

Deepwater Subsalt-Suprasalt Middle to Lower Slope Sands & Reservoirs of the US Gulf of Mexico: The Evolution Of An Exciting Giant Field Concept

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Objectives

- Highlight depositional systems of reservoir sands in the ancestral middle and lower Miocene slope section of the Central LA GOM
- Describe these Conger-Mahogany-Hickory Miocene slope sands as proven highly productive reservoirs, with further potential in surrounding mini-basins
- Demonstrate that the Miocene ancestral middle and lower slope is NOT a “bypass” zone, but is a broad, widespread area of sand-filled confined mini-basins with amalgamated fans and channels as reservoir sands

Subsalt Miocene Slope Sand Production

EUR 400+ MMboe were discovered in the 1990s

Conger >250 MMBoe
 Discovered 1st Prod
 1998 2000

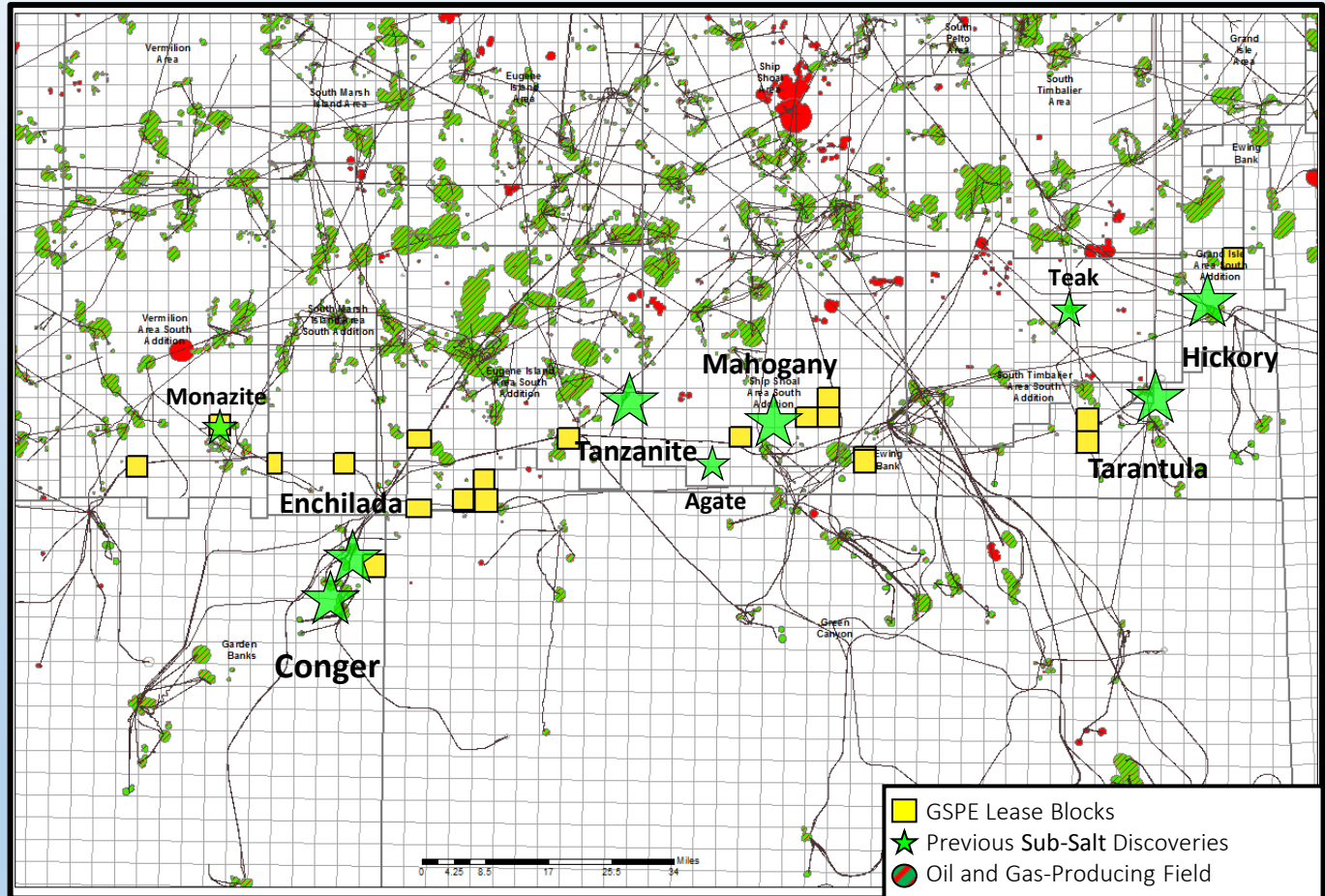
Hickory >55+ MMBoe
 Discovered 1st Prod
 1998 2000

Mahogany >50+ MMBoe
 Discovered 1st Prod
 1993 1997

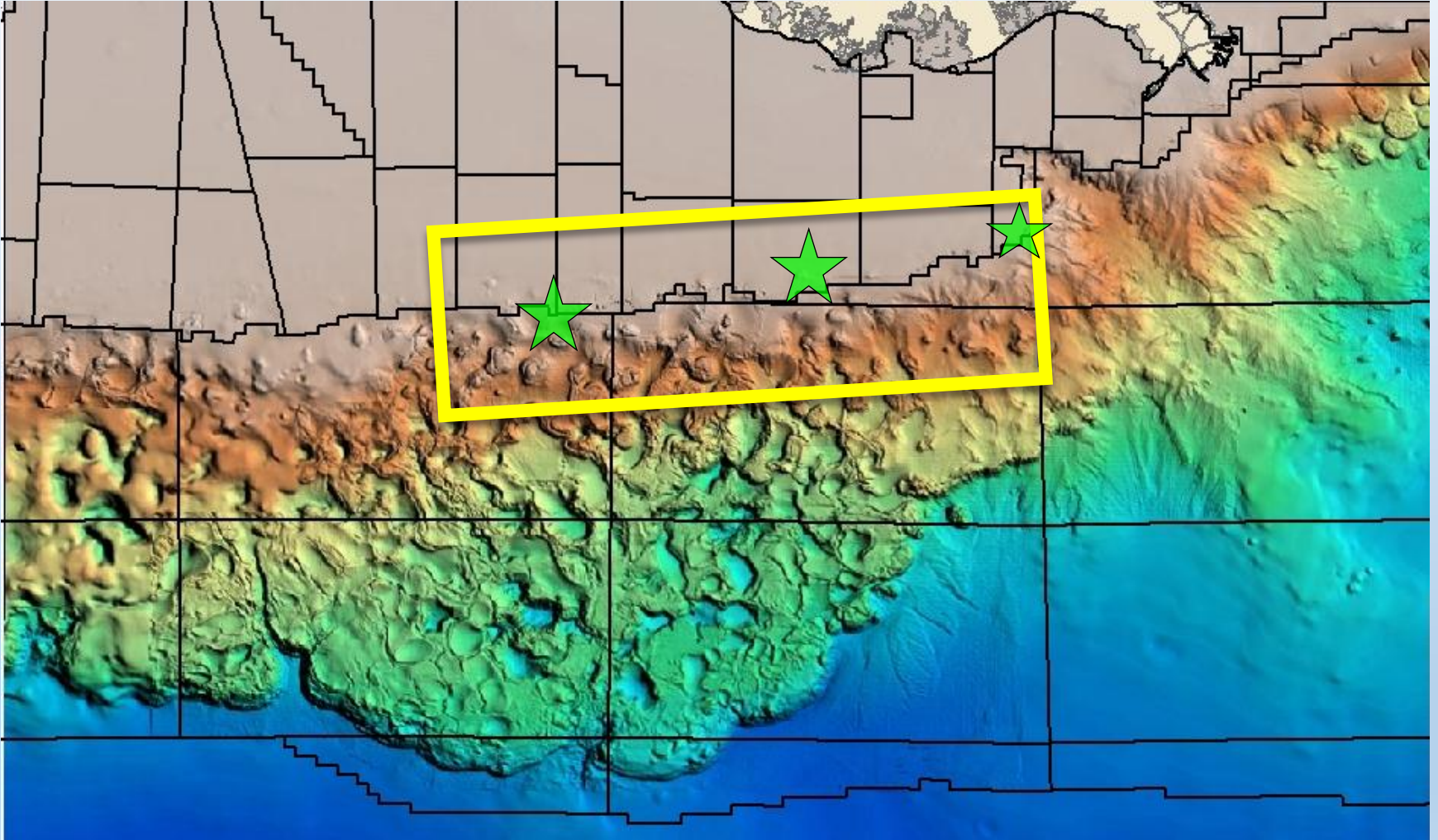
Tanzanite >20 MMBoe
 Discovered 1st Prod
 1998 1999

Enchilada >30 MMBoe
 Discovered 1st Prod
 1995 1997

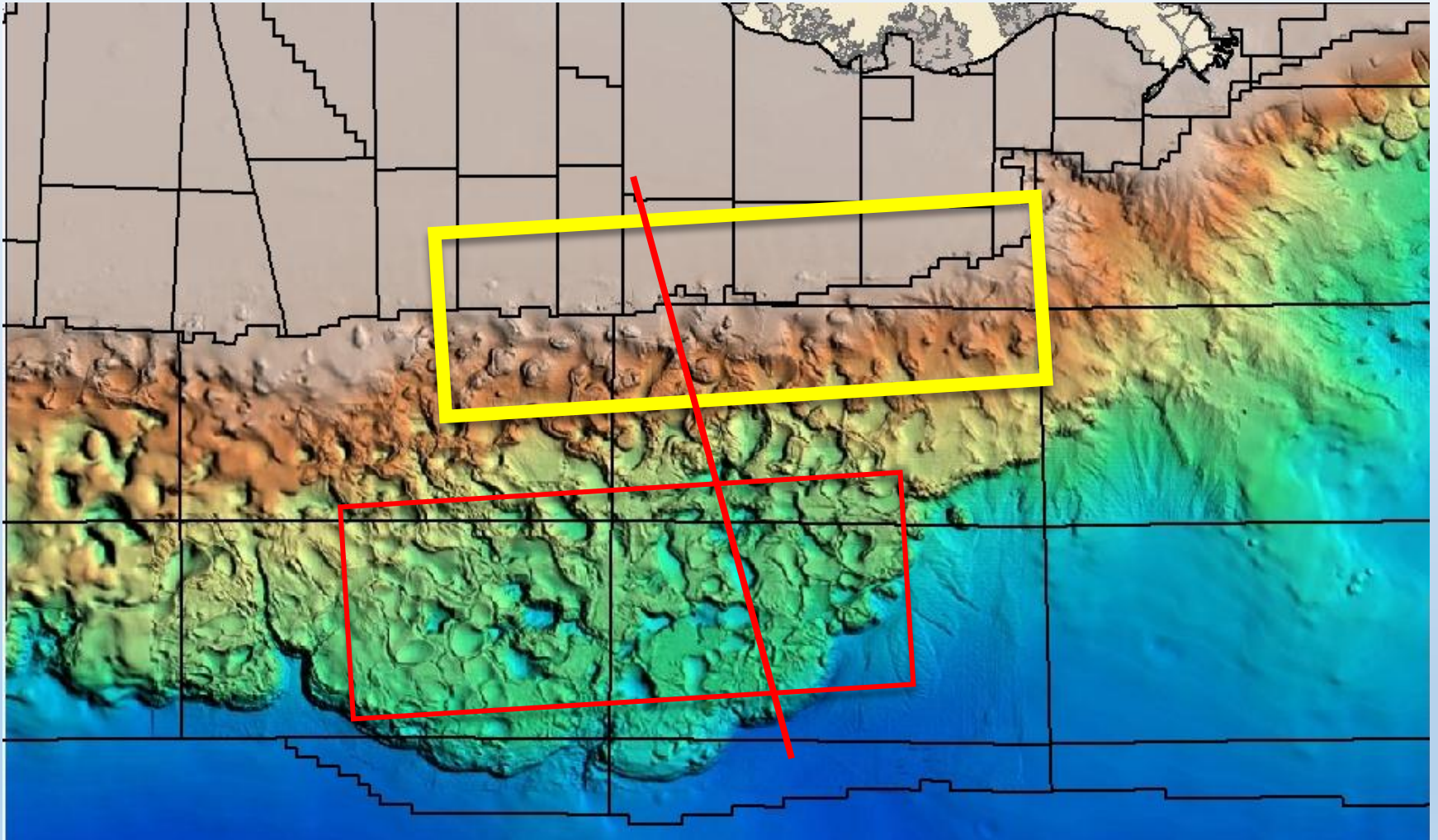
Tarantula >15 MMBoe
 Discovered 1st Prod
 2001 2004



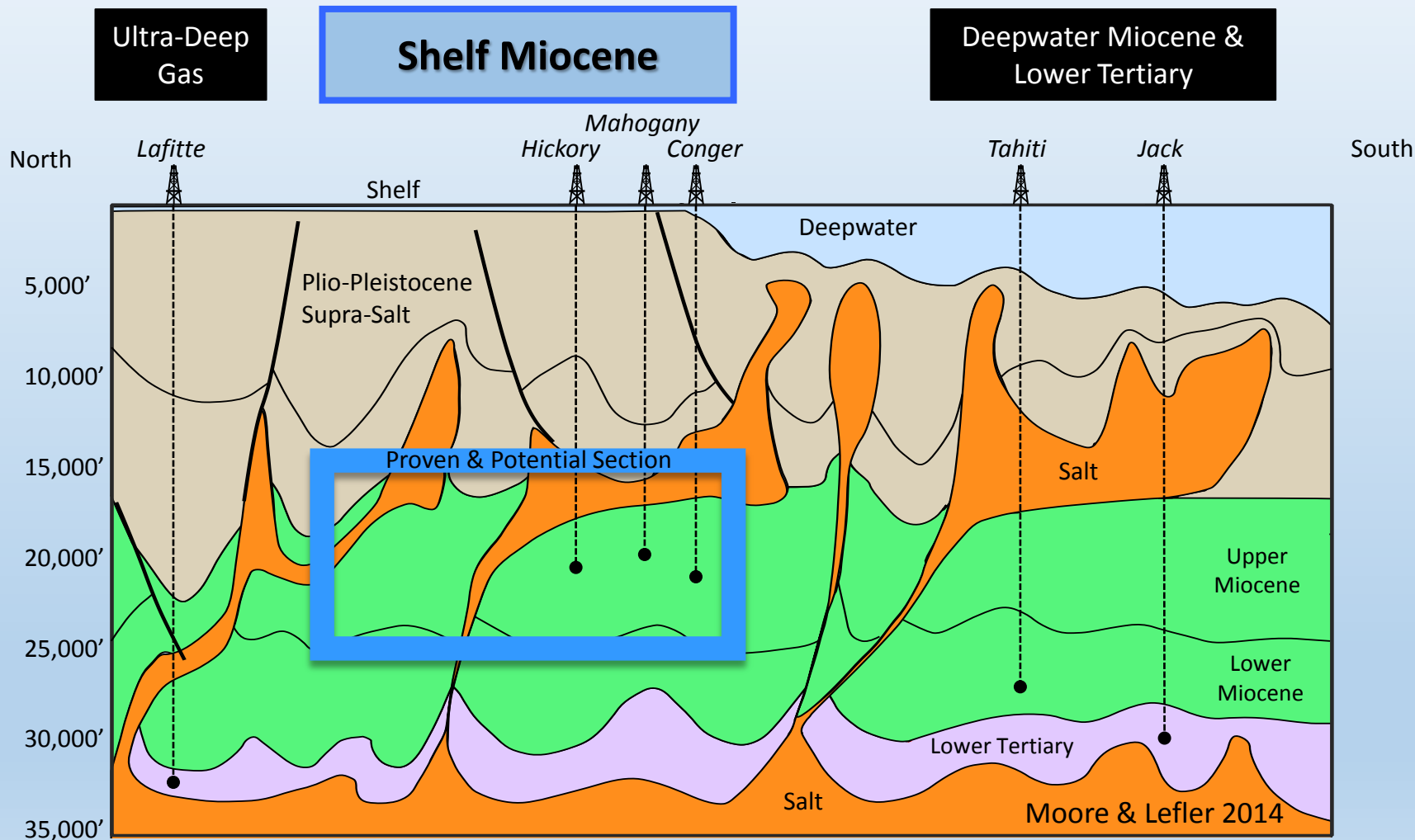
Conger-Mahogany-Hickory Play Area



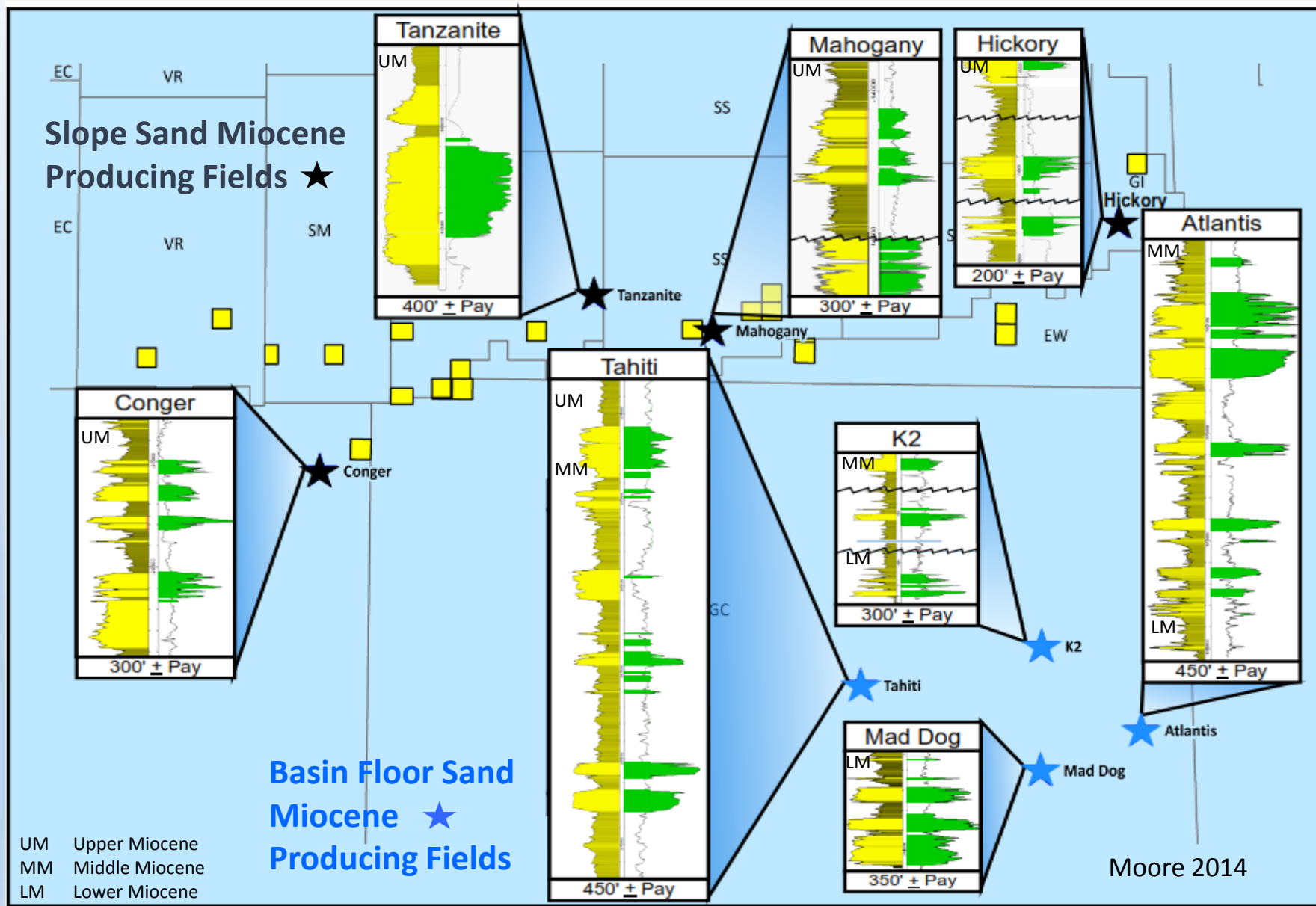
Middle & Lower Slope Miocene Sand Area



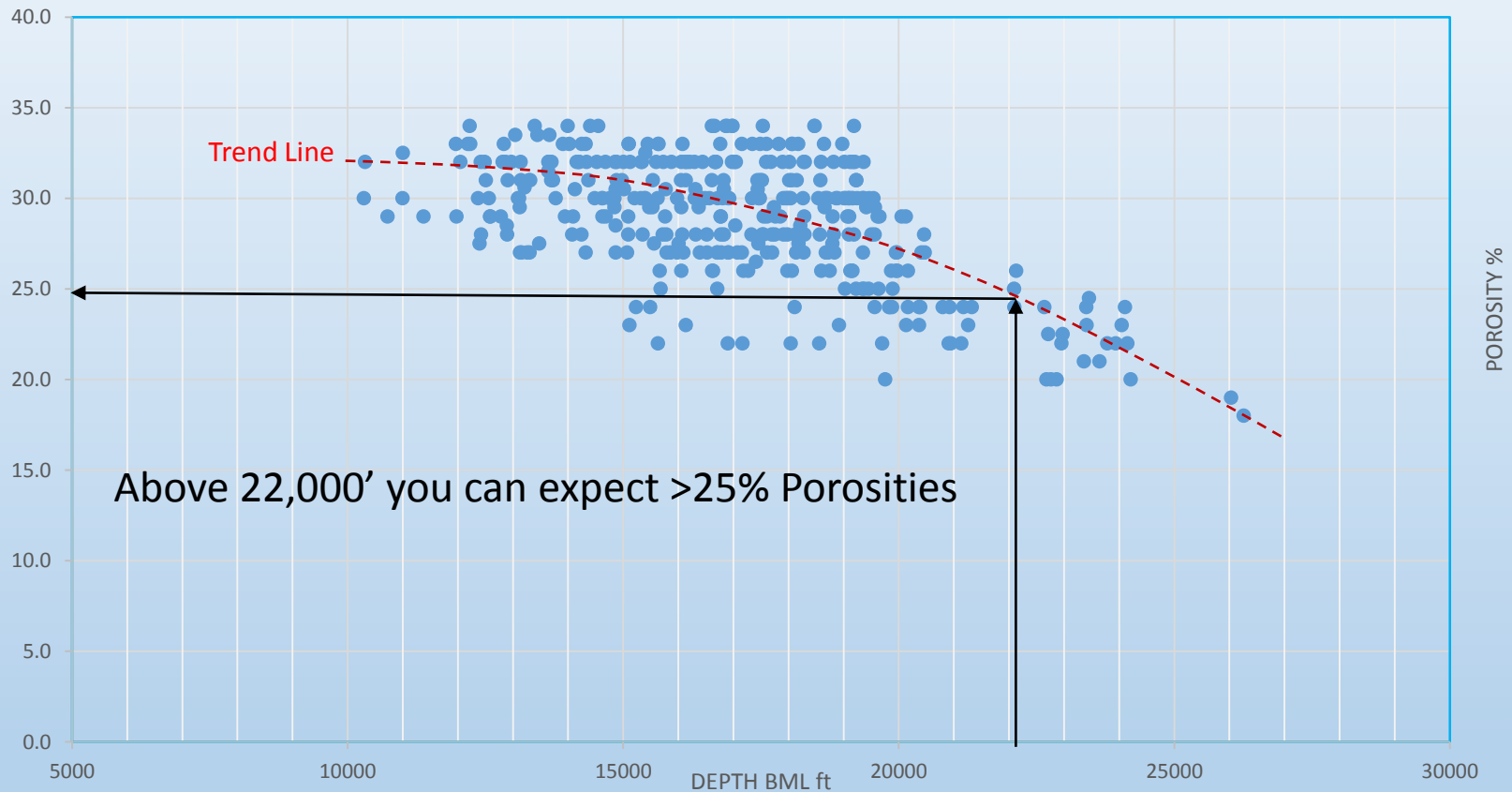
Conger-Mahogany-Hickory Play Area



Highly Productive Slope and Basin Floor Sands

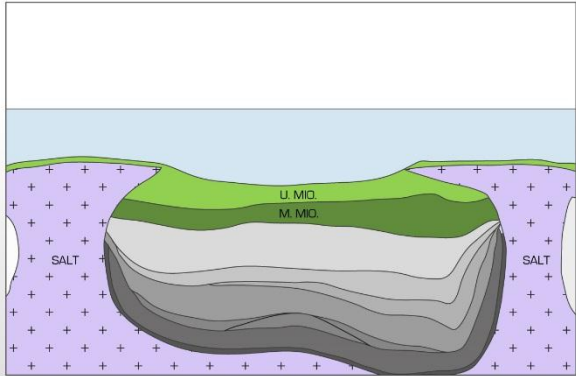


Porosity vs Depth (BML) for Miocene Slope Sands

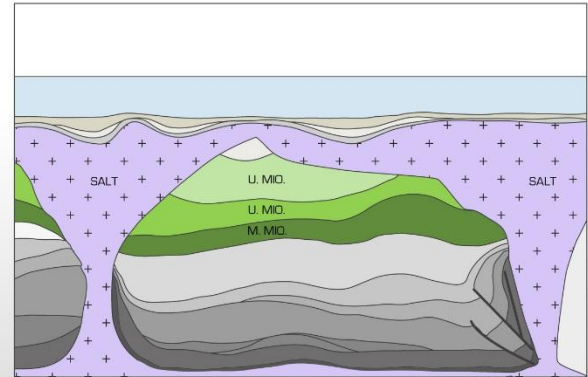


Dynamic Salt & Sediment Model

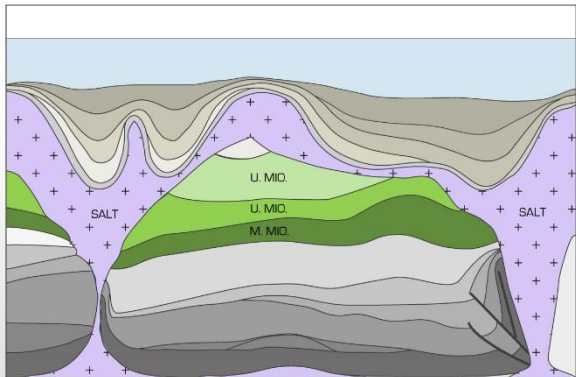
Salt Model - Upper Miocene Time



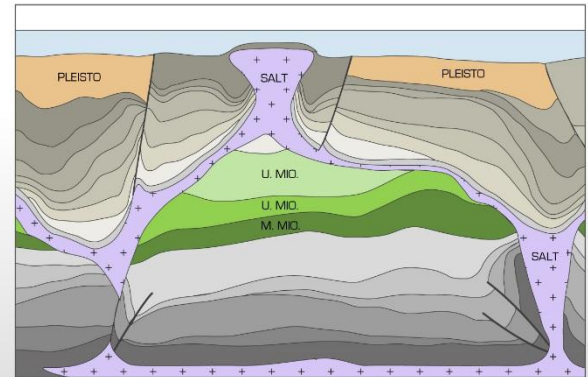
Salt Model - Thick Salt Case



Salt Model - Late Pliocene to Early Pleistocene Time

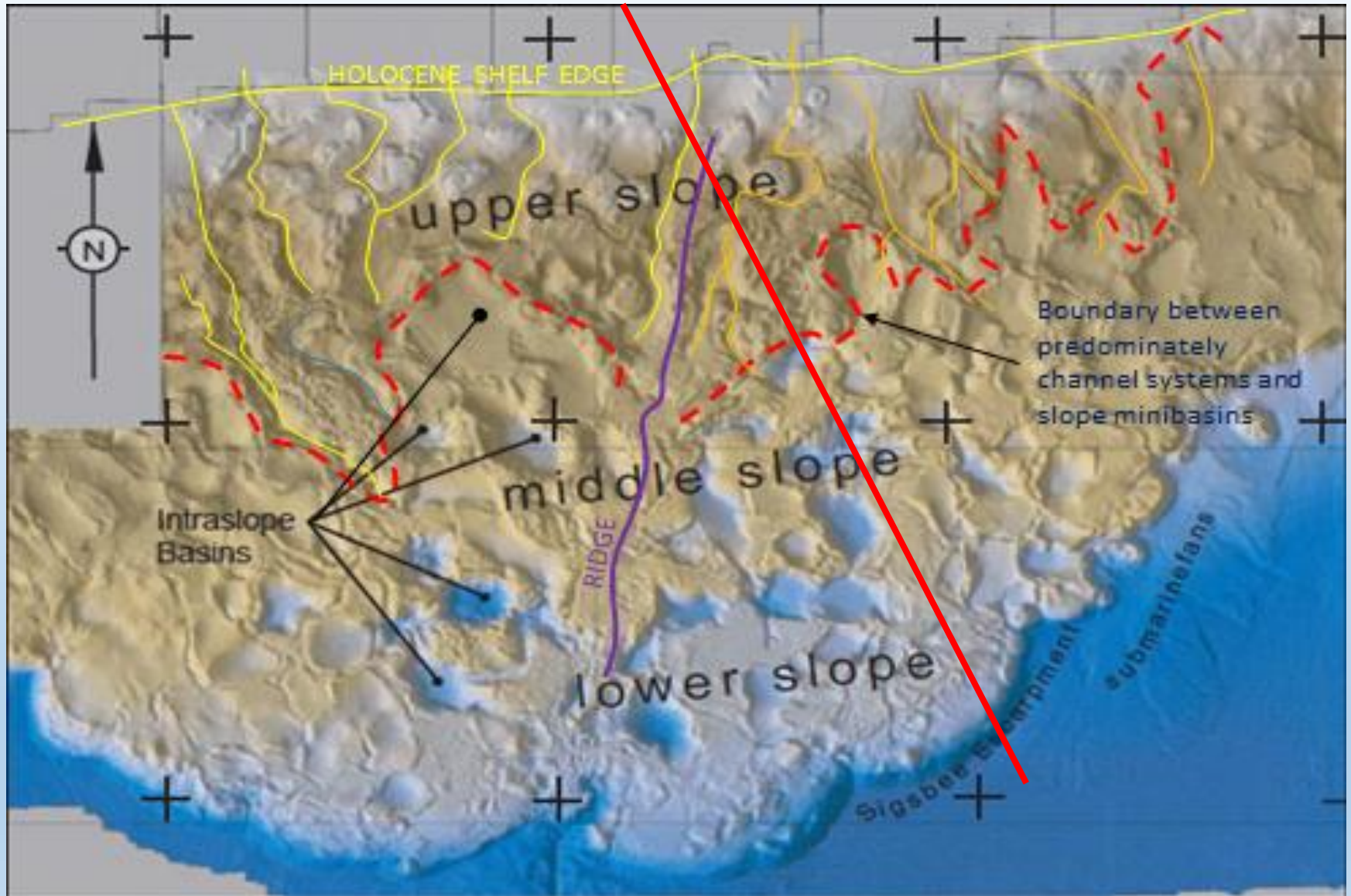


Salt Model - Pleistocene Time



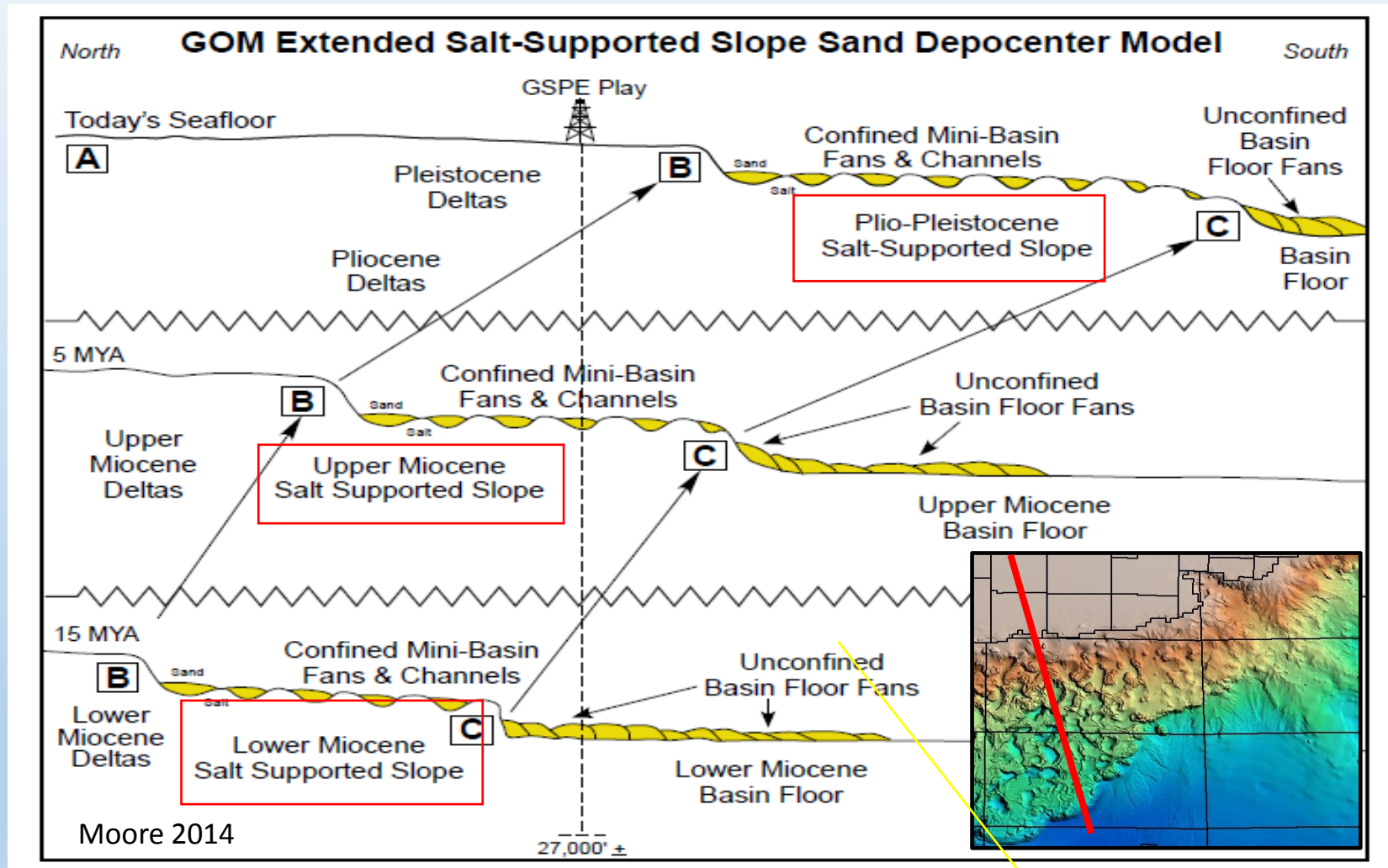
Bathymetry of Modern Sea Floor *

An Analog for sediment fed Intrastope Basins

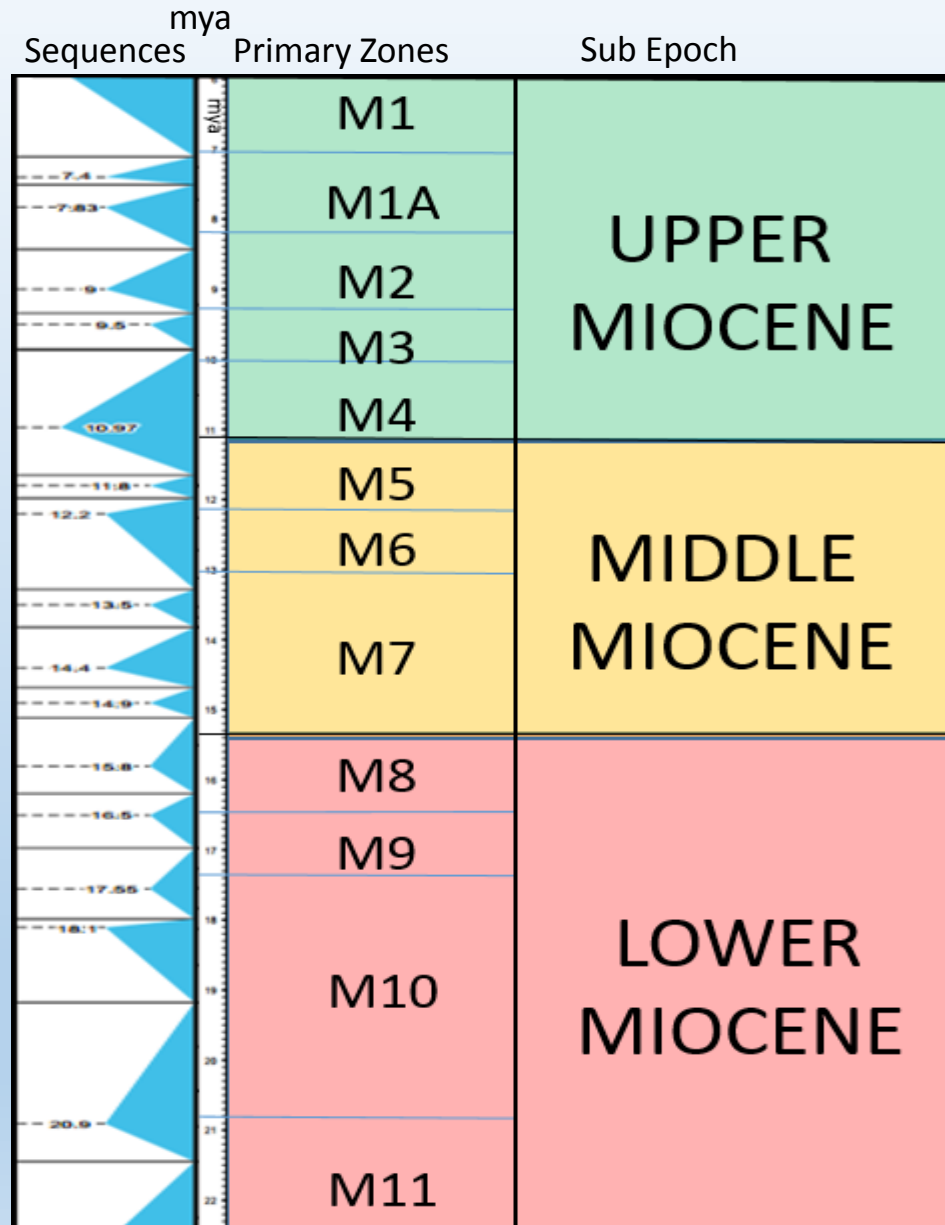


*Modified from Diegel et al., 1995, Prather, 1998

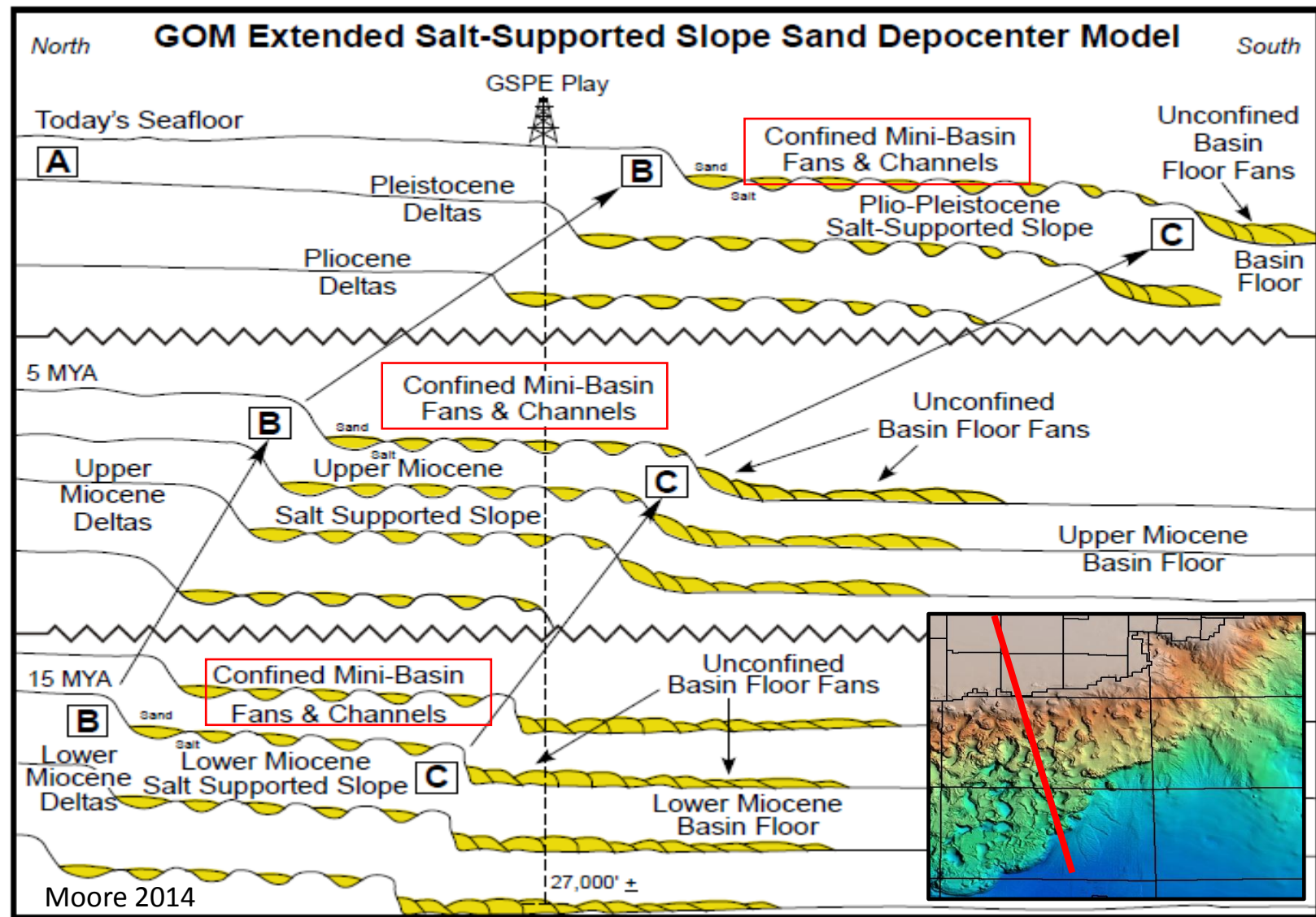
Delta, Slope, & Basin Floor Prograde Seaward



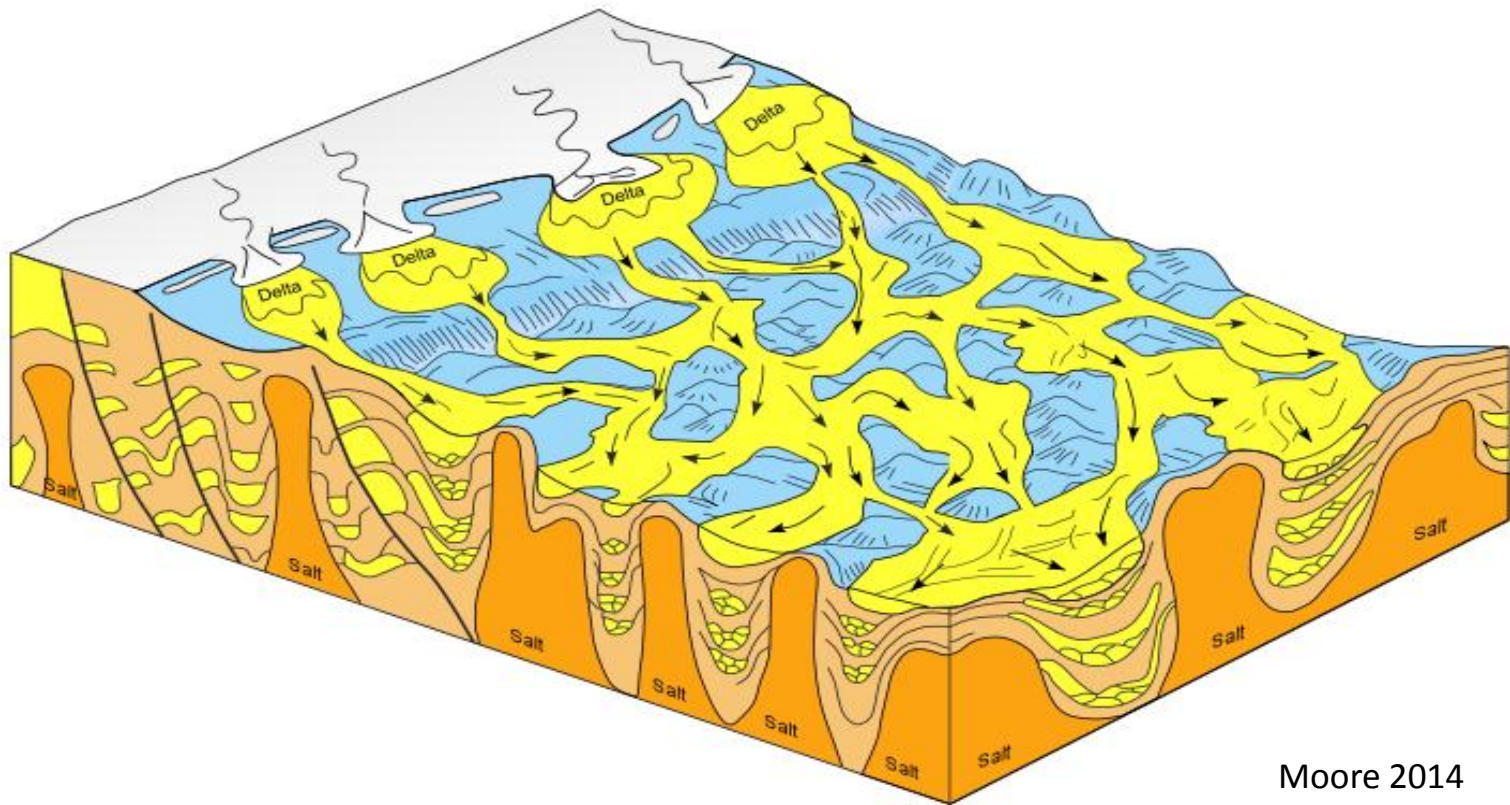
15+ Sequences - Lowstand Sand Potential



15+ Successive Lowstand Cycles in Miocene



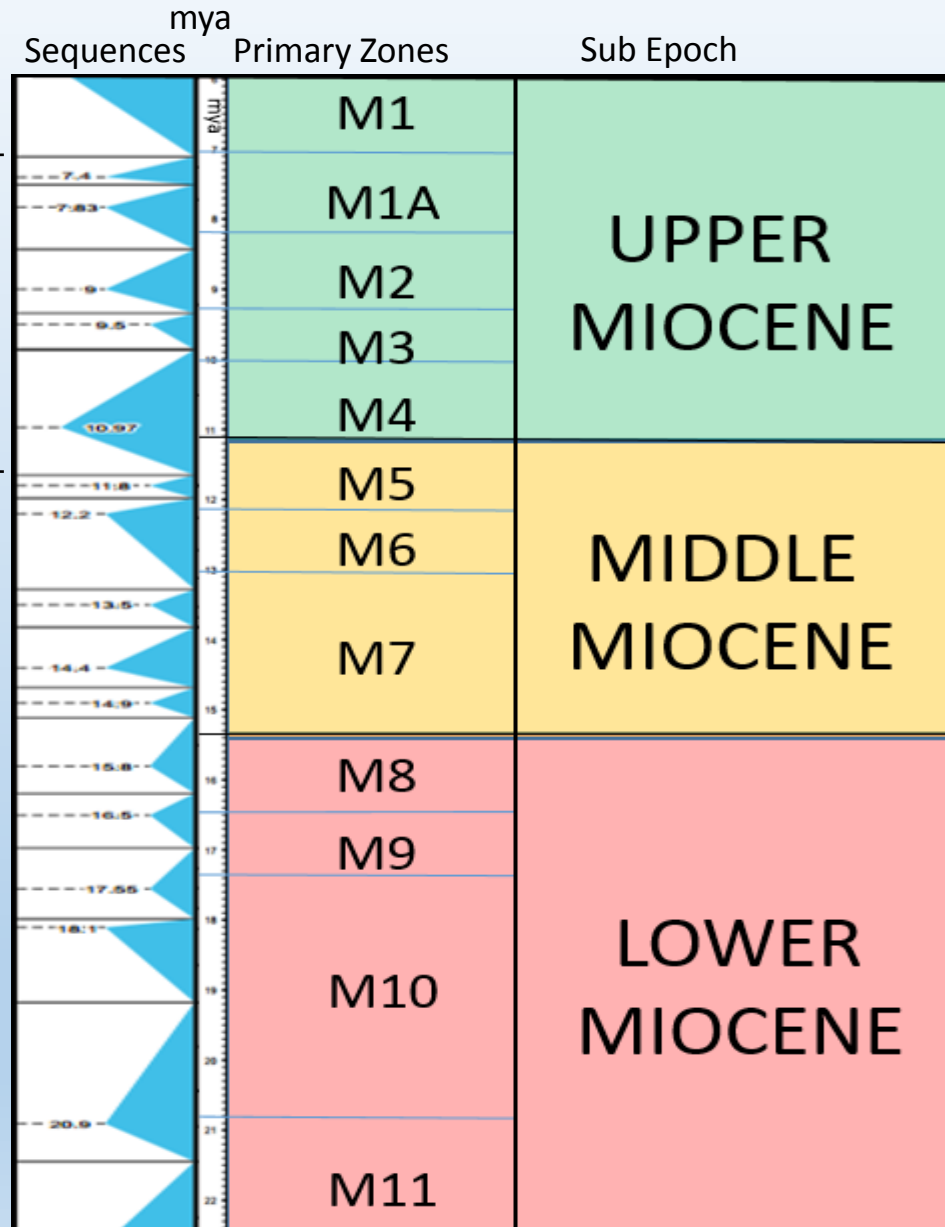
Lowstand Deltas Feed the Salt-Supported Extended-Slope Creating Confined Mini-Basins with Amalgamated Fans & Channels



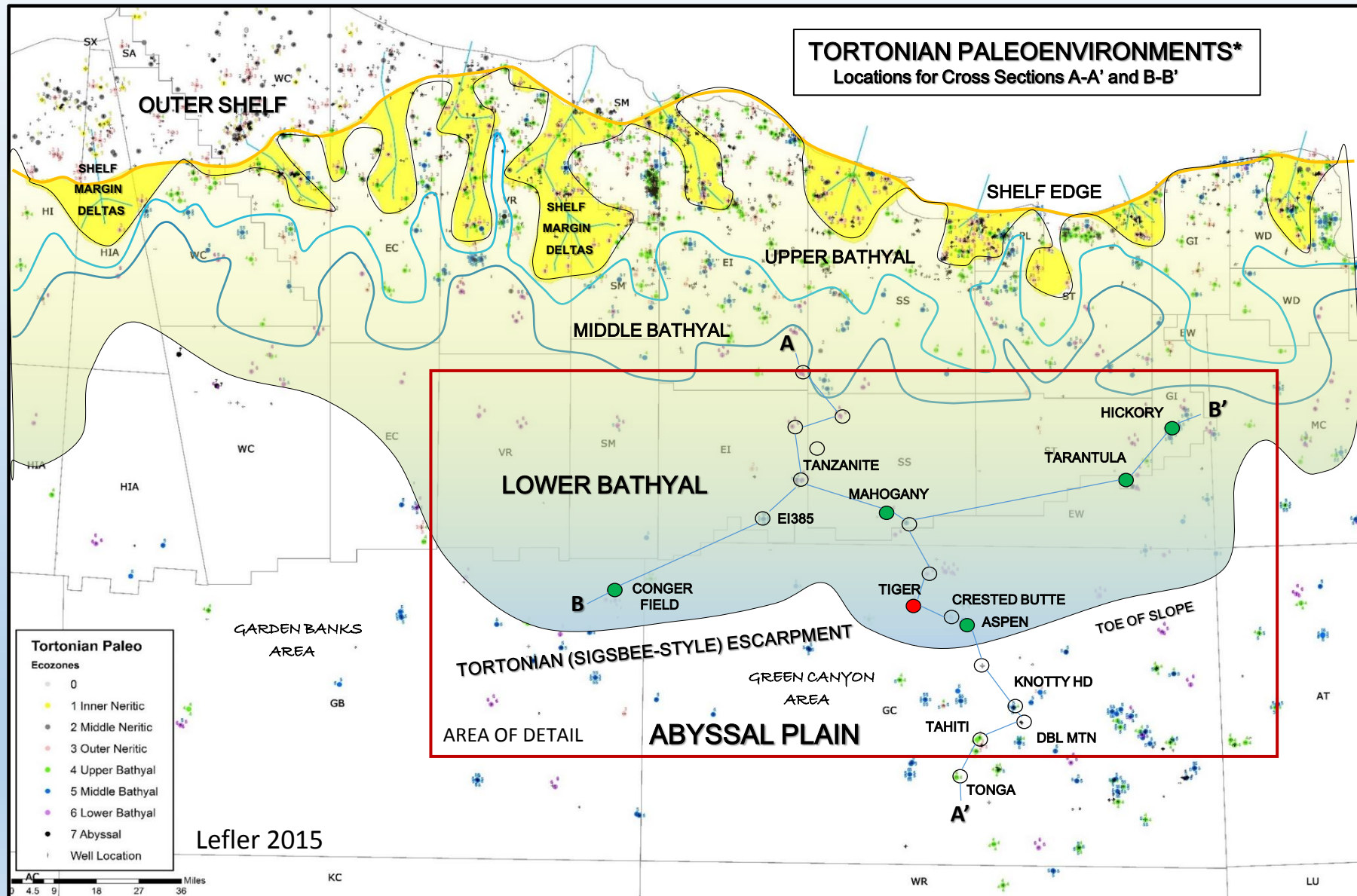
Moore 2014

15+ Sequences - Lowstand Sand Potential

The 6+ LSTs of the
Tortonian Stage
7.0 – 11.6 MYA



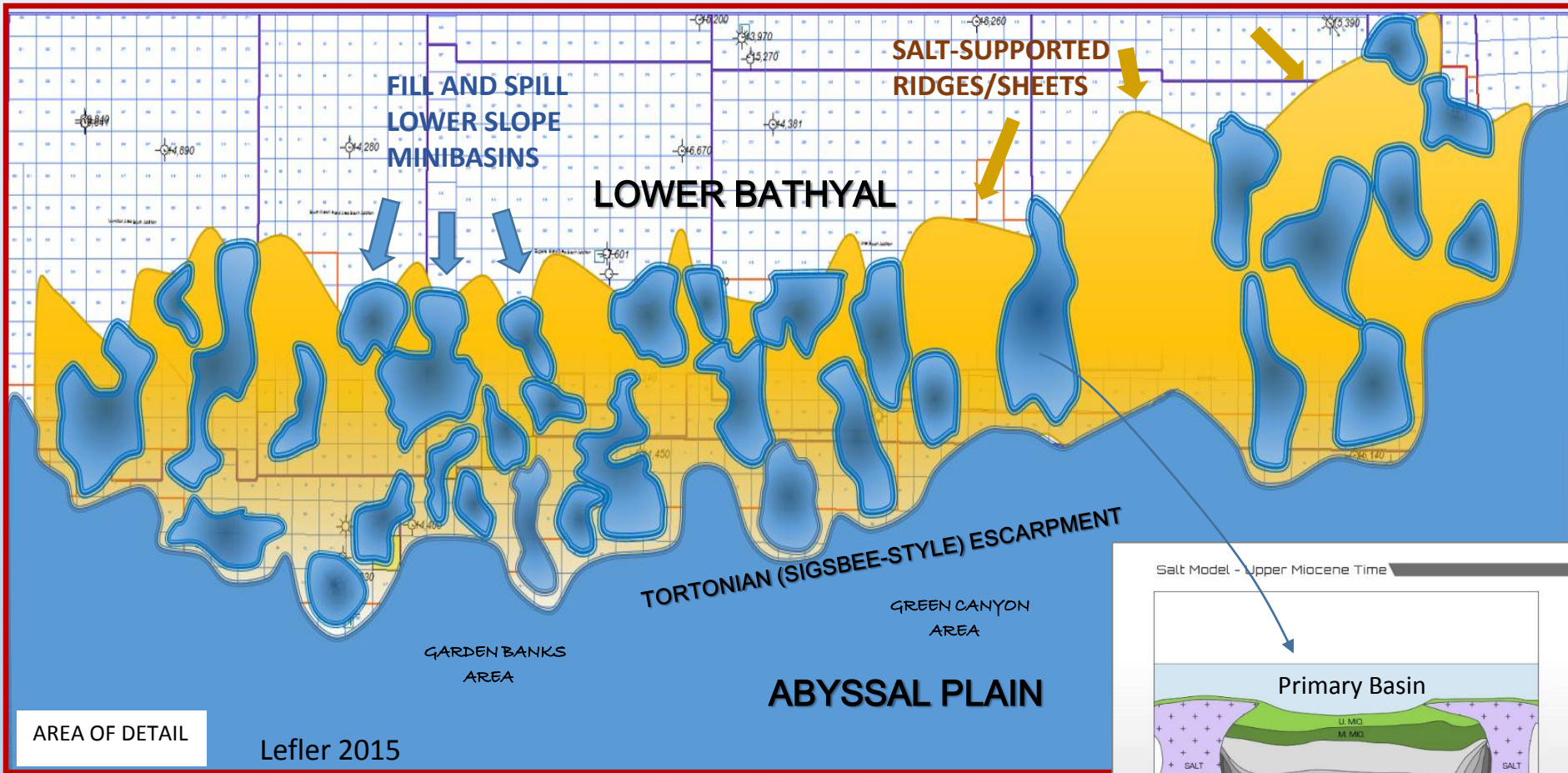
Bathymetry of Upper Miocene “Tortonian” Stage



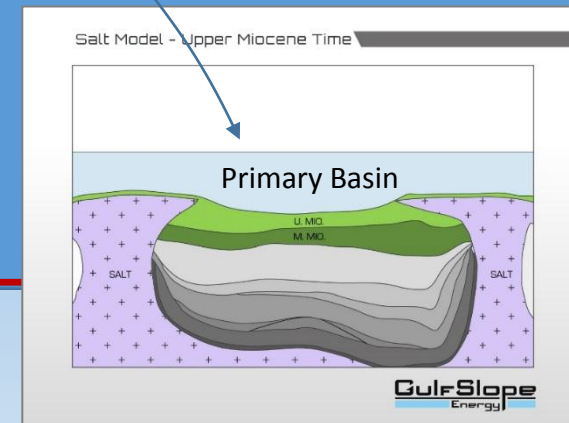
* Interpretation based upon BOEM Public Data

Bathymetry of Upper Miocene “Tortonian”

Showing Lower Slope Mini Basins as “Primary Basins”*

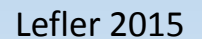


*Interpretation based upon 3D Seismic Isopach mapping



A'

ABYSSAL PLAIN

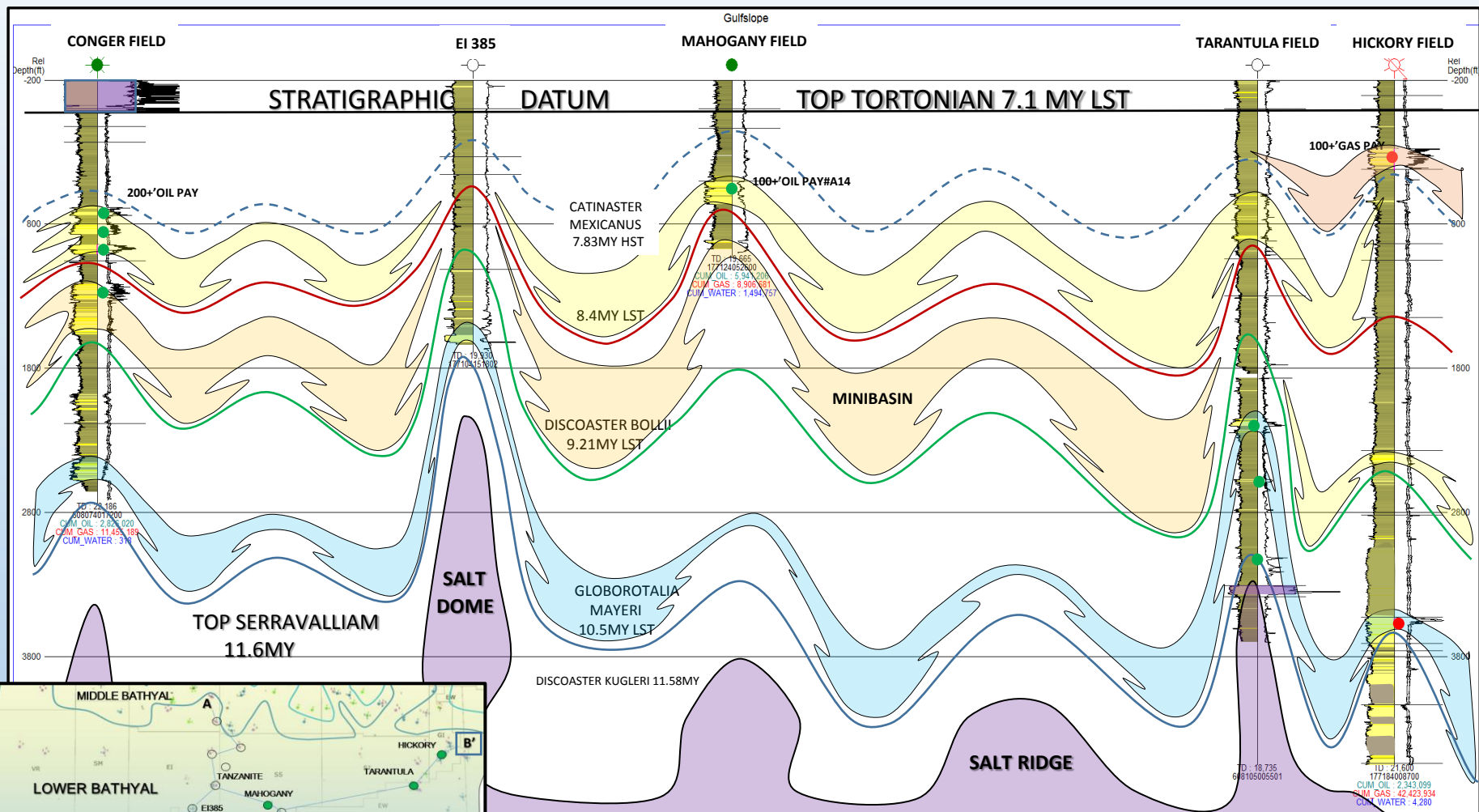


WEST-EAST STRATIGRAPHIC SECTION

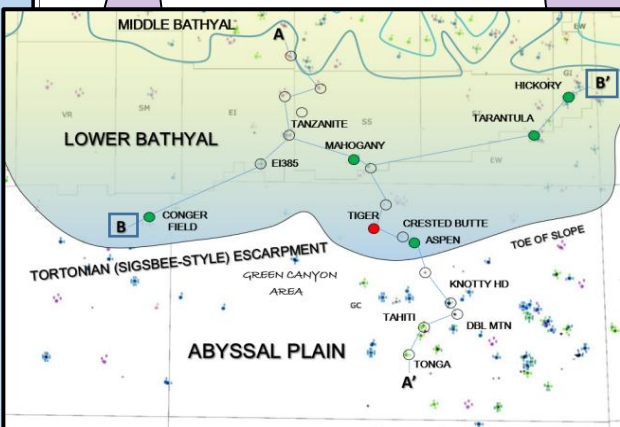
Showing 3 Major Tortonian Lowstand Episodes

B

B'

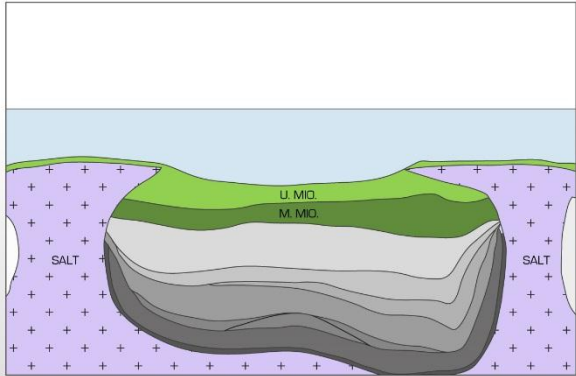


Lefler 2015

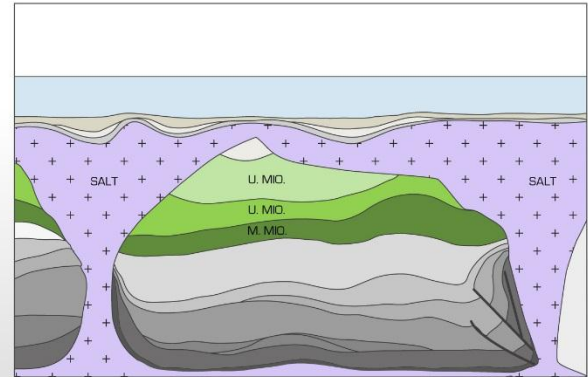


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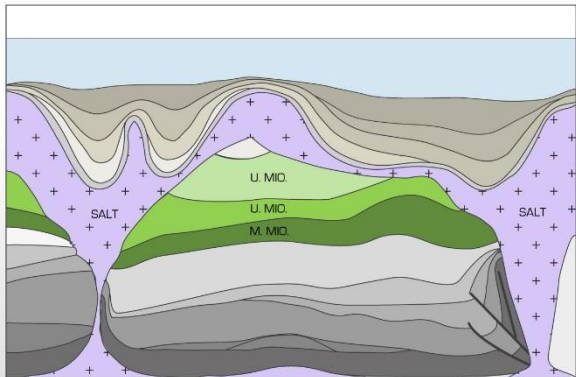
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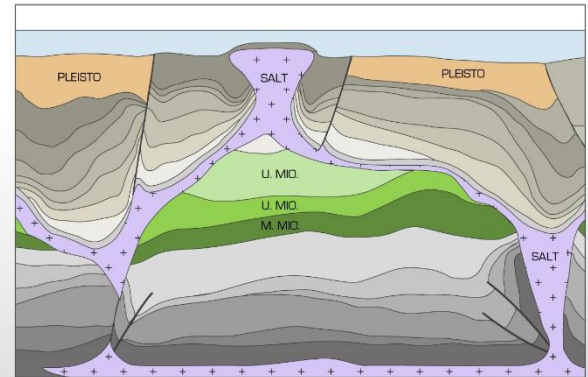
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Salt Model - Late Pliocene to Early Pleistocene Time

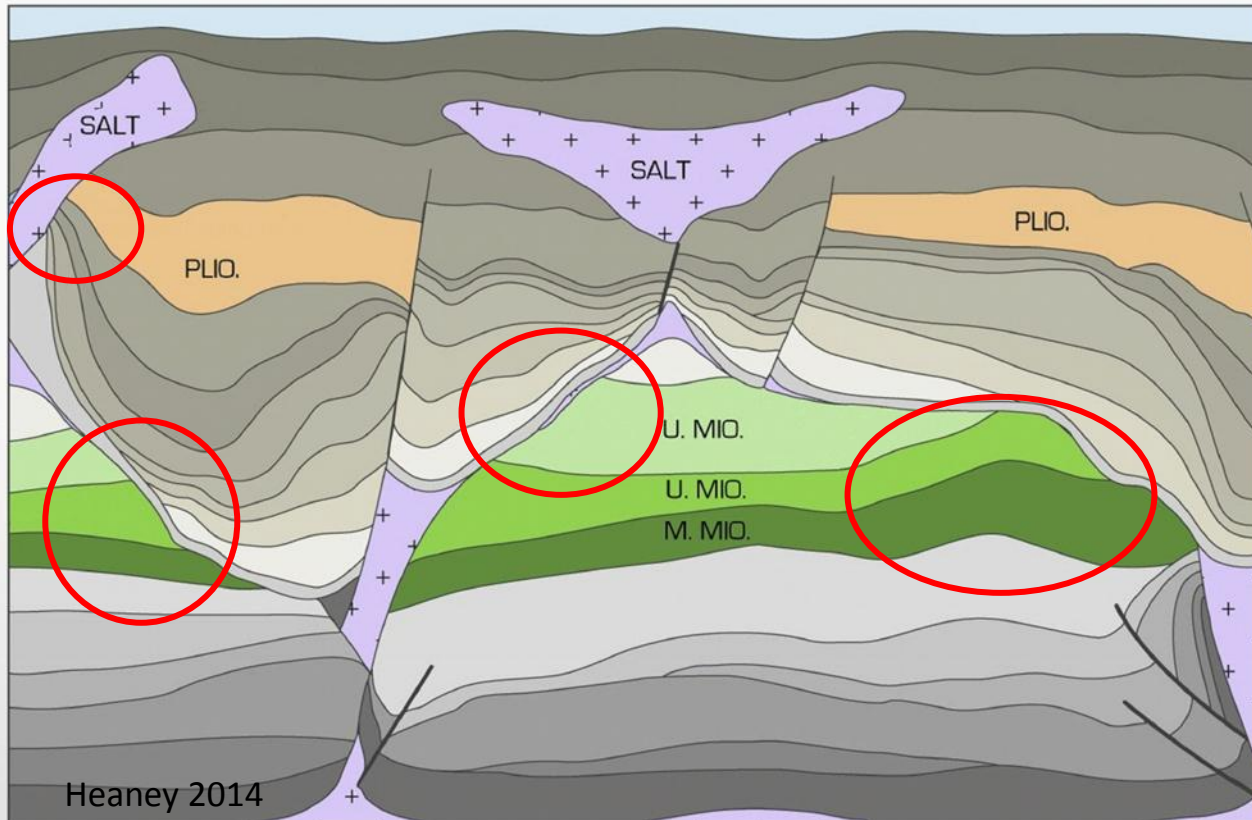


Salt Model - Pleistocene Time



Trap Styles result from Salt & Sand Dynamics

Salt Model - Recent Time



GulfSlope
Energy

Conclusions

- Lower slope sands are extensively deposited across the Miocene ancestral slope, and are most commonly found as amalgamated fans and channels in confined mini-basins
- Lower Slope Miocene sands have produced well in Conger-Mahogany-Tanzanite-Hickory reservoirs to date (350+ MMBOE produced – 400+ MMBOE EUR)
- GOM Miocene ancestral lower slope is NOT a “bypass” zone, but consists of widespread sand-filled confined mini-basins with sizeable untested field potential

Geological & Geophysical Advantages

- Confined Mini-basin Fan Sands - Continuous Reservoirs
- Excellent Porosities - 25% to 30+%
- Key Fields - Conger, Mahogany Deep, Hickory, Tarantula, Aspen
- Proven Petroleum System - Reservoirs, Traps, Seals, Sources
- Advanced Seismic Processing (RTM+) Clarifies Sub-Salt Images

Economic Advantages

- Water Depths: 300-600'
- Modern Drilling Technology below Salt
- Mostly Jack-up Rig Access - \$70K/day - \$20-40MM per wildcat
- Mostly Conventional Platforms - \$40-50 MM per platform
- Extensive Existing Platform-Pipeline Infrastructure across area

Acknowledgements

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