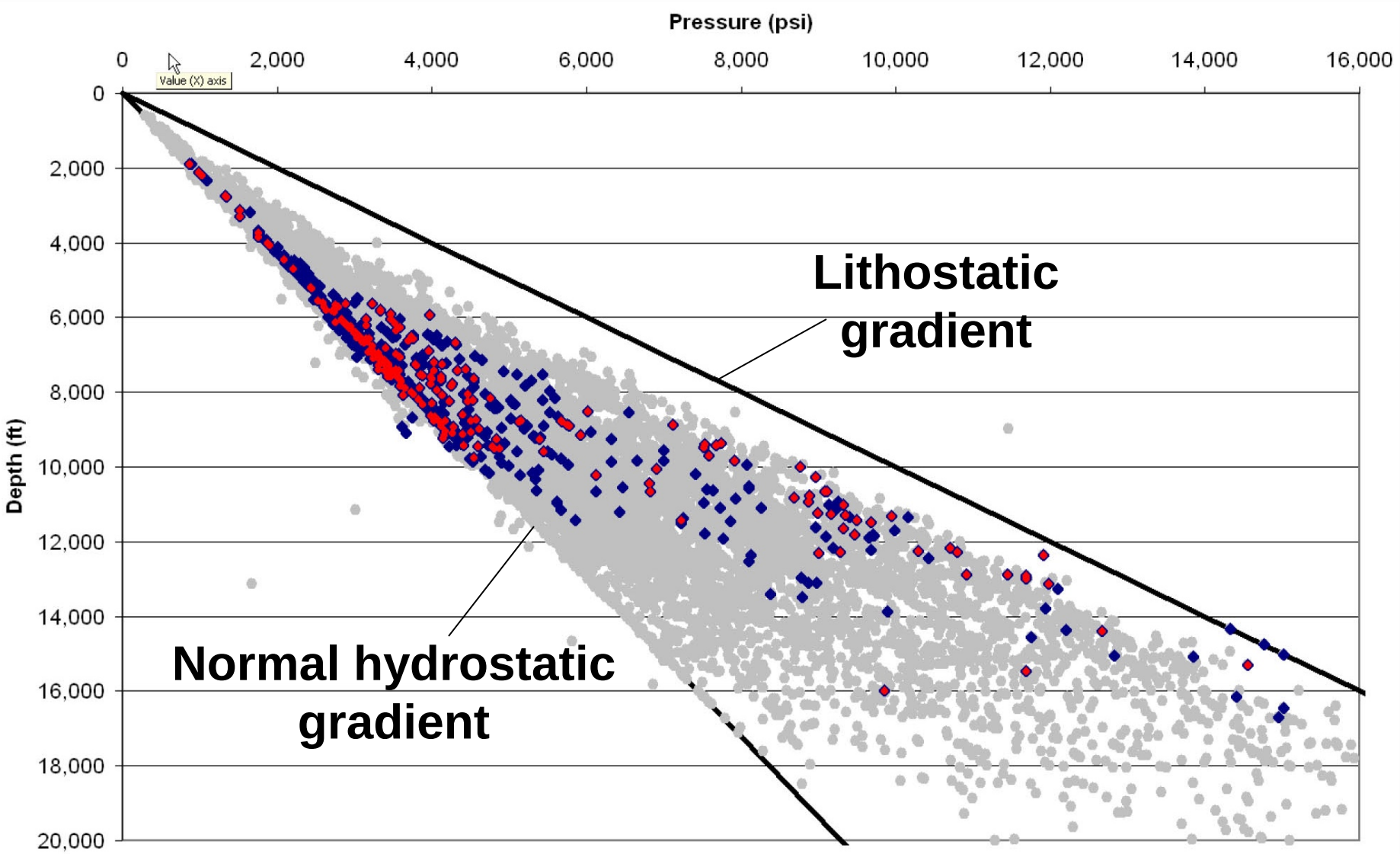
Temperature-depth profile



Burial history curve



Miocene Pressure-Depth Profile, Offshore Texas



Observations and Issues

- Large portfolio of potential sinks and seals in eastern Gulf of Mexico region.
- Seismic and well data being compiled.
- High-quality public 2D seismic data available.
- Geophysical log coverage spotty above Jurassic.
- Complex structural chronology, stratigraphic architecture in DeSoto Canyon Salt Basin.
- Relatively simple Cretaceous carbonate platform and distally steepened Cenozoic shelf in West Florida.
- Geopressure >12,000 ft; main storage prospects in Cretaceous-Miocene section.
- Is sufficient porosity, permeability available in carbonate units to support commercial offshore storage?
- Are robust reservoir seals developed above Miocene sand units?