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

Eastern Gulf of Mexico

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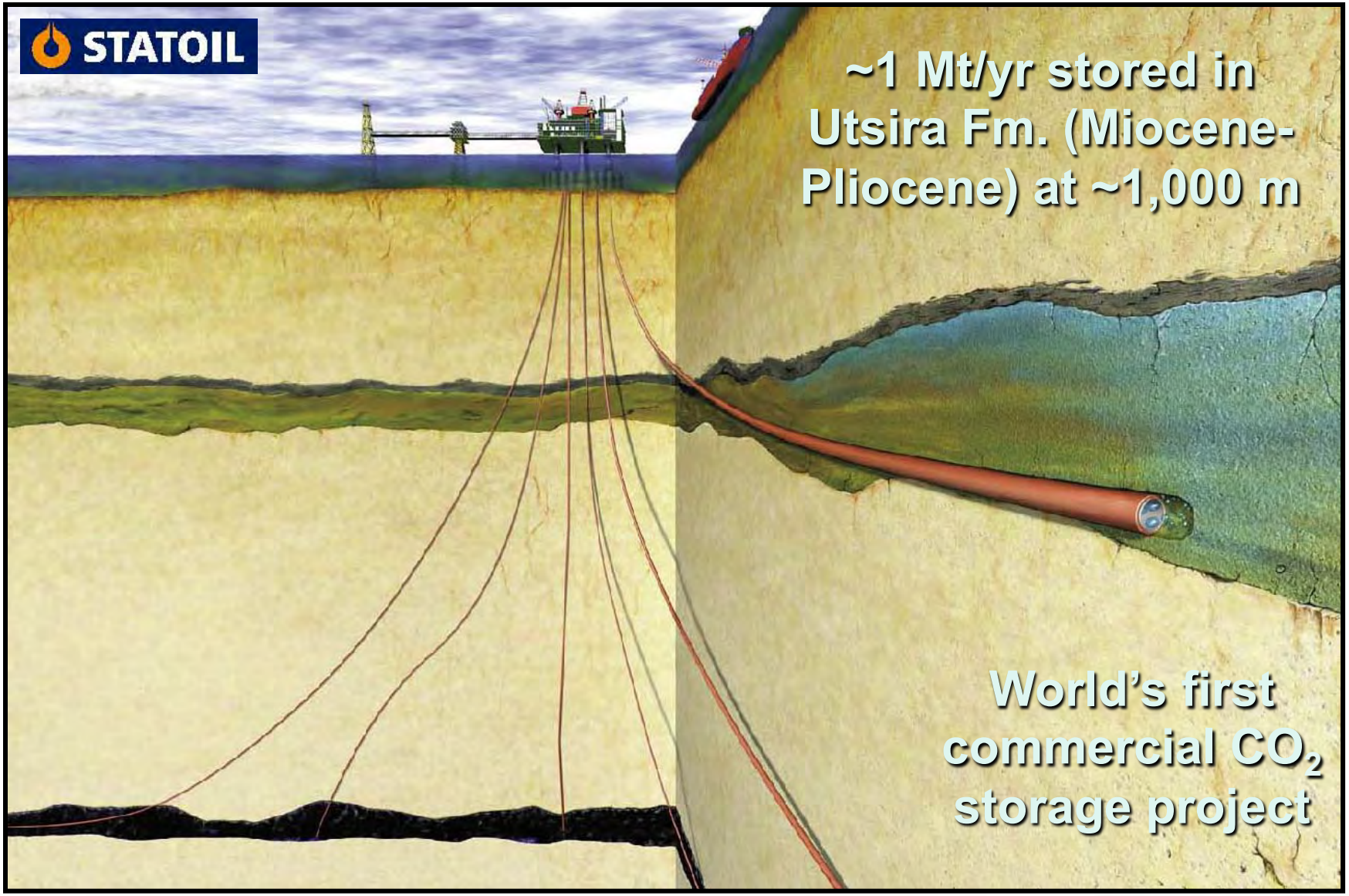
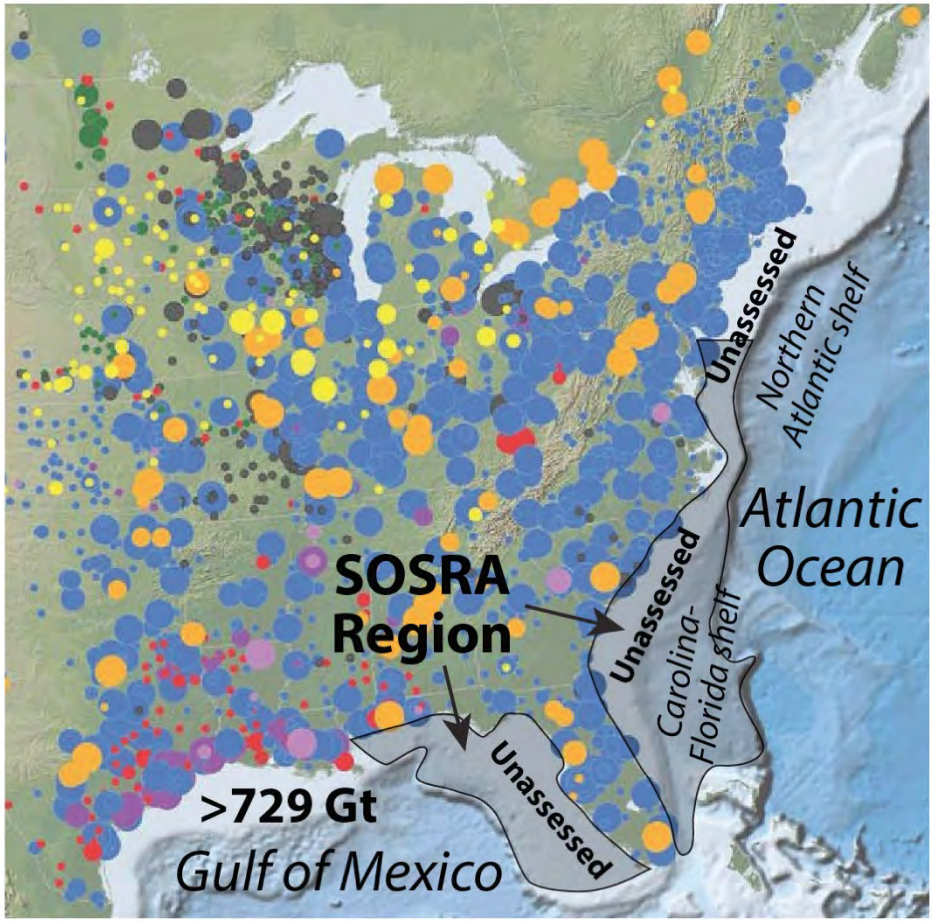
SECARB 11th Annual Stakeholders' Briefing
The Georgian Terrace Hotel, Atlanta, GA
March 9, 2016

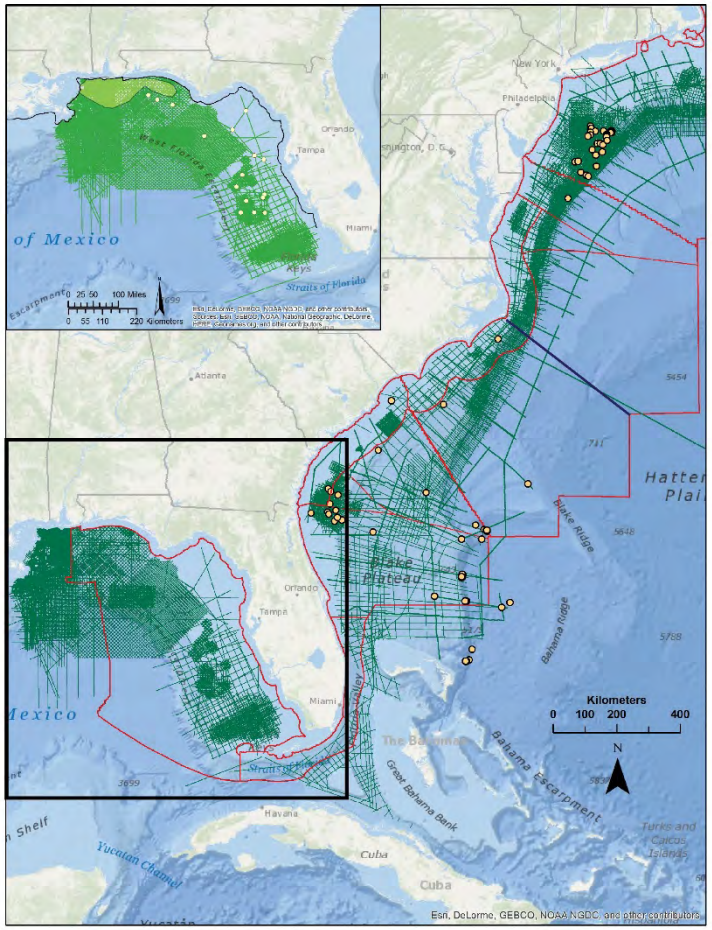
Offshore CO_2 Storage: Sleipner, North Sea



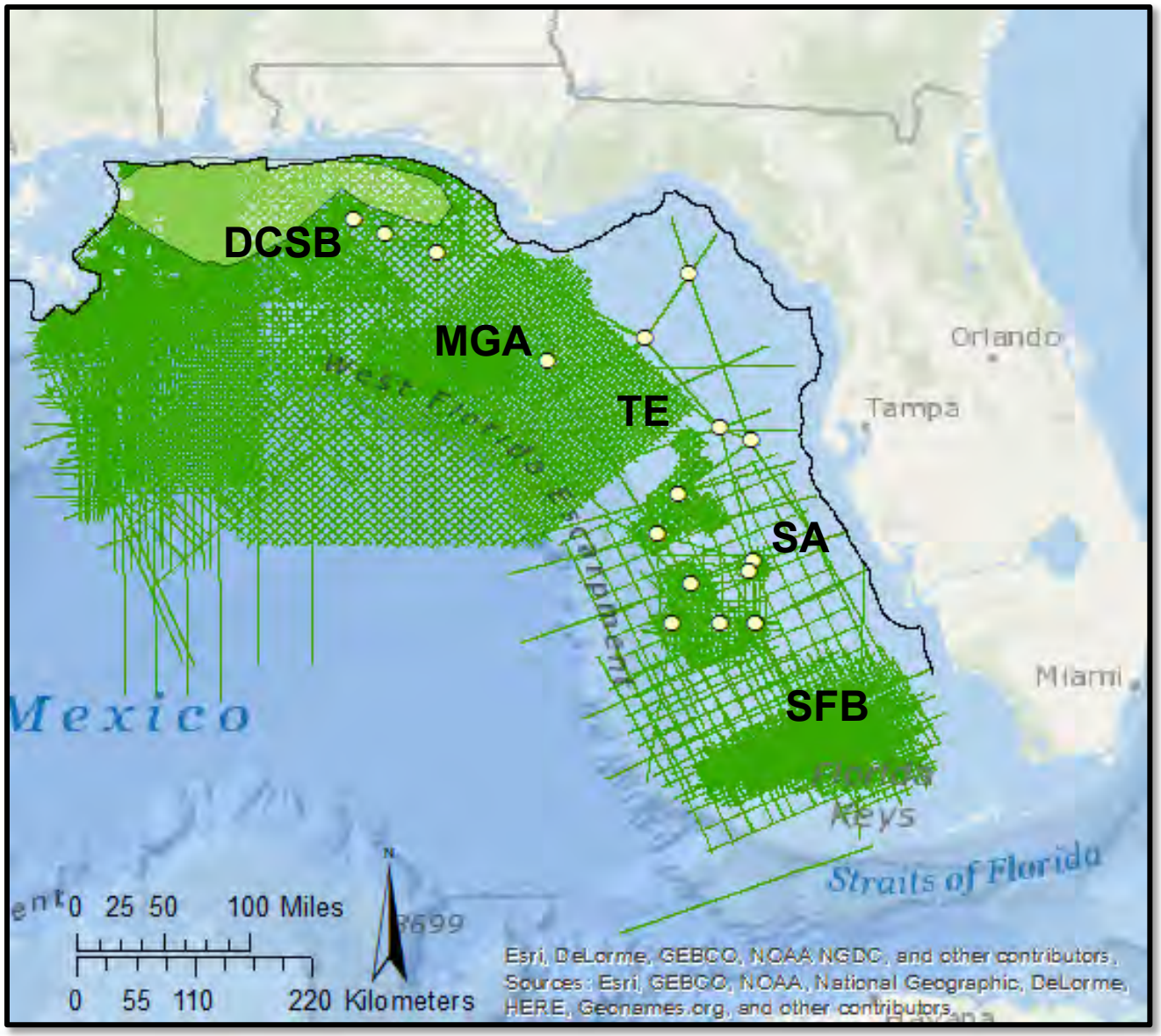
Kaarstad (2004)

Summary – SOSRA





Study Area and Subregions



DCSB DeSoto Canyon Salt Basin

MGA Middle Ground Arch

TE Tampa Embayment

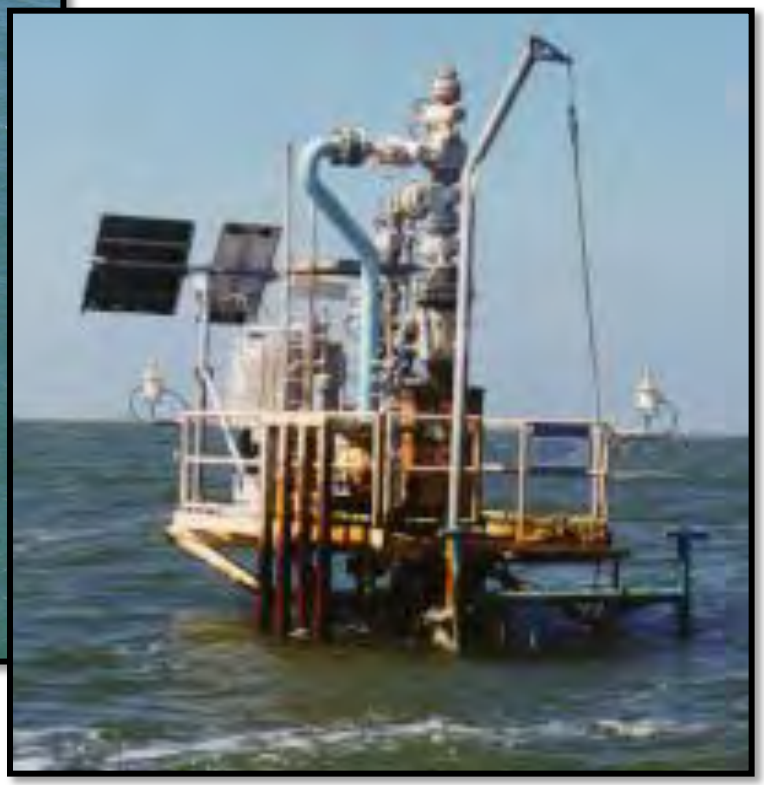
SA Sarasota Arch

SFB South Florida Basin

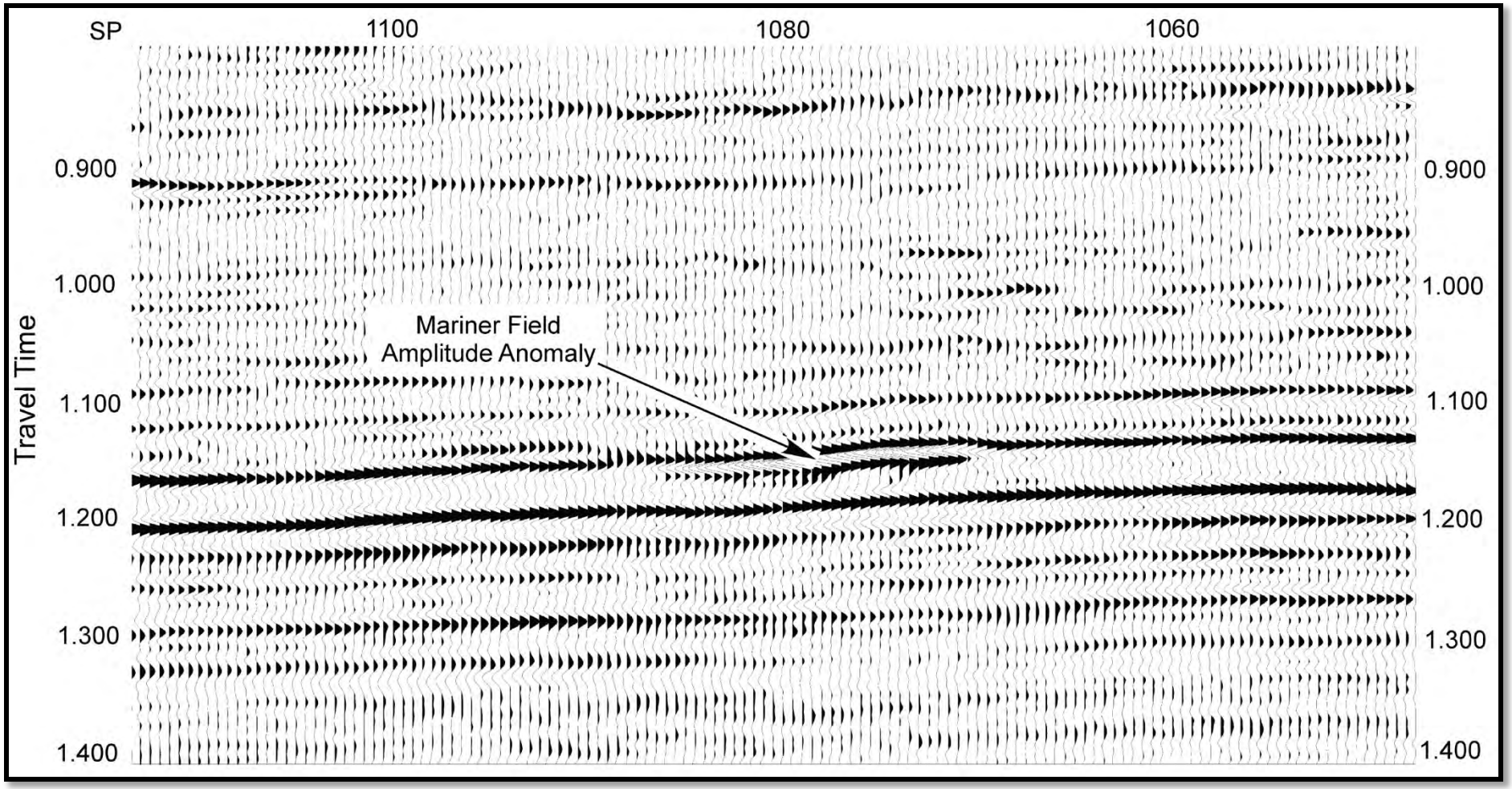
A Tale of Two Platforms

Ultradeep gas platform

Shallow gas well

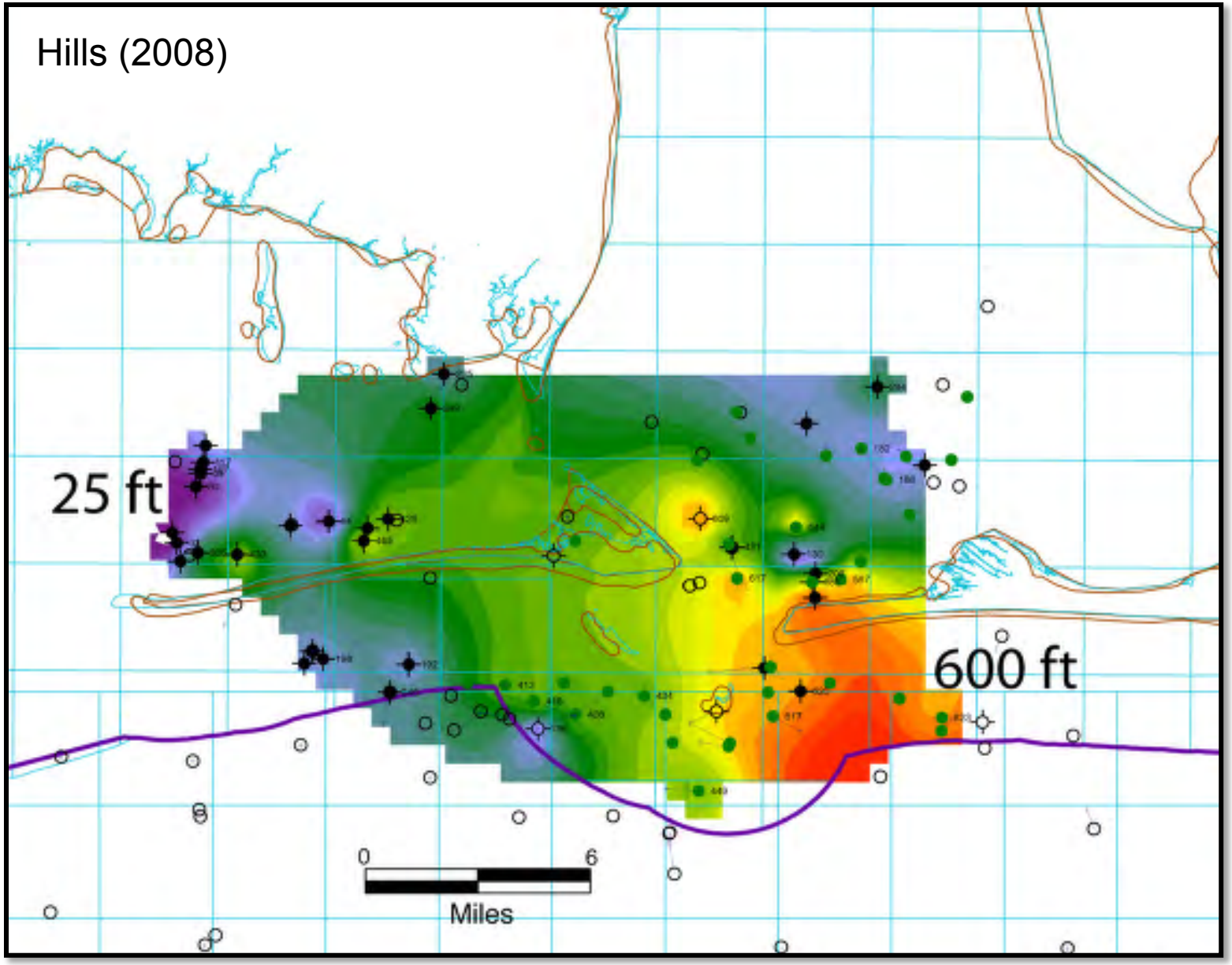


Miocene Gas Sands



Handford and Baria (2003)

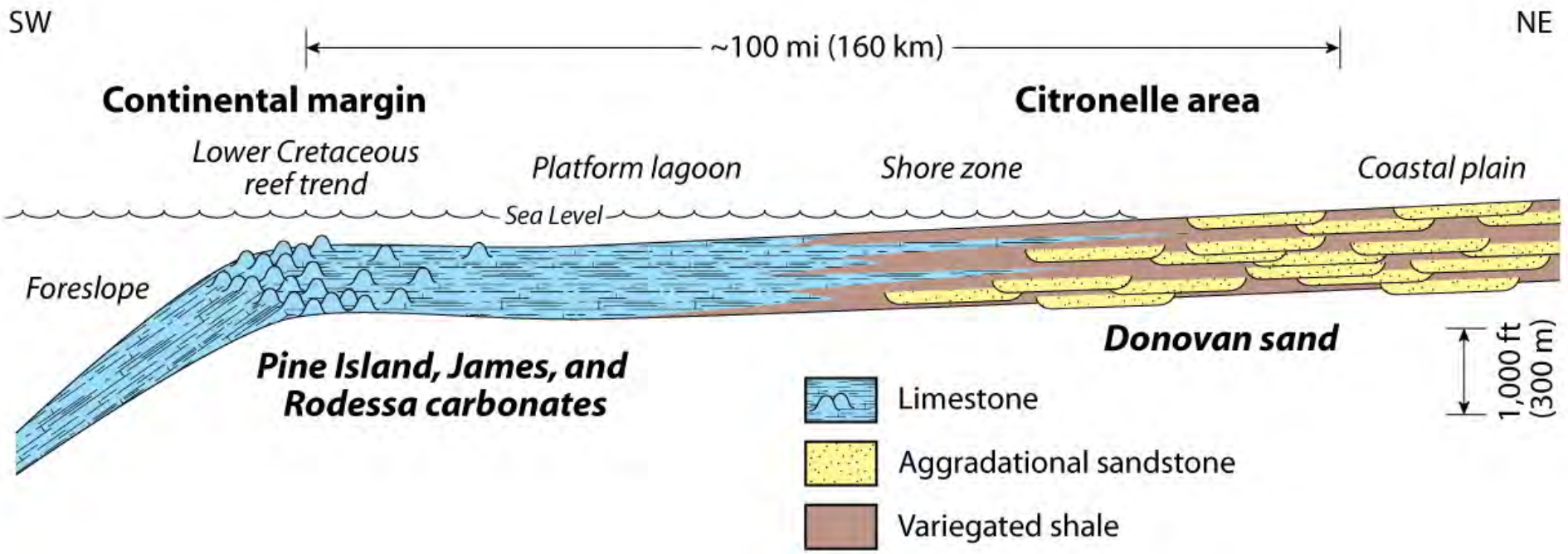
Net Miocene Sand > 2500 ft Deep



Cretaceous Facies

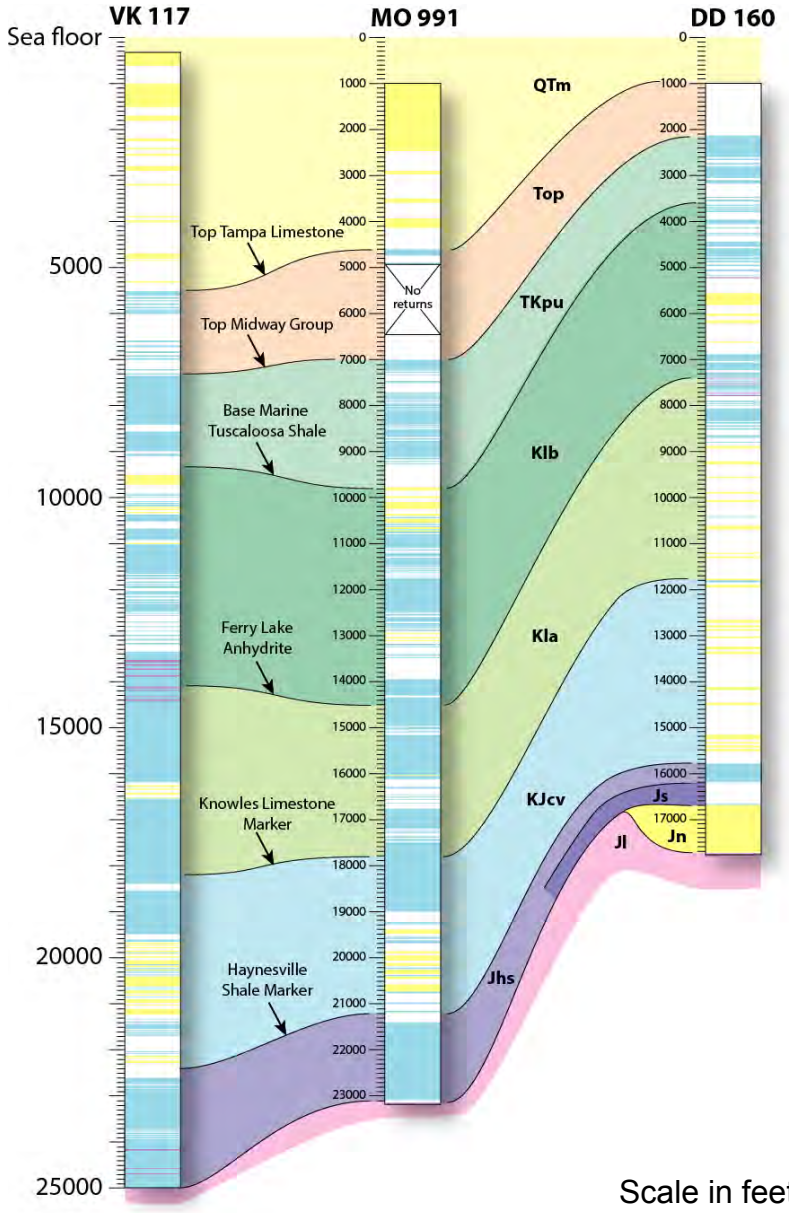
SOSRA REGION

NETL EOR TEST
SECARB ANTHROPOGENIC TEST



Pashin et al. (2014)

DeSoto Canyon Salt Basin - Lithologic Columns



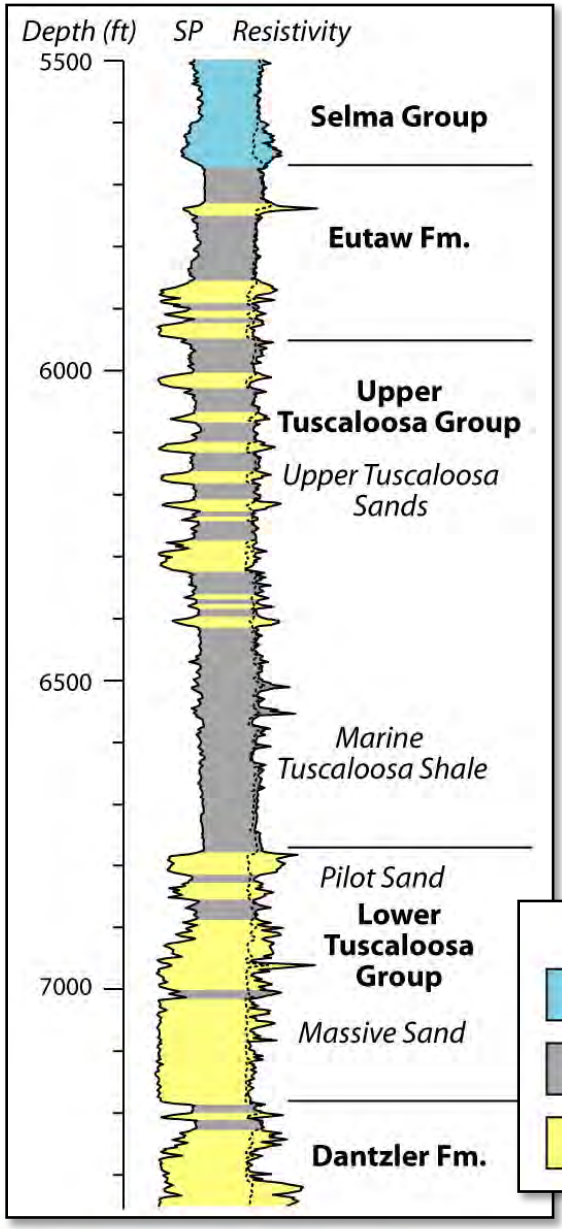
Lithology

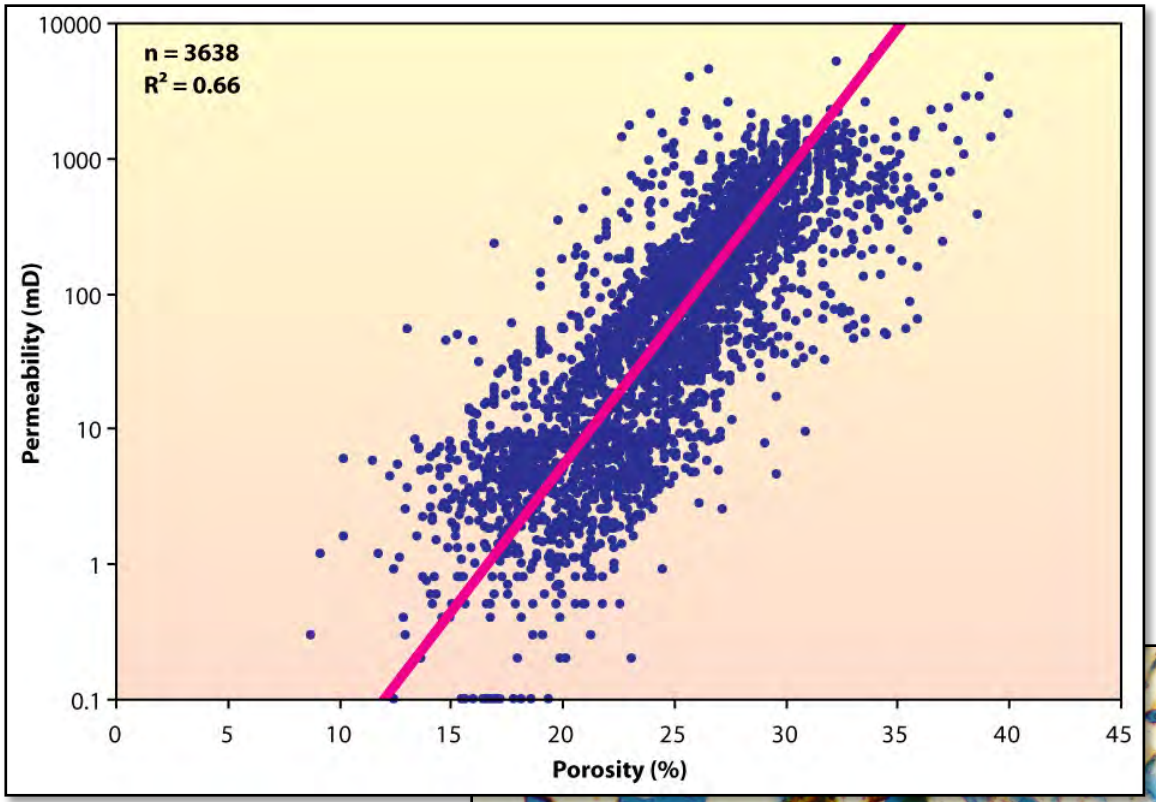
- Shale
- Sandstone
- Limestone
- Anhydrite, Salt

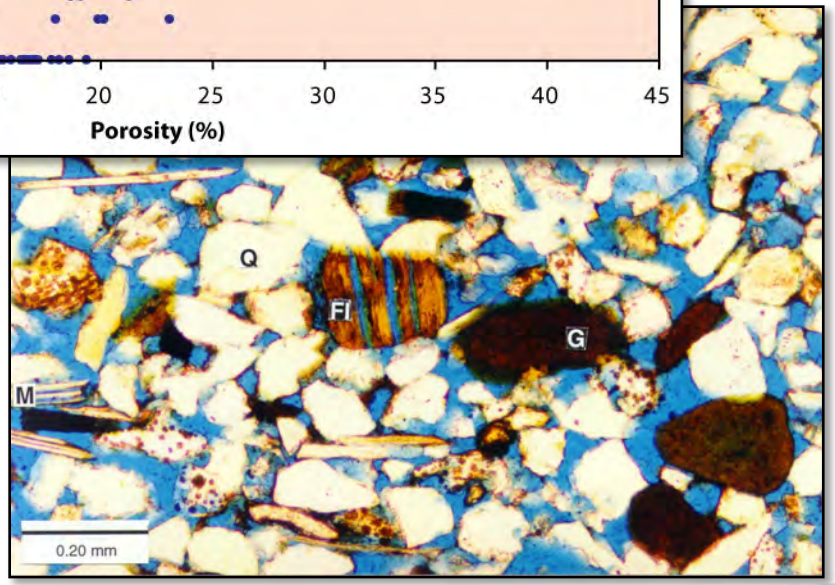
Stratigraphy

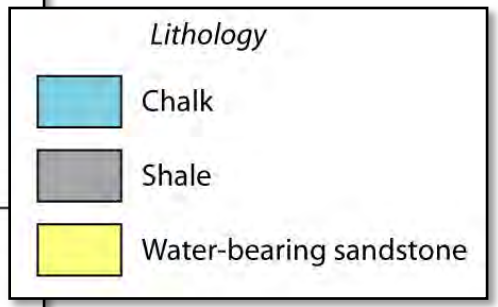
- QTm — Quaternary-Miocene
- Top — Oligocene-Paleocene
- TKpu — Paleocene-Upper Cretaceous
- Klb — Lower Cretaceous B
- Kla — Lower Cretaceous A
- KJcv — Cotton Valley Group
- Jhs — Haynesville and Smackover Formations
- Js — Smackover Formation
- Jn — Norphlet Formation
- Jl — Louann Salt

Cretaceous Sandstone

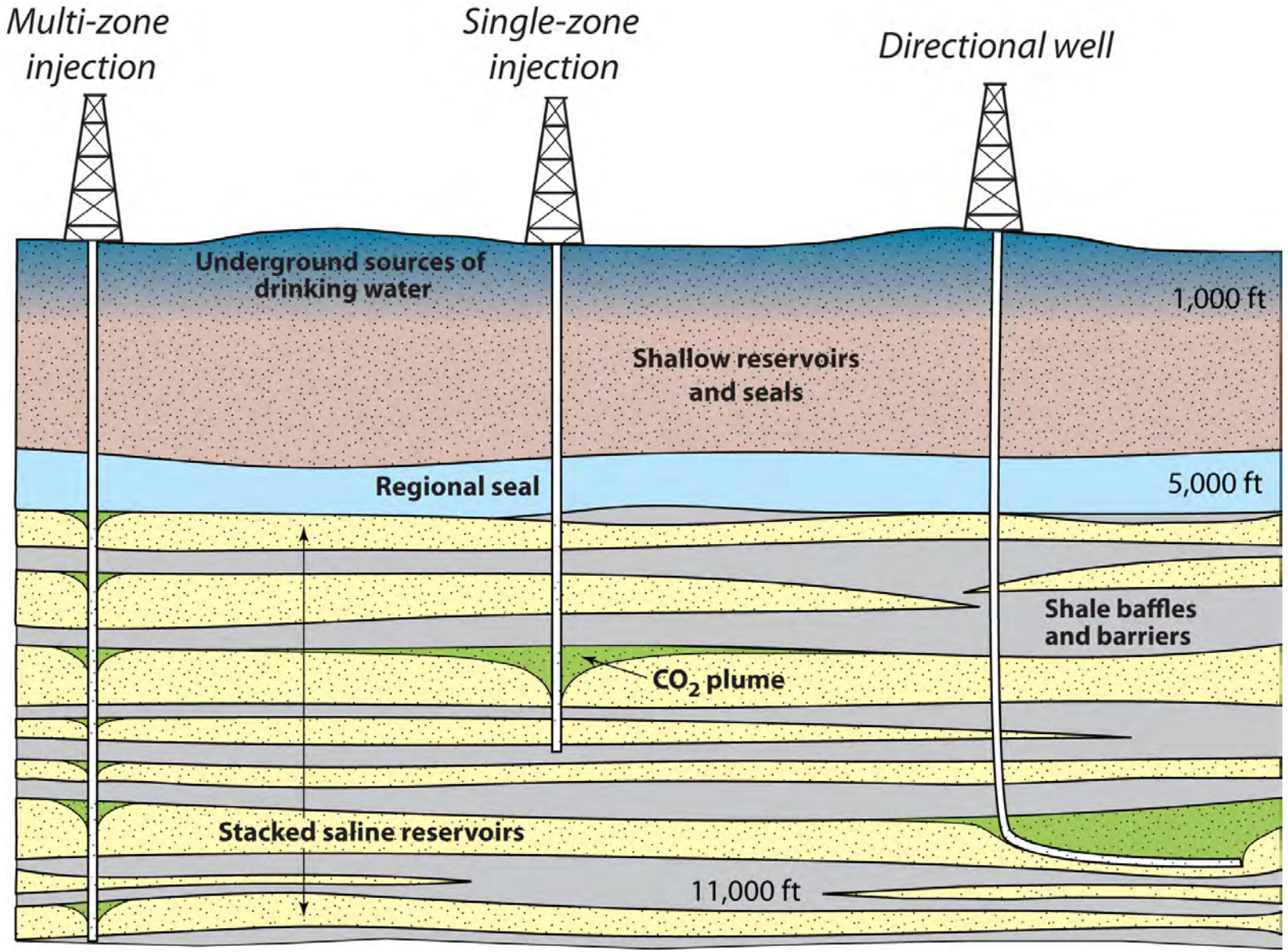




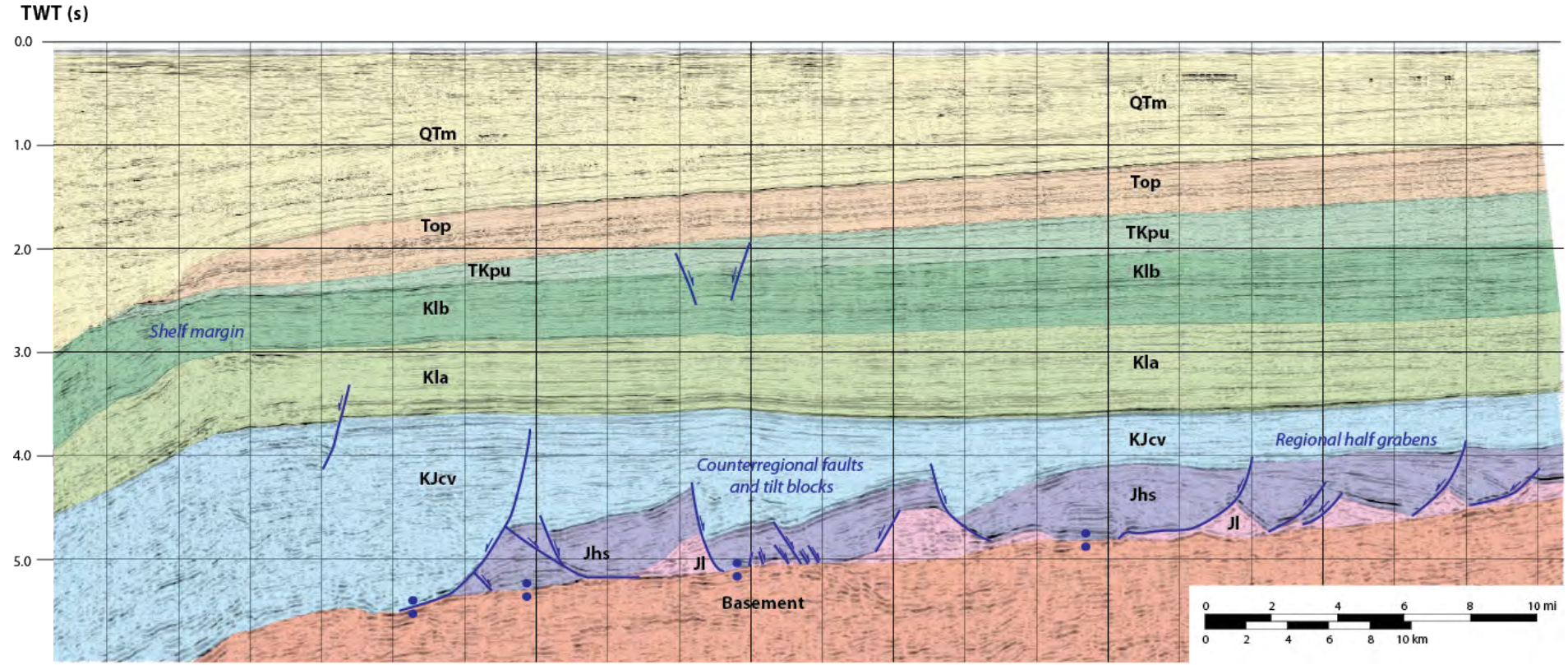




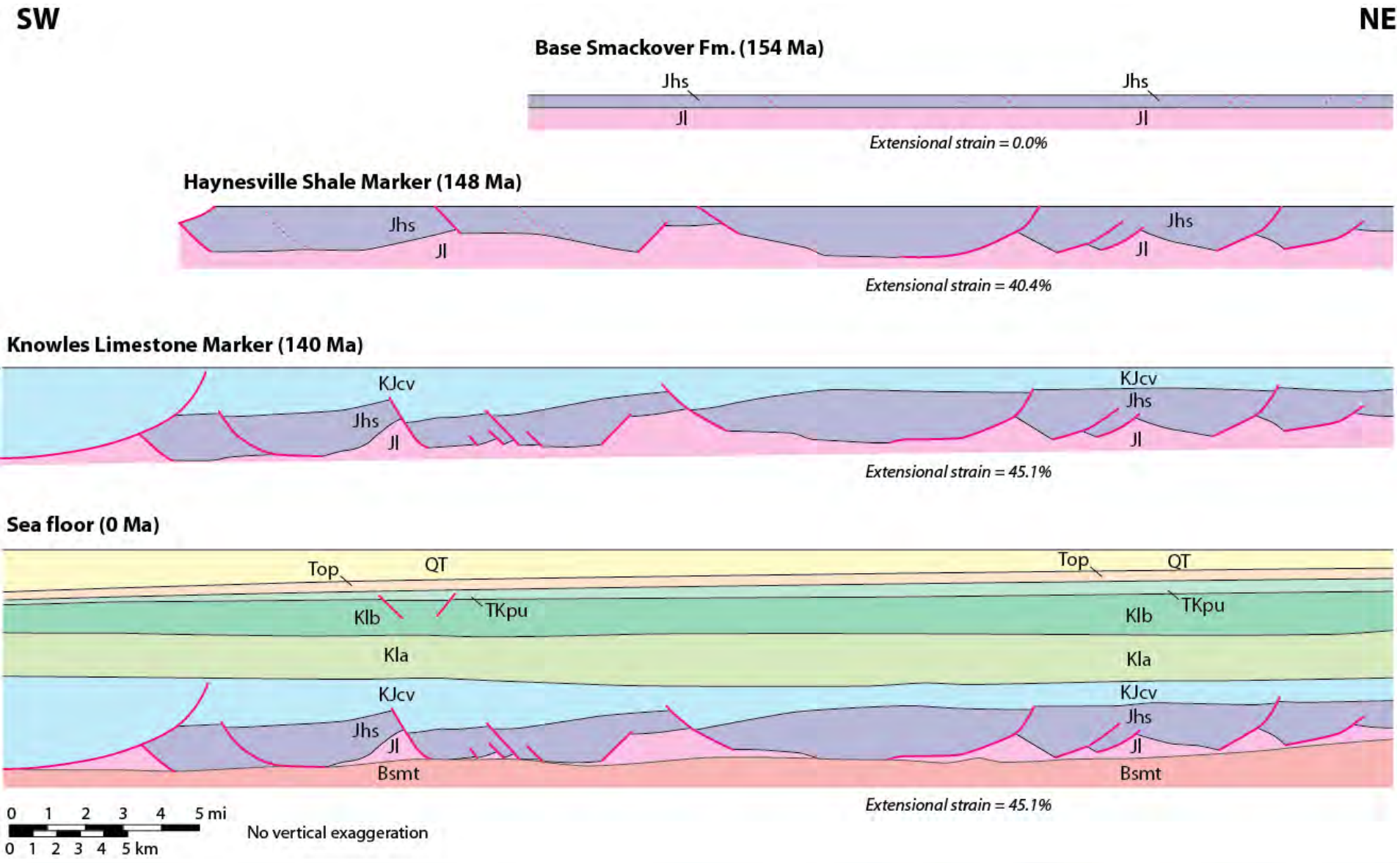
How Do We Adapt Proven Storage Strategies?



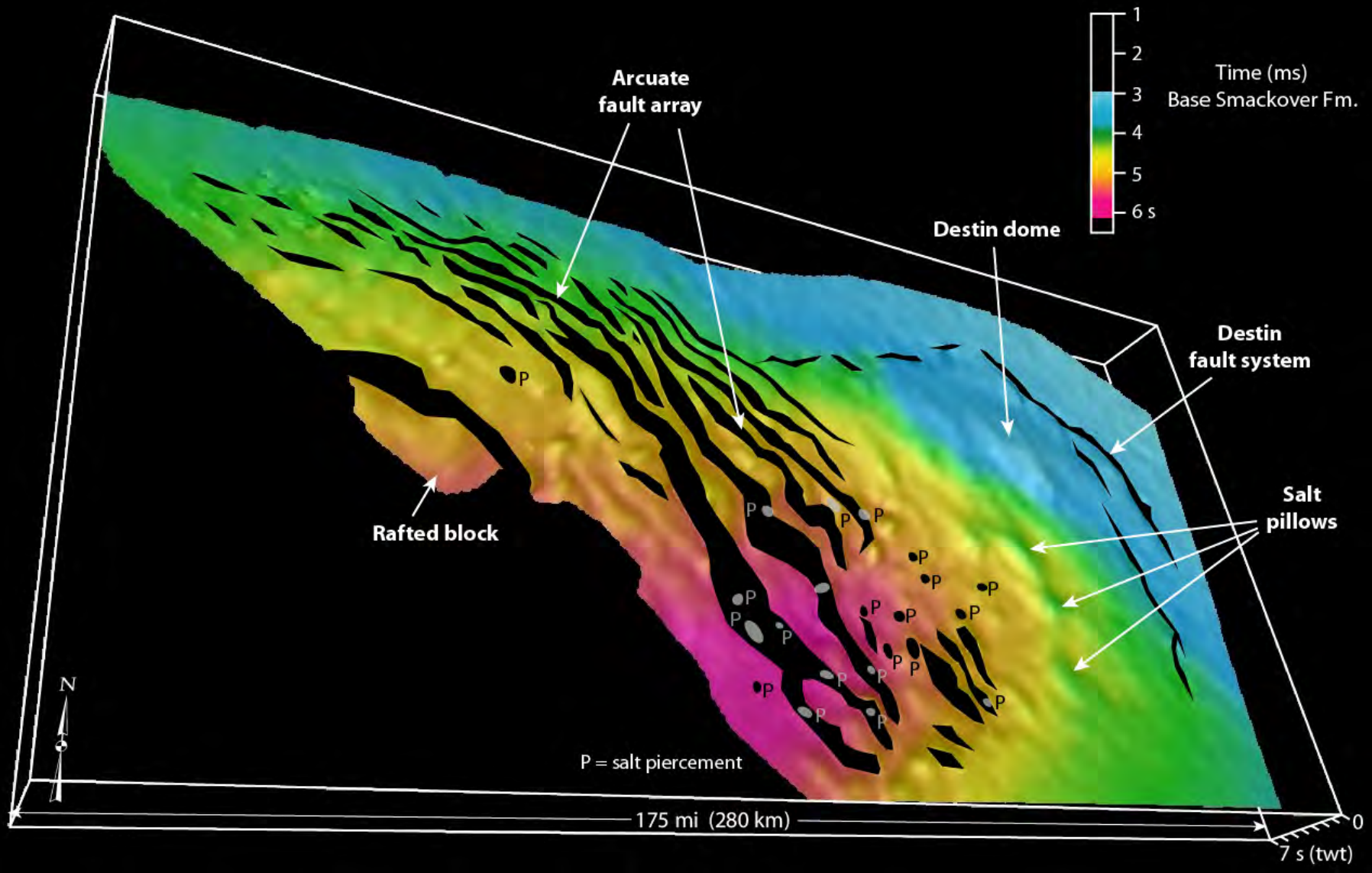
DCSB Viosca Knoll Shelf

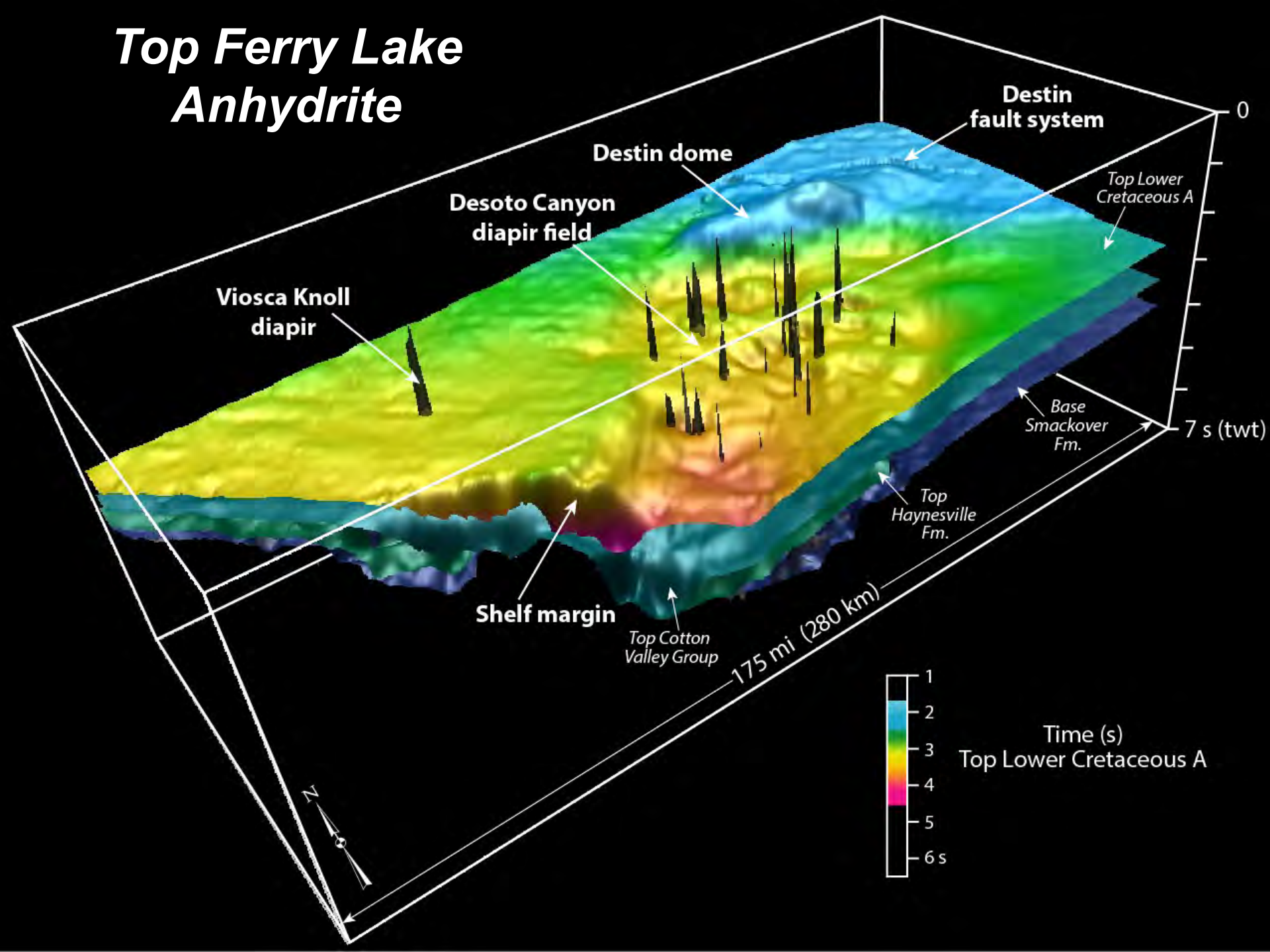


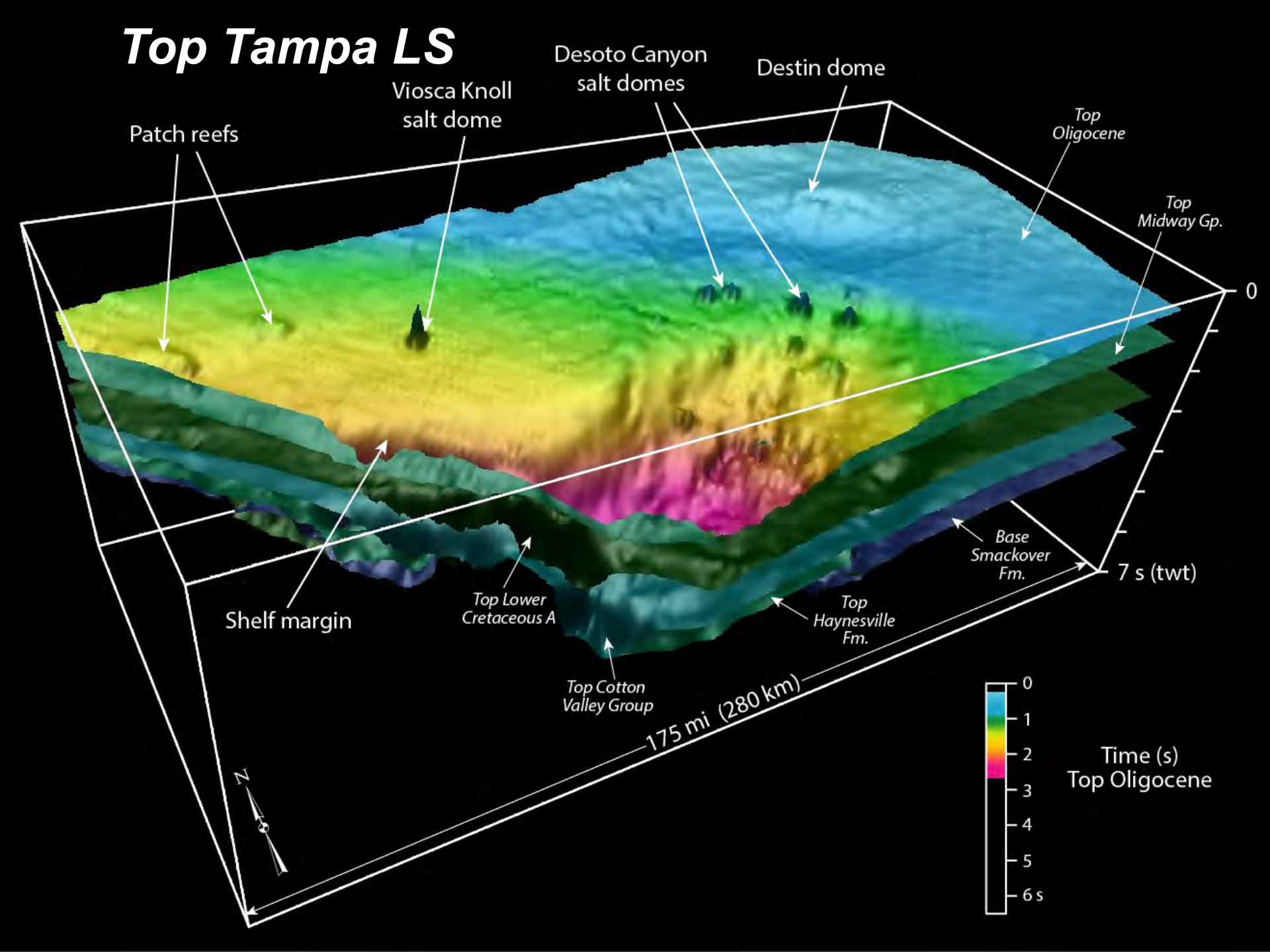
Balanced Structural Restoration



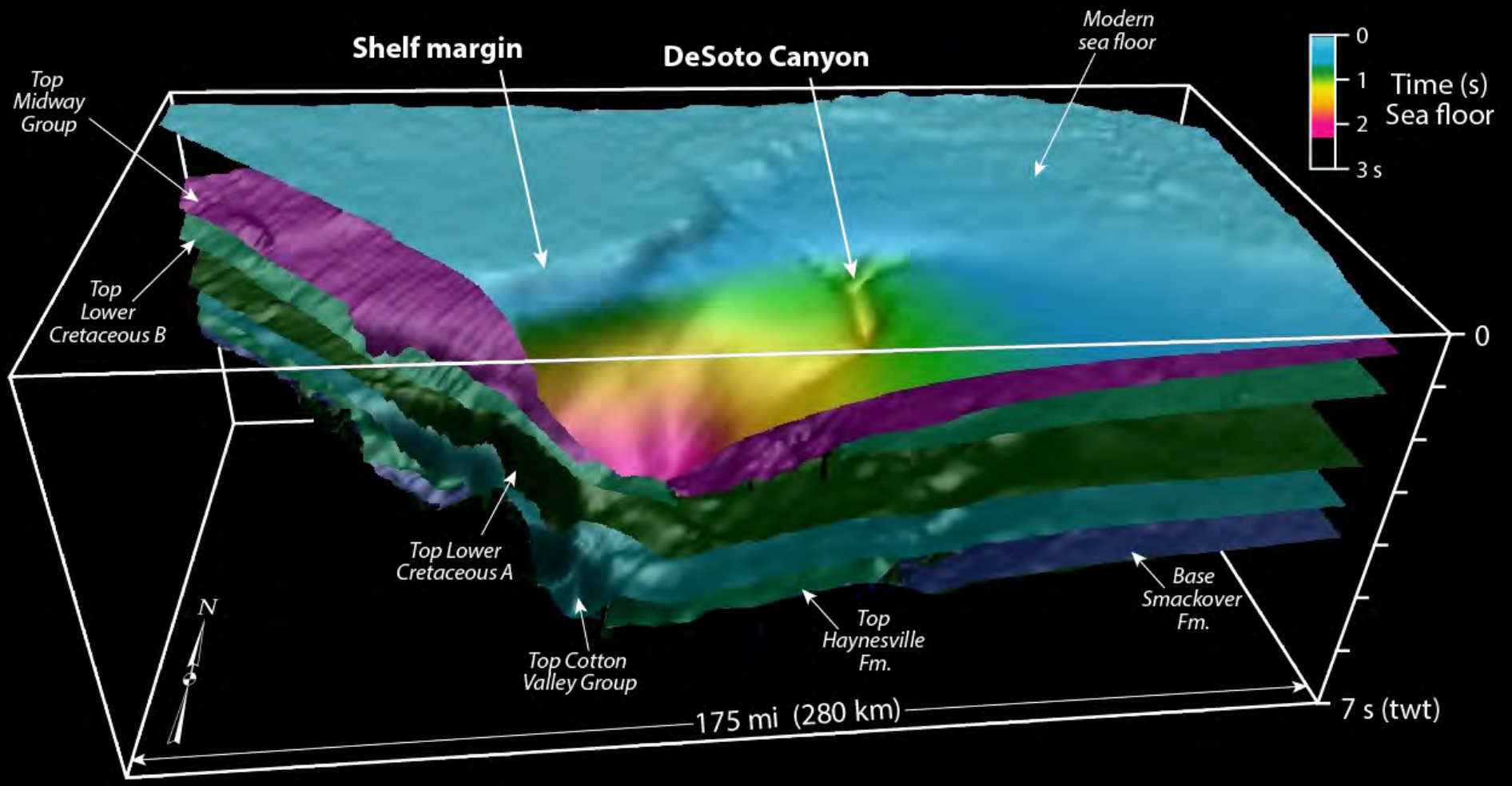
Base Smackover Limestone



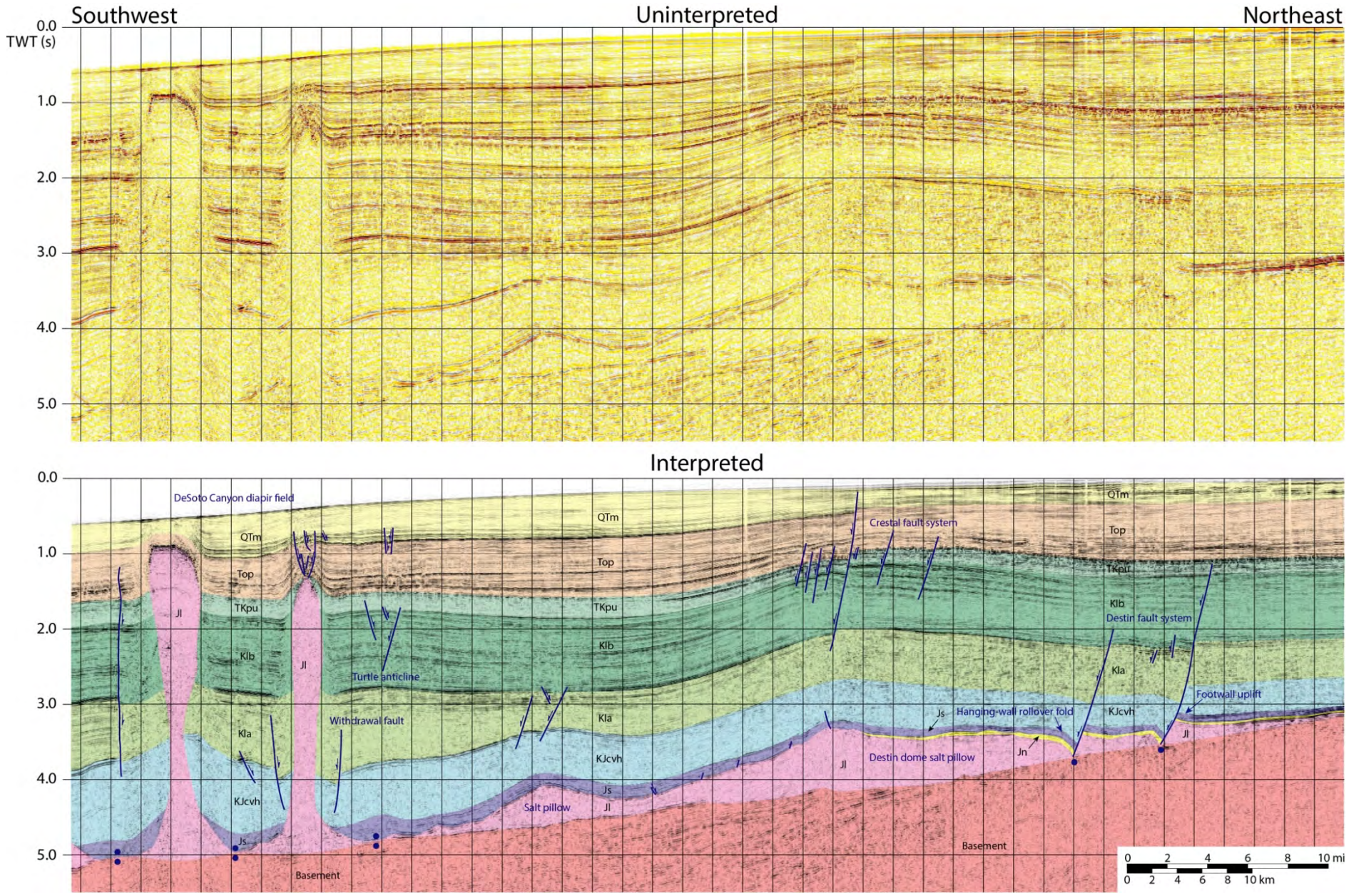

Top Ferry Lake Anhydrite
Destin fault system
Destin dome
Desoto Canyon diapir field
Viosca Knoll diapir
Top Lower Cretaceous A
Base Smackover Fm.
Top Haynesville Fm.
Shelf margin
Top Cotton Valley Group
0
7 s (twt)
175 mi (280 km)
N
1
2
3
4
5
6 s
Time (s)
Top Lower Cretaceous A


Top Tampa LS
Patch reefs
Viosca Knoll salt dome
Desoto Canyon salt domes
Destin dome
Top Oligocene
Top Midway Gp.
0
7 s (twt)
Base Smackover Fm.
Top Haynesville Fm.
Top Lower Cretaceous A
Shelf margin
Top Cotton Valley Group
175 mi (280 km)
N
0
1
2
3
4
5
6 s
Time (s)
Top Oligocene

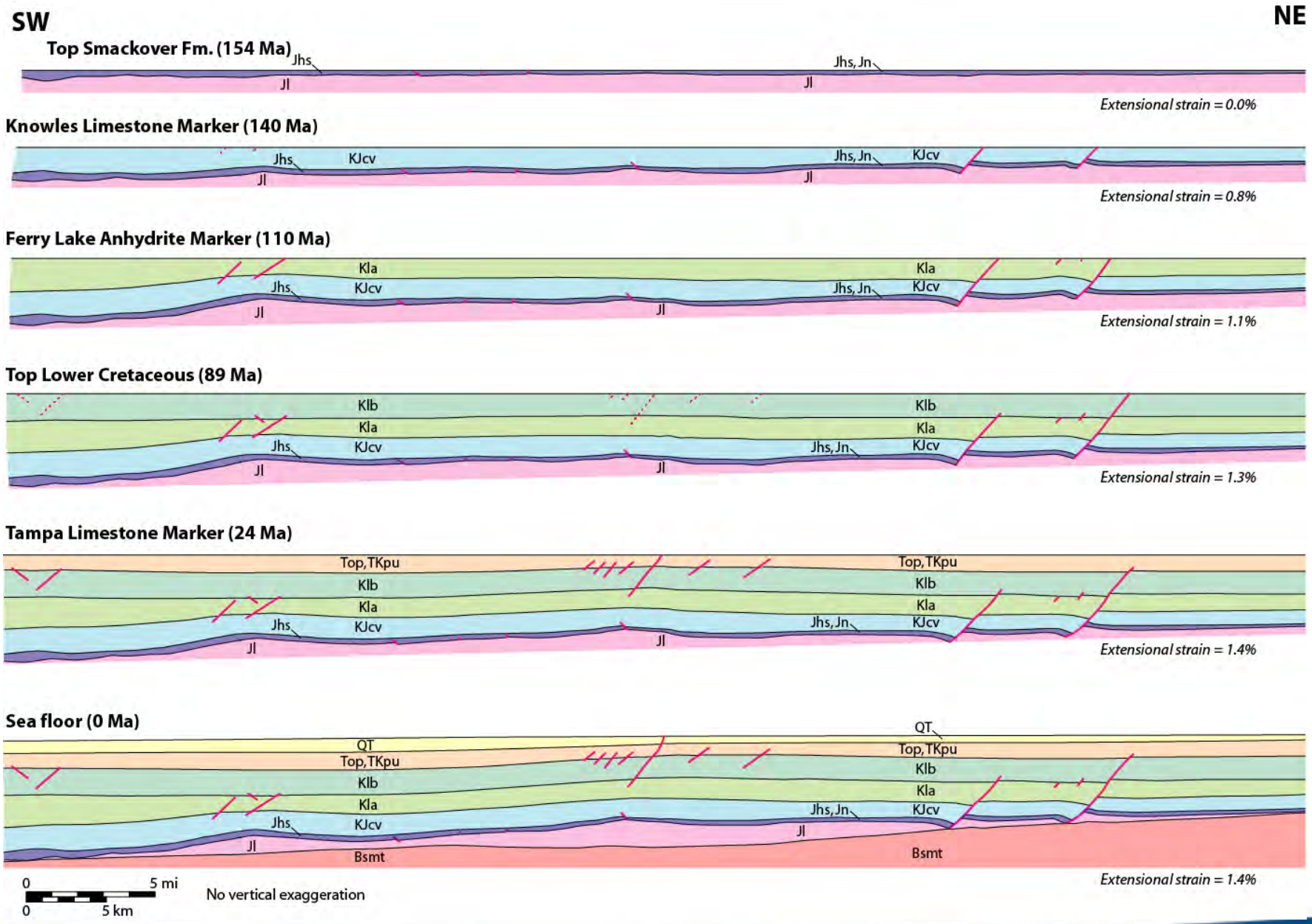
Sea floor topography



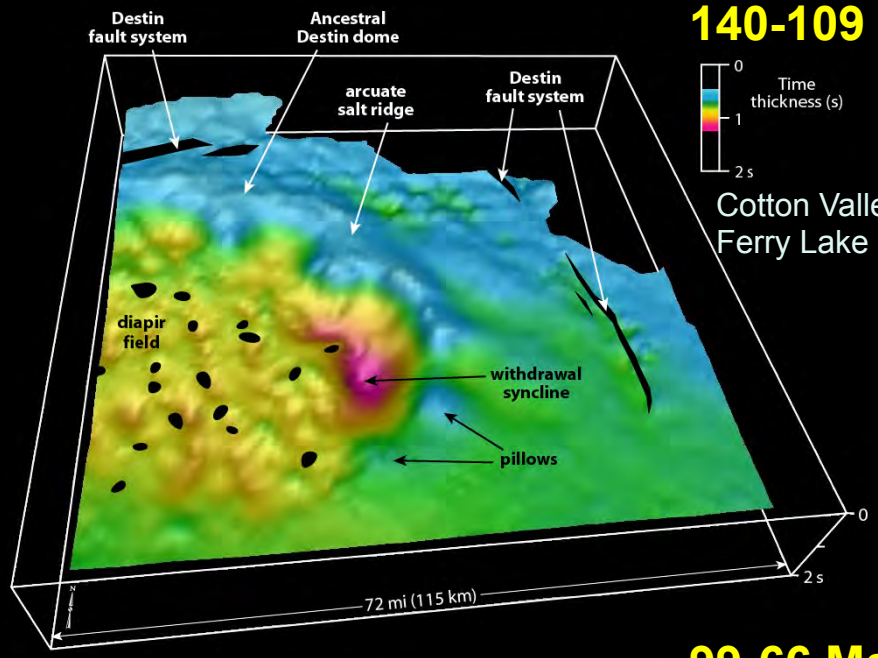
DCSB Destin Dome



Balanced Structural Restoration

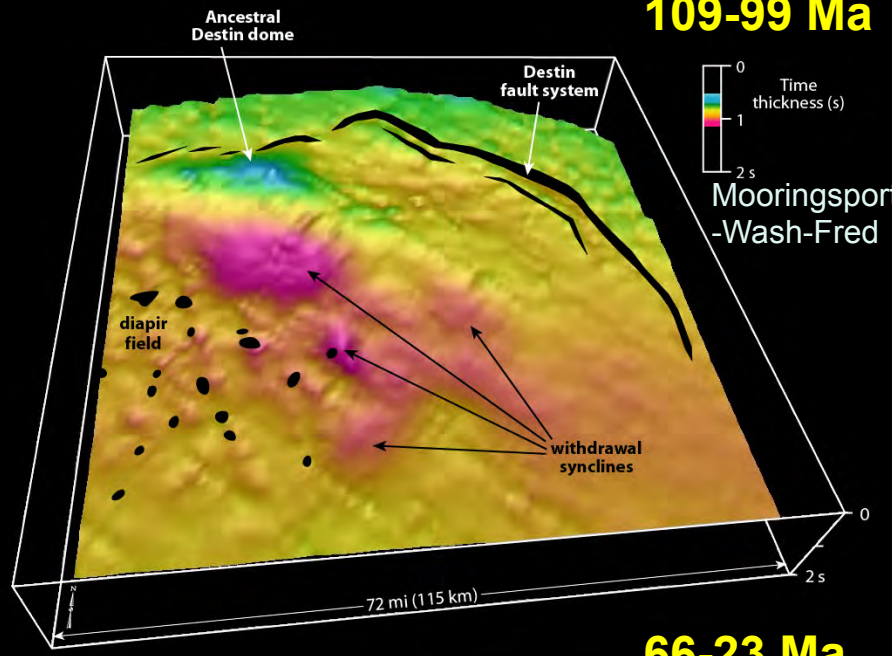


DCSB PILLOW EVOLUTION



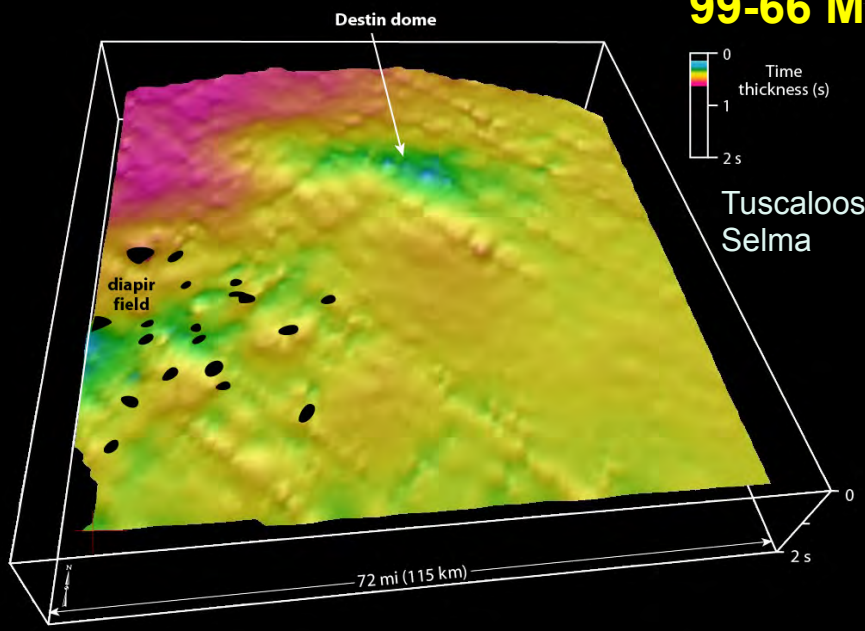
140-109 Ma

Cotton Valley-Ferry Lake



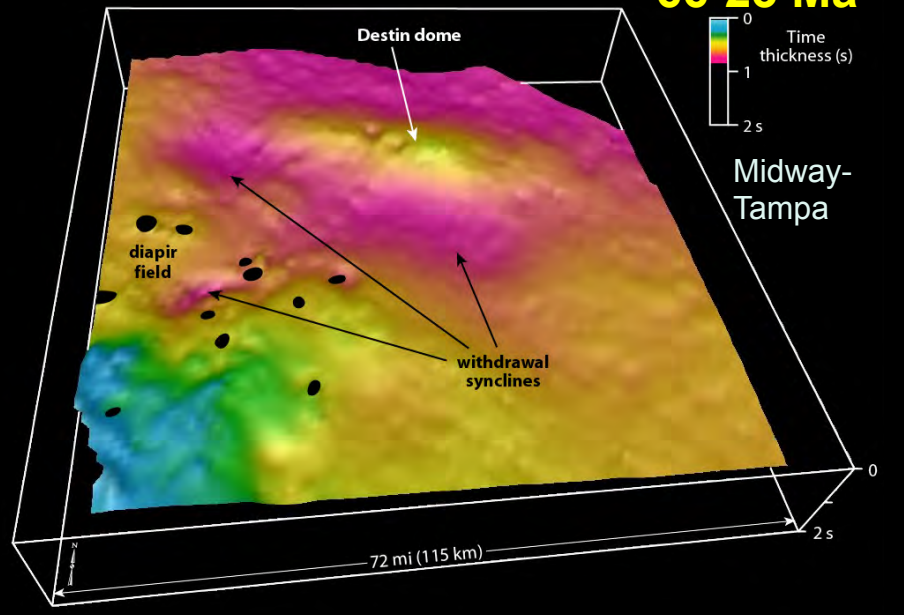
109-99 Ma

Mooringsport-Wash-Fred



99-66 Ma

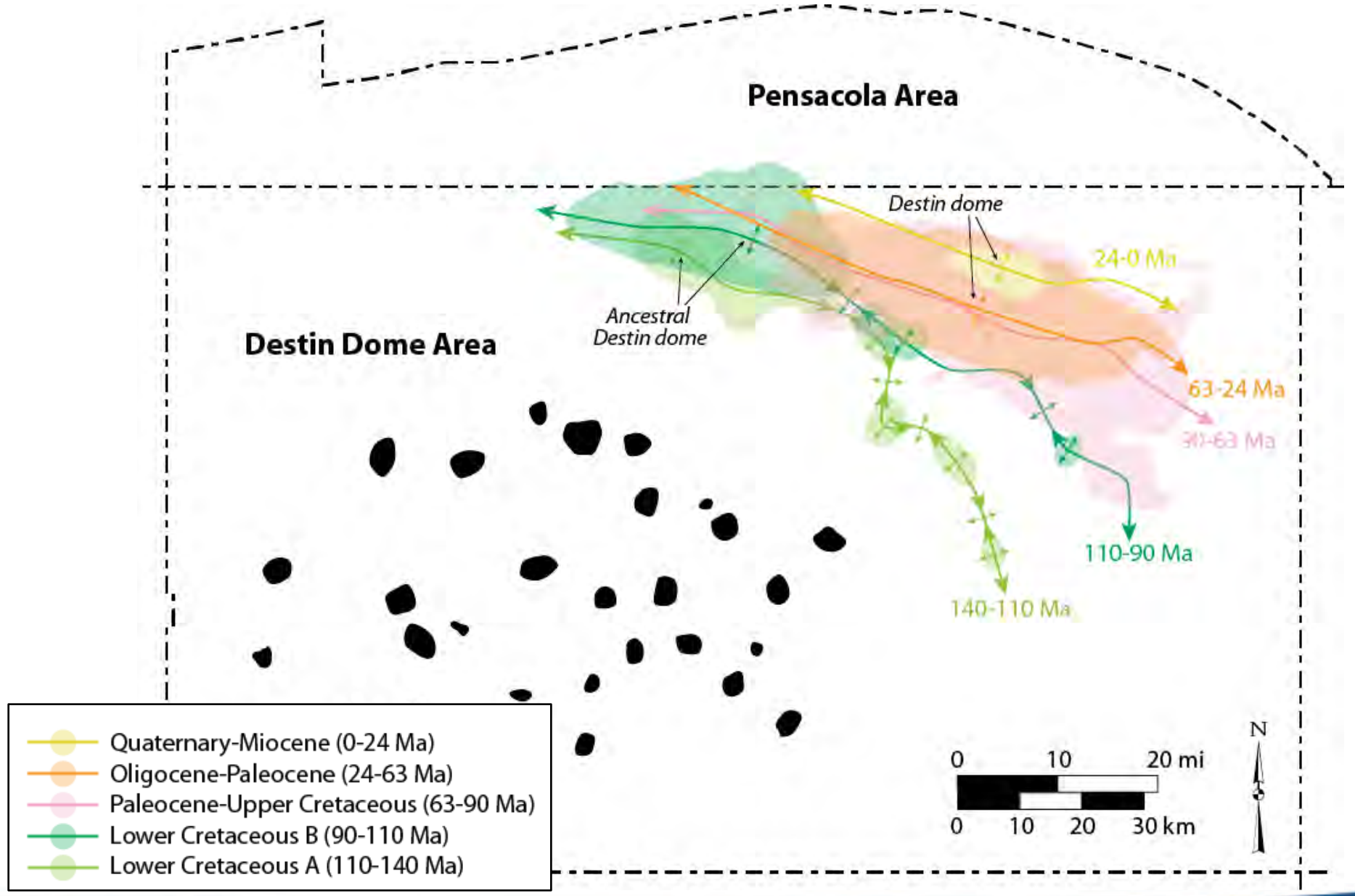
Tuscaloosa-Selma



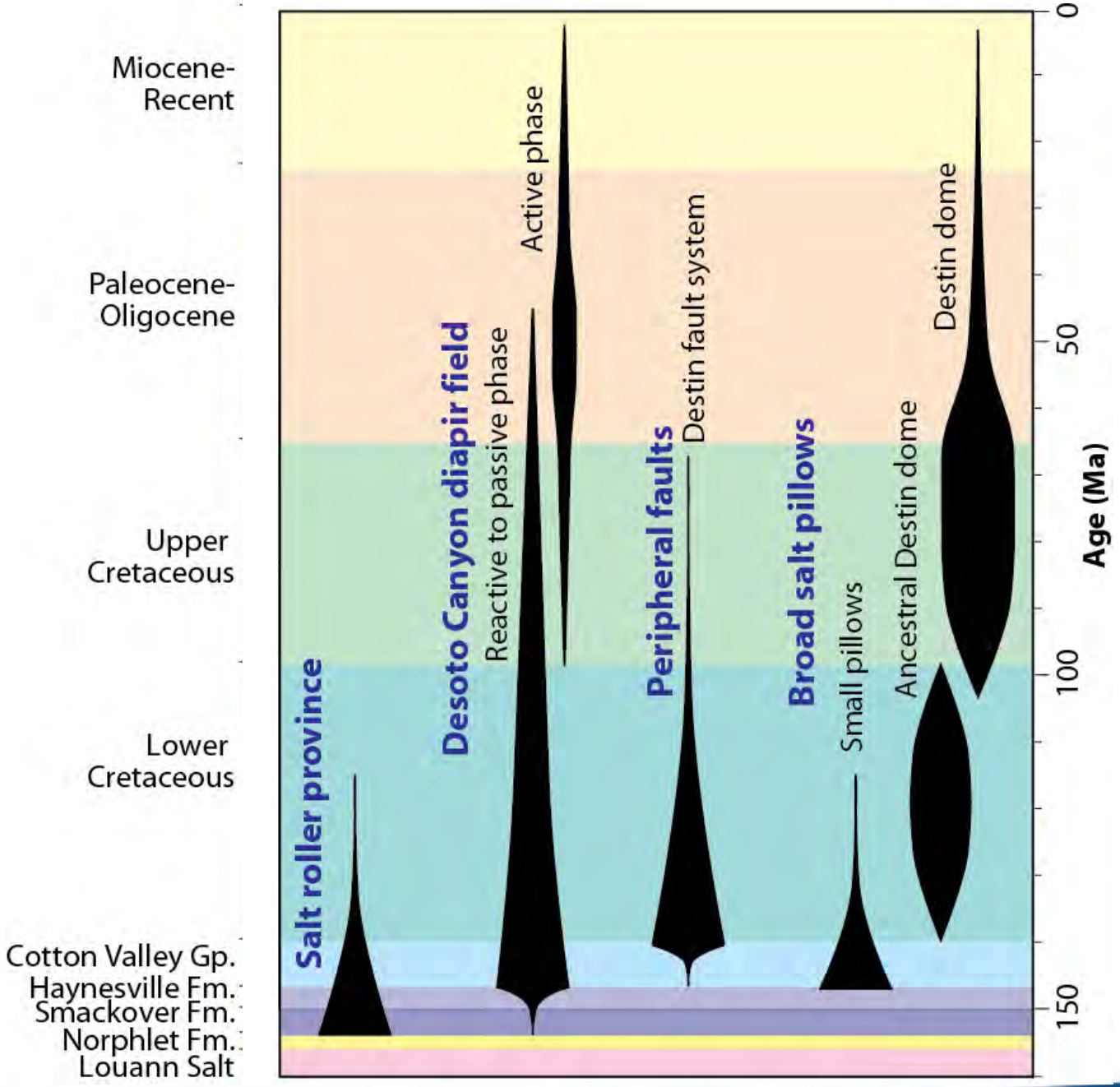
66-23 Ma

Midway-Tampa

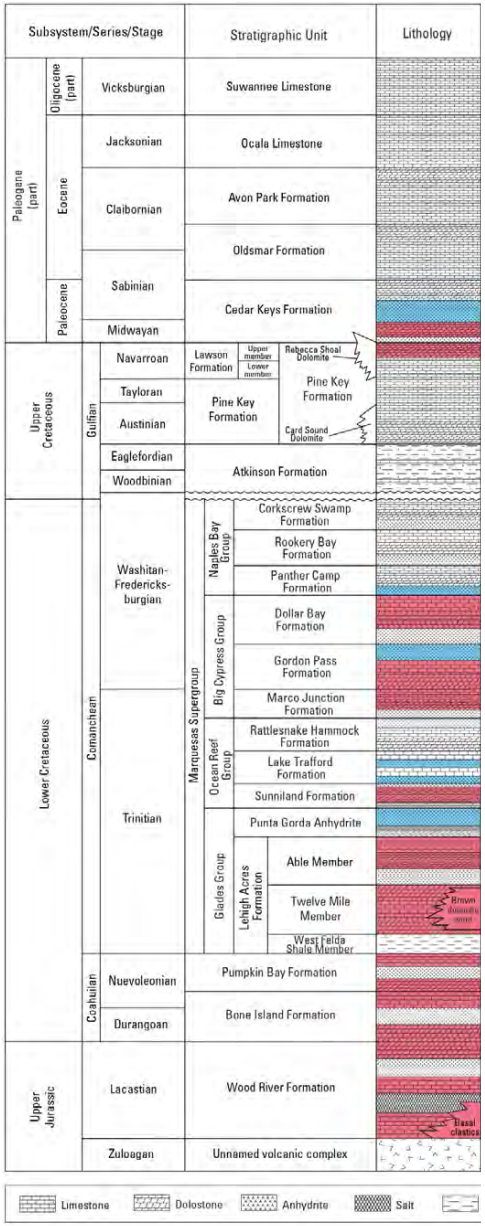
Pillow Growth History



Structural Chronology



Florida - Lithologic Columns



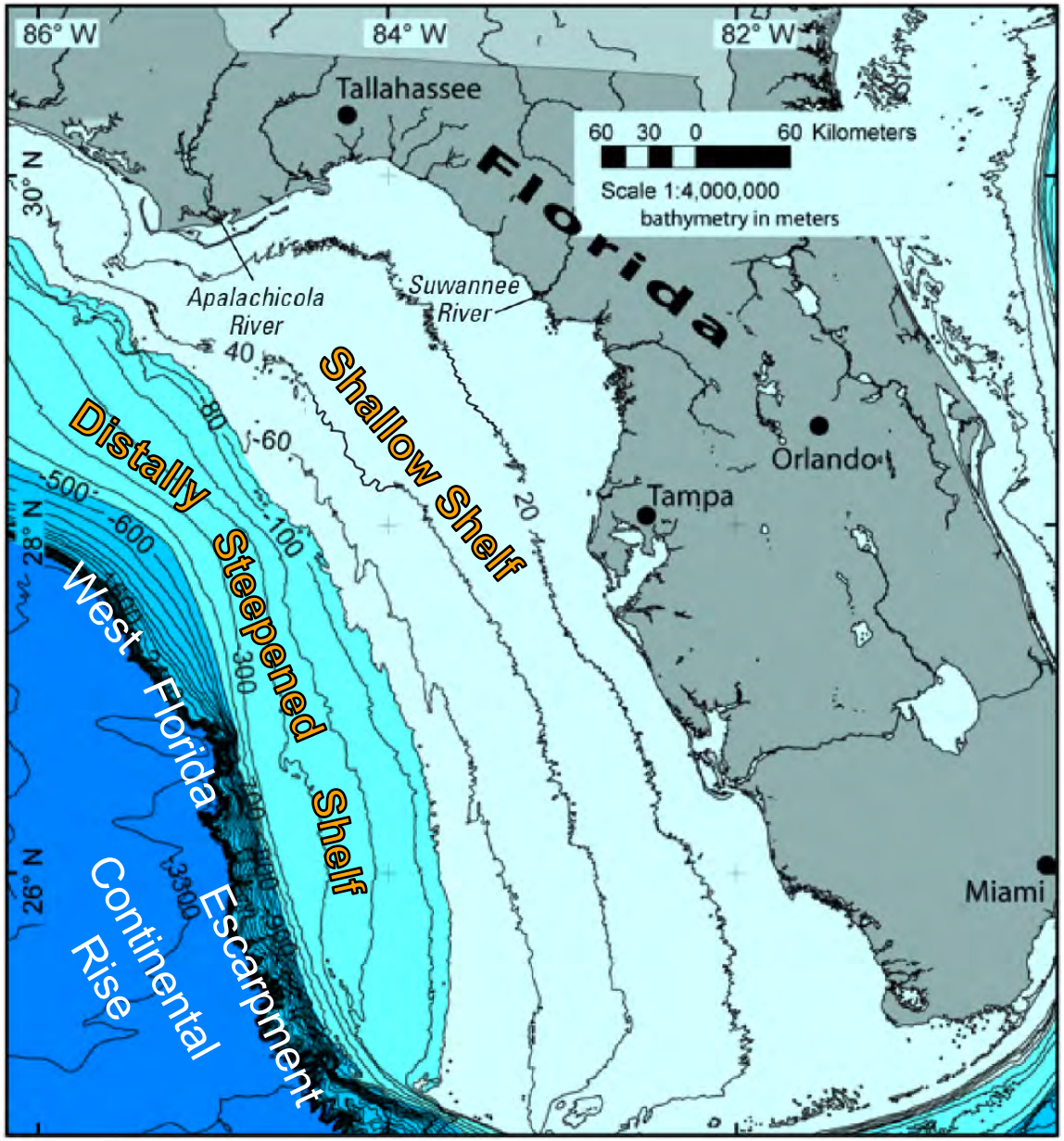
Blue - Seal
Red - Sink

		PANHANDLE FLORIDA		NORTHERN FLORIDA		SOUTHERN FLORIDA	
SYSTEM	SERIES	FORMATION	HYDROSTRATIGRAPHIC UNIT	FORMATION	HYDROSTRATIGRAPHIC UNIT	FORMATION	HYDROSTRATIGRAPHIC UNIT
QUATERNARY	HOLOCENE	Undifferentiated sediments	sand and gravel aquifer / surficial aquifer system	Undifferentiated sediments Anastasia Formation	surficial aquifer system	Undifferentiated sediments Miami Limestone Key Largo Limestone Anastasia Formation	surficial aquifer system / Biscayne aquifer
	PLEISTOCENE					Undifferentiated sediments Tamiami Formation Long Key Formation Hawthorn Group	
TERTIARY	PLIOCENE	Citronelle Formation Miccosukee Formation Jackson Bluff Formation Intracoastal Formation Alum Bluff Group Coarse Clastics		Undifferentiated sediments Miccosukee Formation Cypresshead Formation			
	MIOCENE	Coarse Clastics Alum Bluff Group Pensacola Clay Intracoastal Formation Hawthorn Group Chipola Formation Bruce Creek Limestone St. Marks Formation Chattahoochee Formation	intermediate aquifer system or intermediate confining unit	Hawthorn Group	intermediate aquifer system or intermediate confining unit	Hawthorn Group	intermediate aquifer system or intermediate confining unit
				St. Marks Formation			
	OLIGOCENE	Bucatunna Clay Chickasawhay Limestone Marianna Limestone Suwannee Limestone	Floridan aquifer system	Suwannee Limestone	Floridan aquifer system	Suwannee Limestone	Floridan aquifer system
	EOCENE	Ocala Limestone Avon Park Formation Lisbon Formation Tallahatta Formation Claiborne Group Undiff.		Ocala Limestone Avon Park Formation Oldsmar Formation		Ocala Limestone Avon Park Formation Oldsmar Formation	
	PALEOCENE	Wilcox Group Midway Group	undifferentiated aquifer systems and confining units	Cedar Keys Formation	undifferentiated aquifer systems and confining units	Cedar Keys Formation	undifferentiated aquifer systems and confining units
CRETACEOUS AND OLDER		Undifferentiated		Undifferentiated		Undifferentiated	

SEGS (1986)

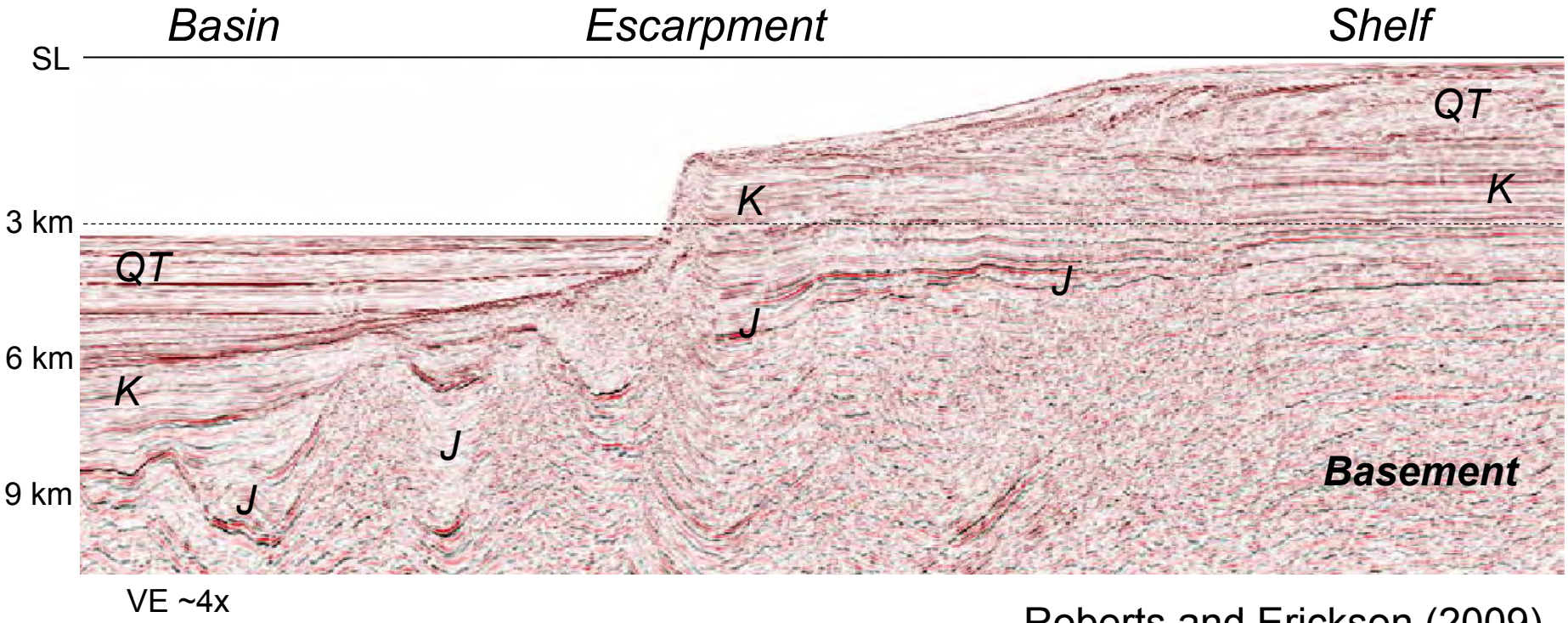
Roberts-Ashby et al. (2015)

West Florida Shelf Bathymetry



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

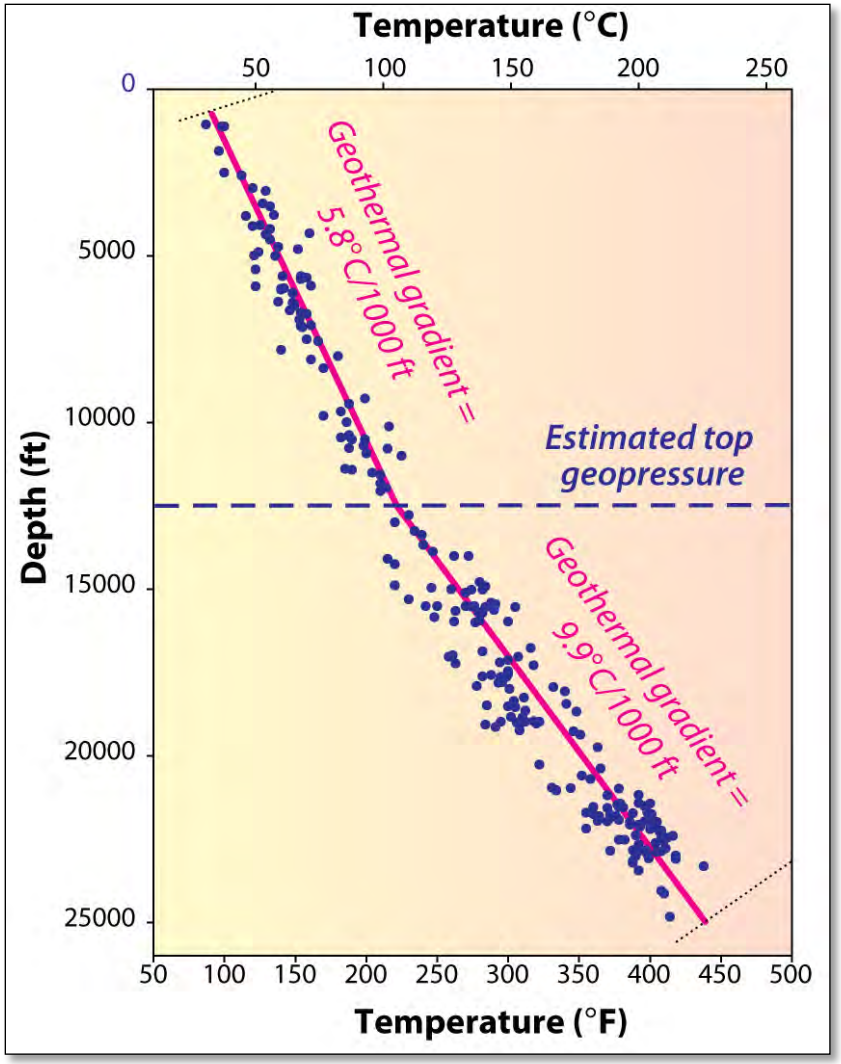
West Florida Shelf-Escarpment



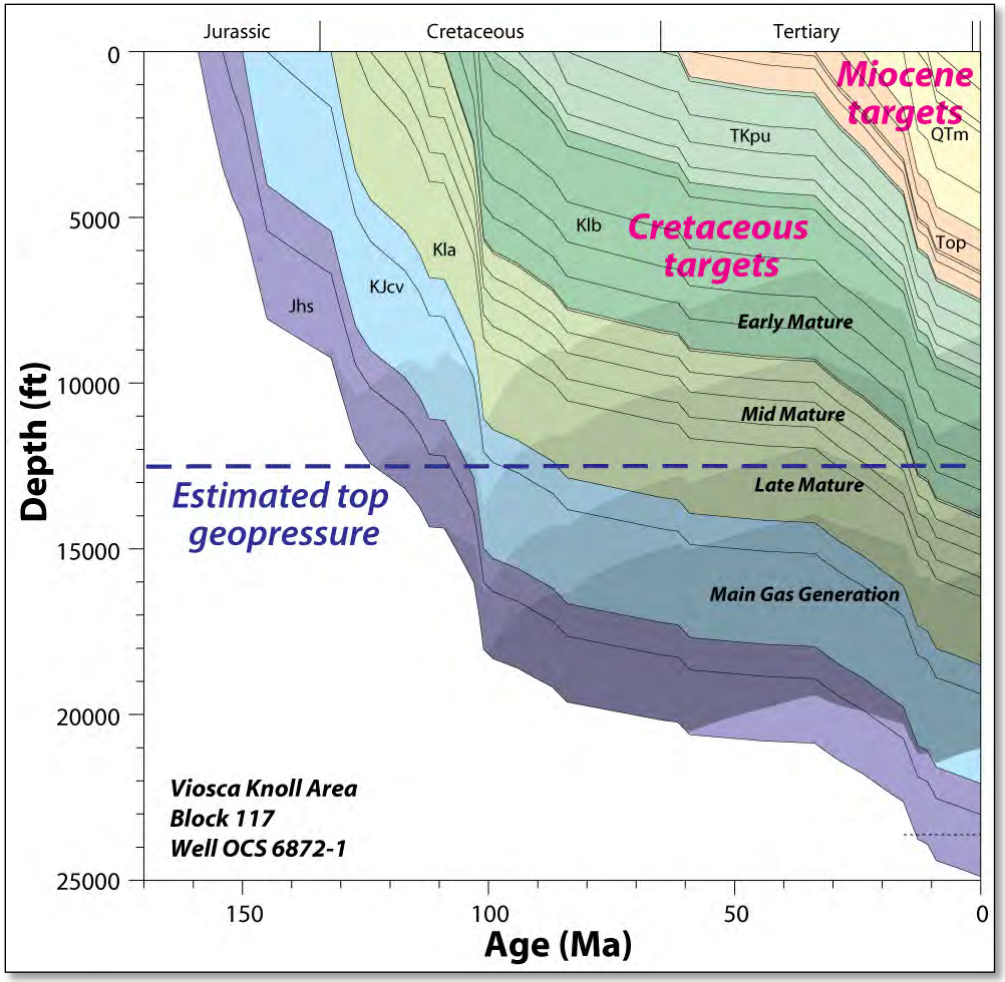
Roberts and Erickson (2009)

Geothermal and Burial Data

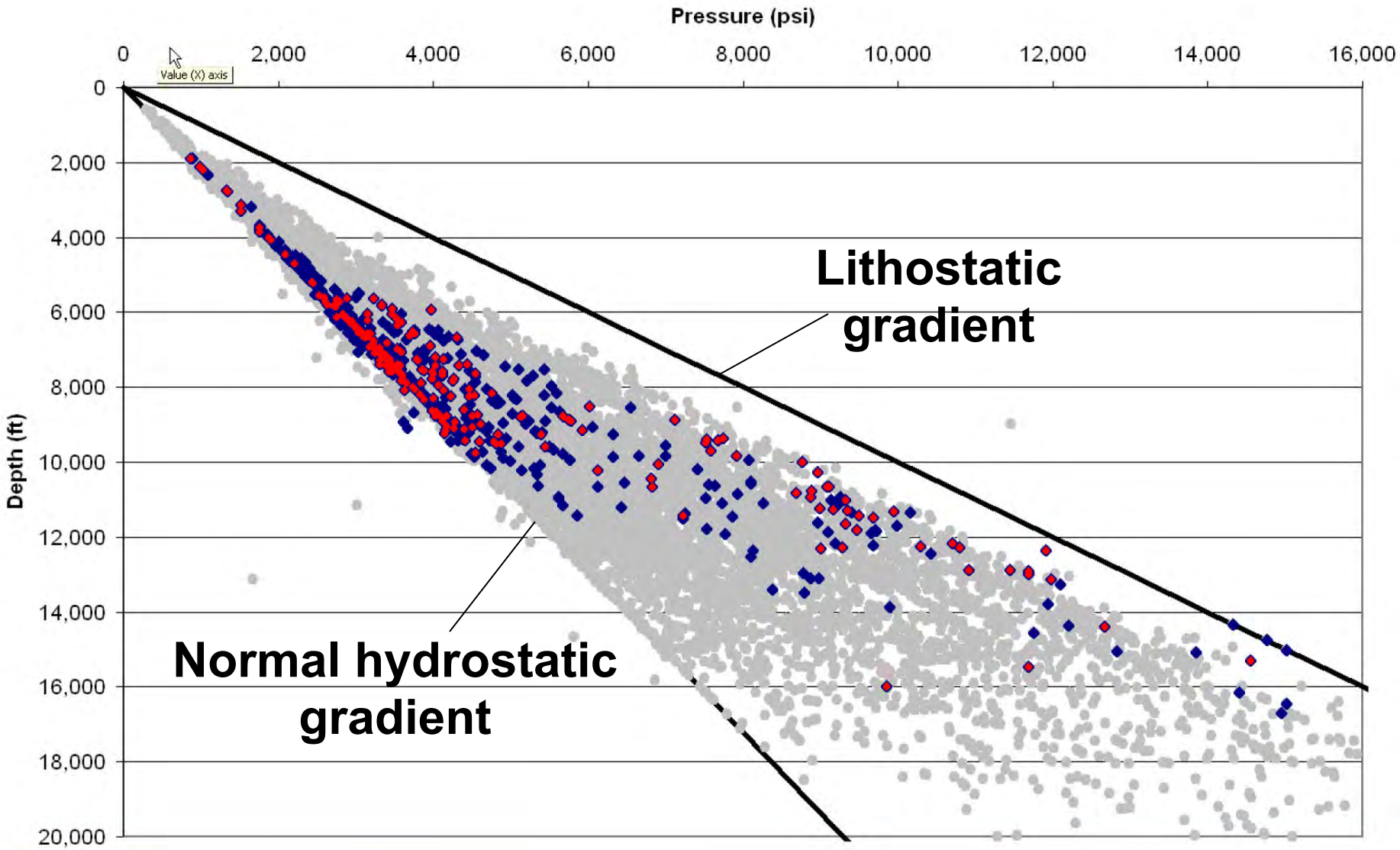
Temperature-depth profile



Burial history curve

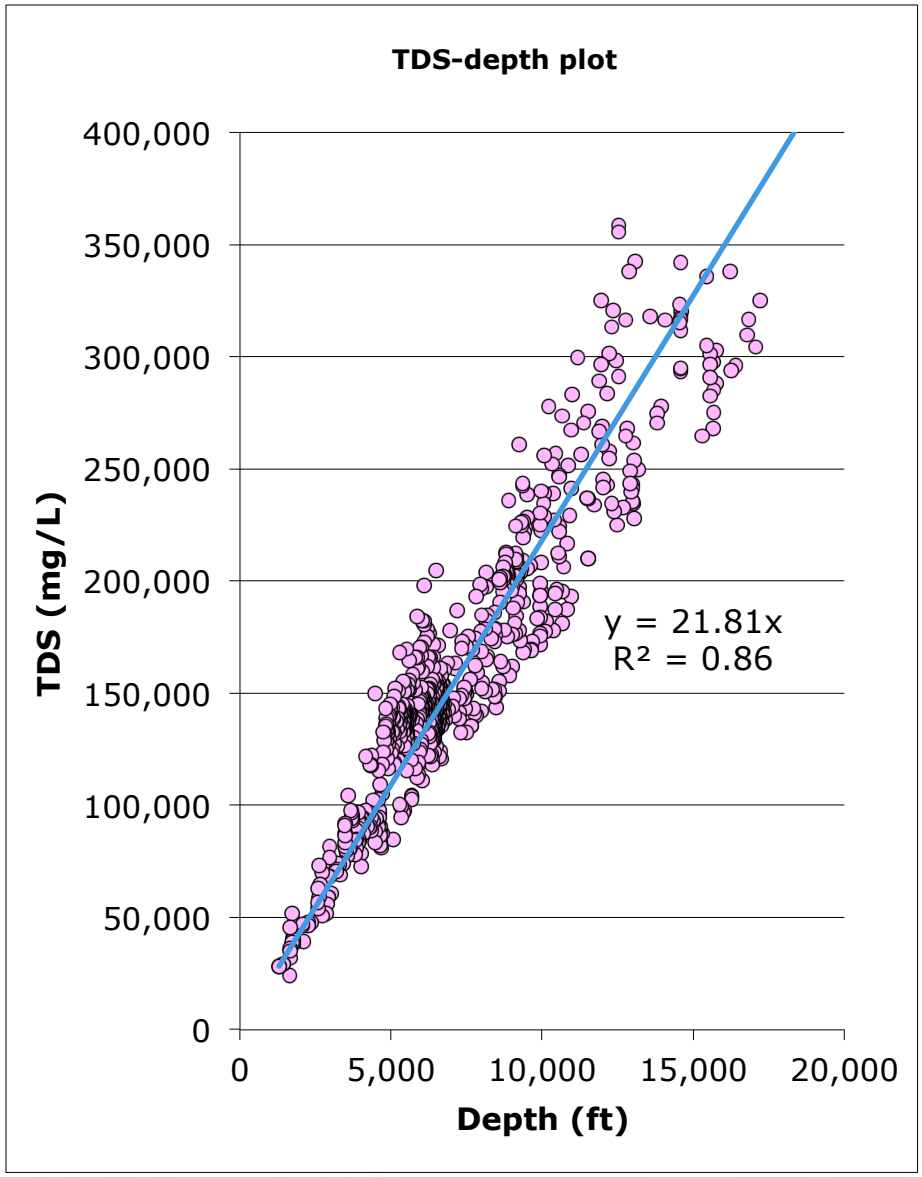


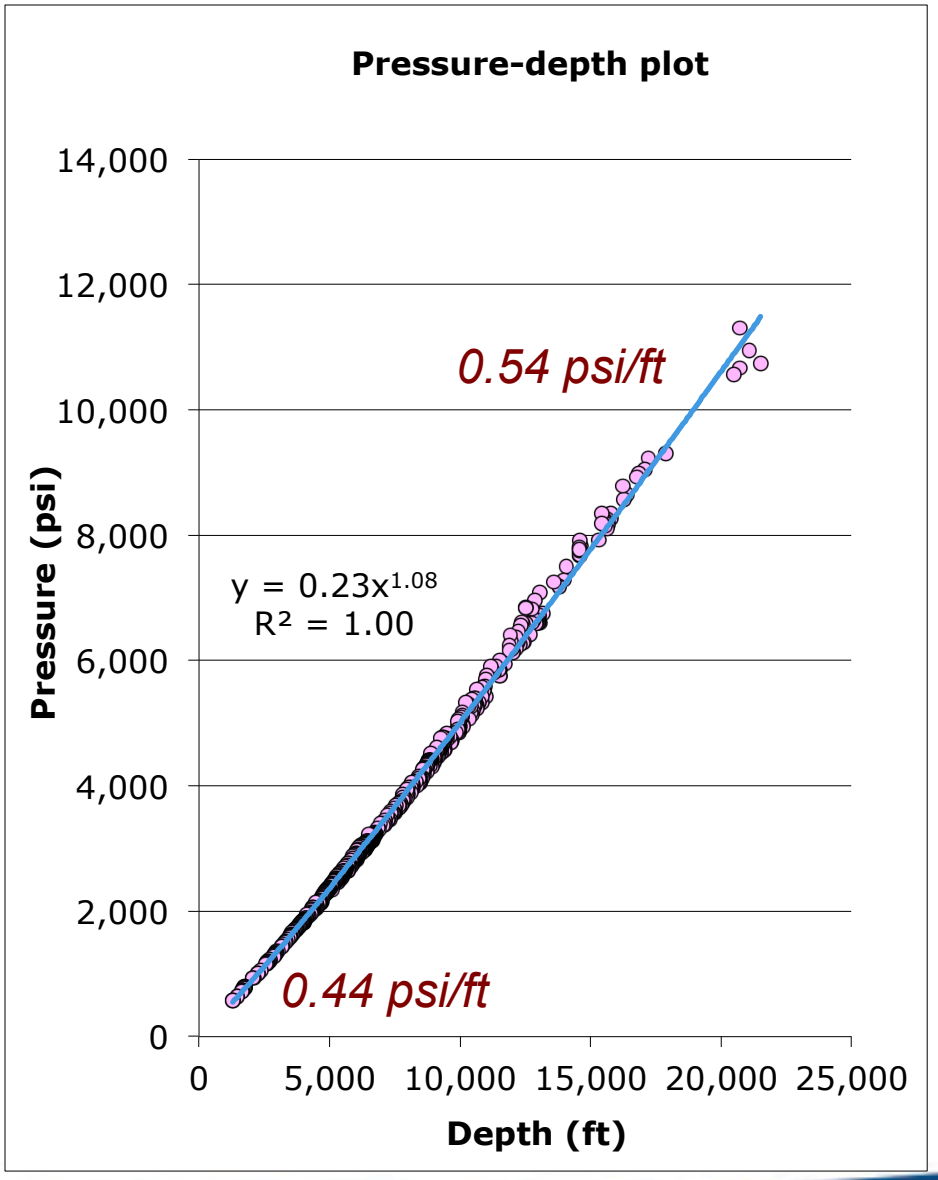
Miocene Pressure-Depth Profile, Offshore Texas



Meckel (2010), Offshore Texas Miocene

Normal Brine, Pressure Gradients





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?