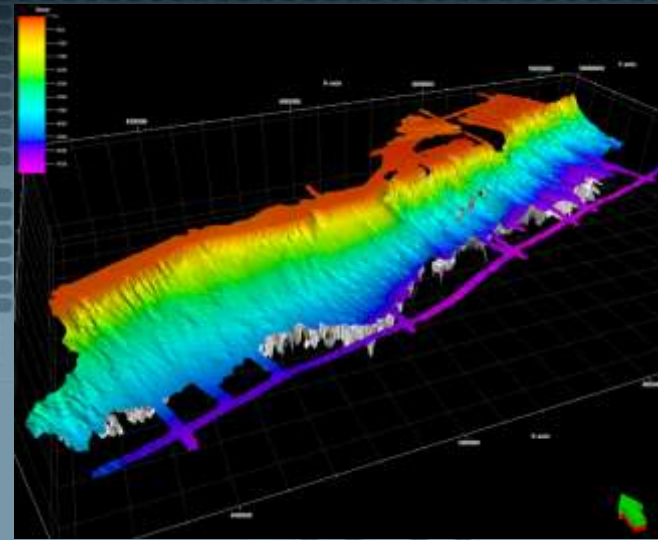




Nova Scotia OFFSHORE



Why Offshore Nova Scotia

Hamish Wilson Technical Director SLR Consulting



NEW GEOSCIENCE. NEW OPPORTUNITY.



- Nova Scotia Play Fairway Analysis
 - The source rock story
 - Reservoir presence de-risking
- Play maps and volumes
- Why has none of this been found?
- Forward work programme

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Hydrocarbon occurrences



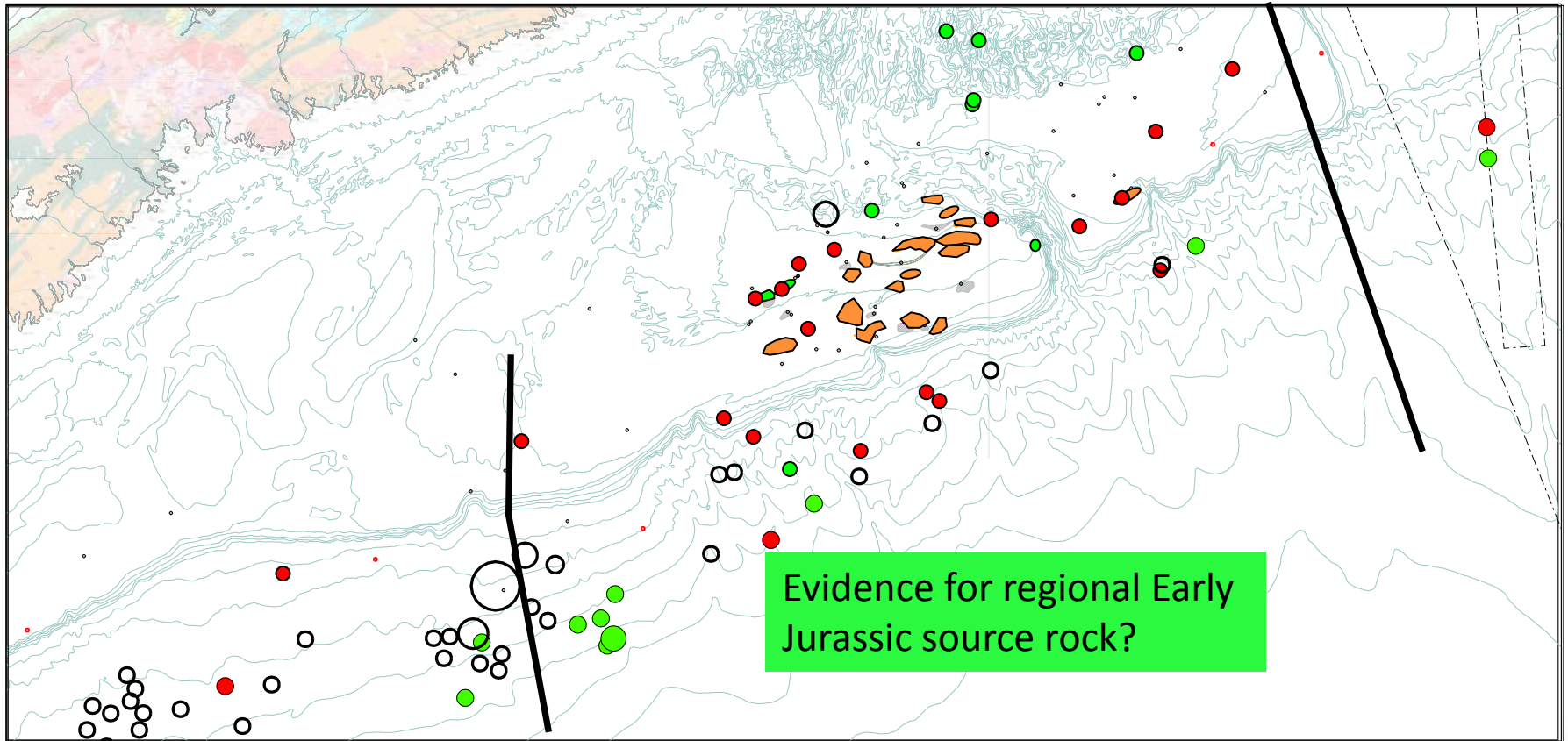
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FIELDS

SHOWS

**PISTON
cores**

DHI



Venture B-13 - gammacerane

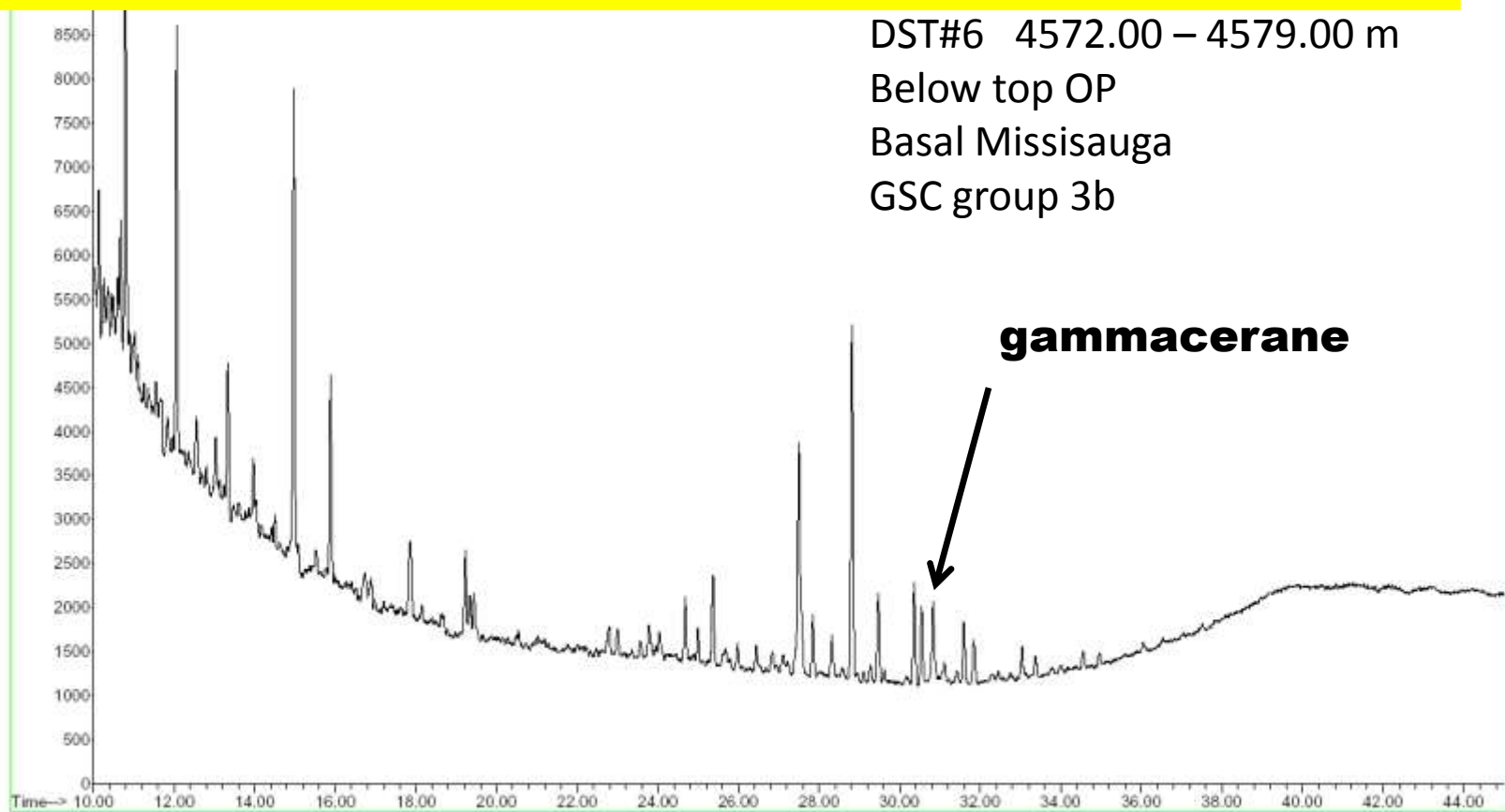


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File : \\S5-cal-tiger\msd_data\Oils\L00244.D
Operator : sla
Acquired : 16 Jun 2010 12:52 using AcqMethod: PTOMAPV1

Evidence for stratified water column

Interpreted as restricted marine hypersaline environment

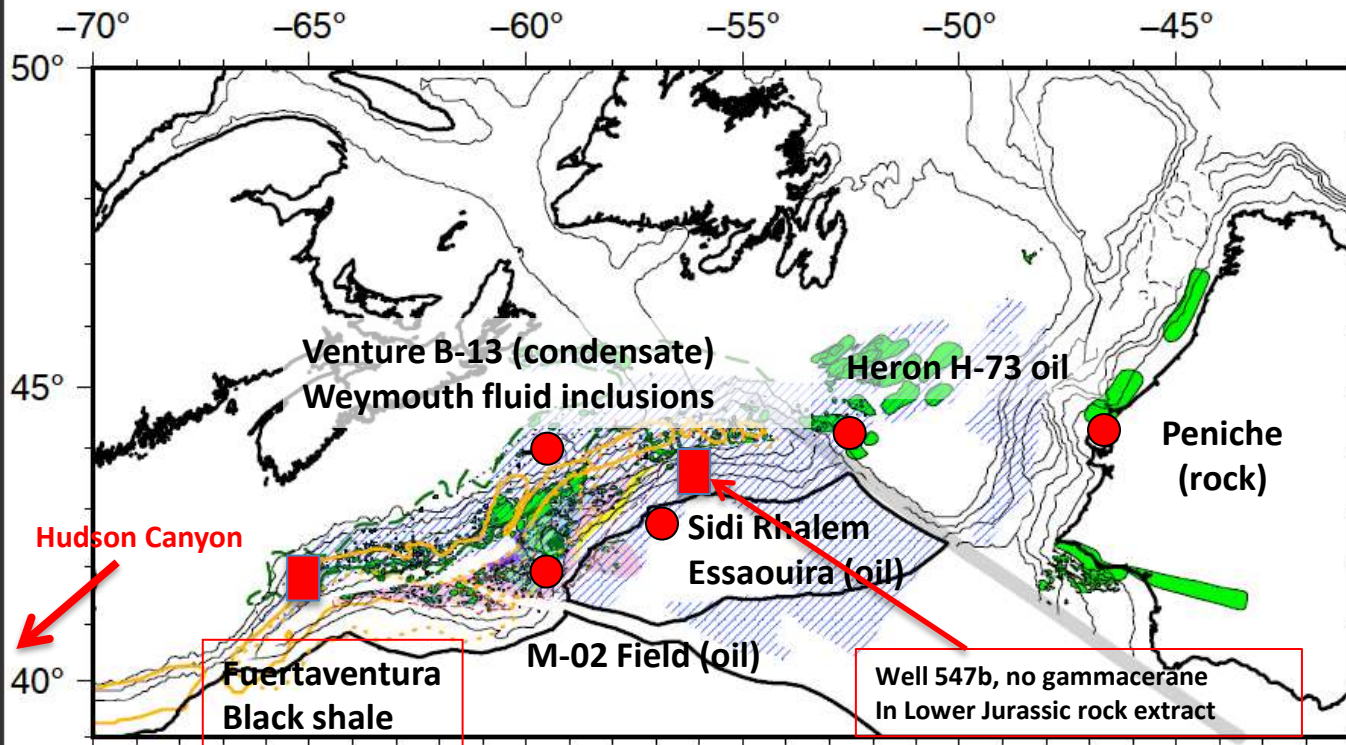


Lower Jurassic source rock indications Nova Scotia, Morocco, Portugal, Grand Banks

Salt distribution

ECMA reconstruction (end of rifting)
(Sinemurian/Pliensbachian limit, 190 Ma)

● Gammacerane



North America

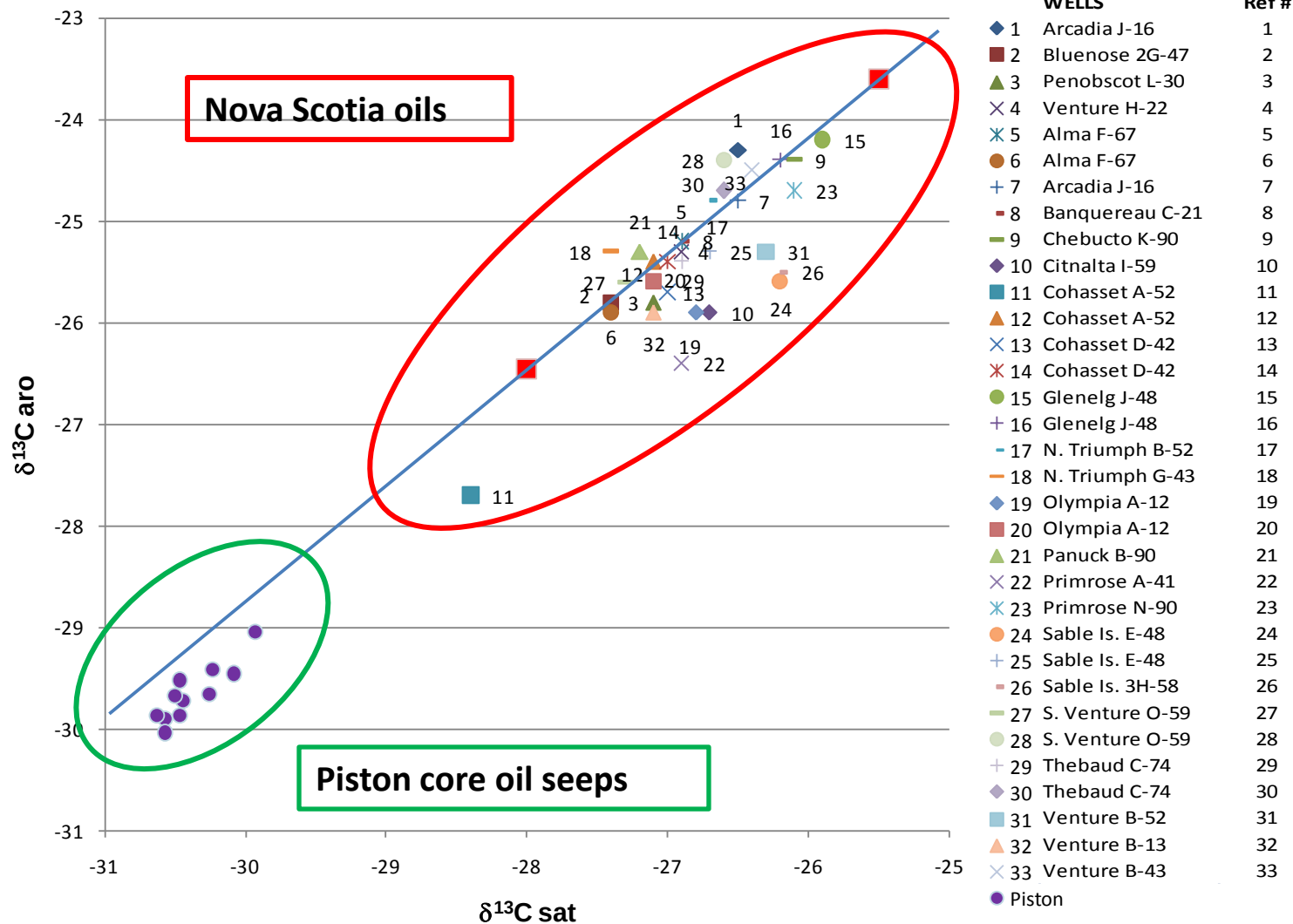
- Outlines of salt structures (Beicip, Davison, Edwards, Wade et McLean)
- Extent of halite (Labails)
- Autochthonous salt (Albertz)
- Salt and fault (Beicip, preliminary)

Africa, Meseta and Iberia

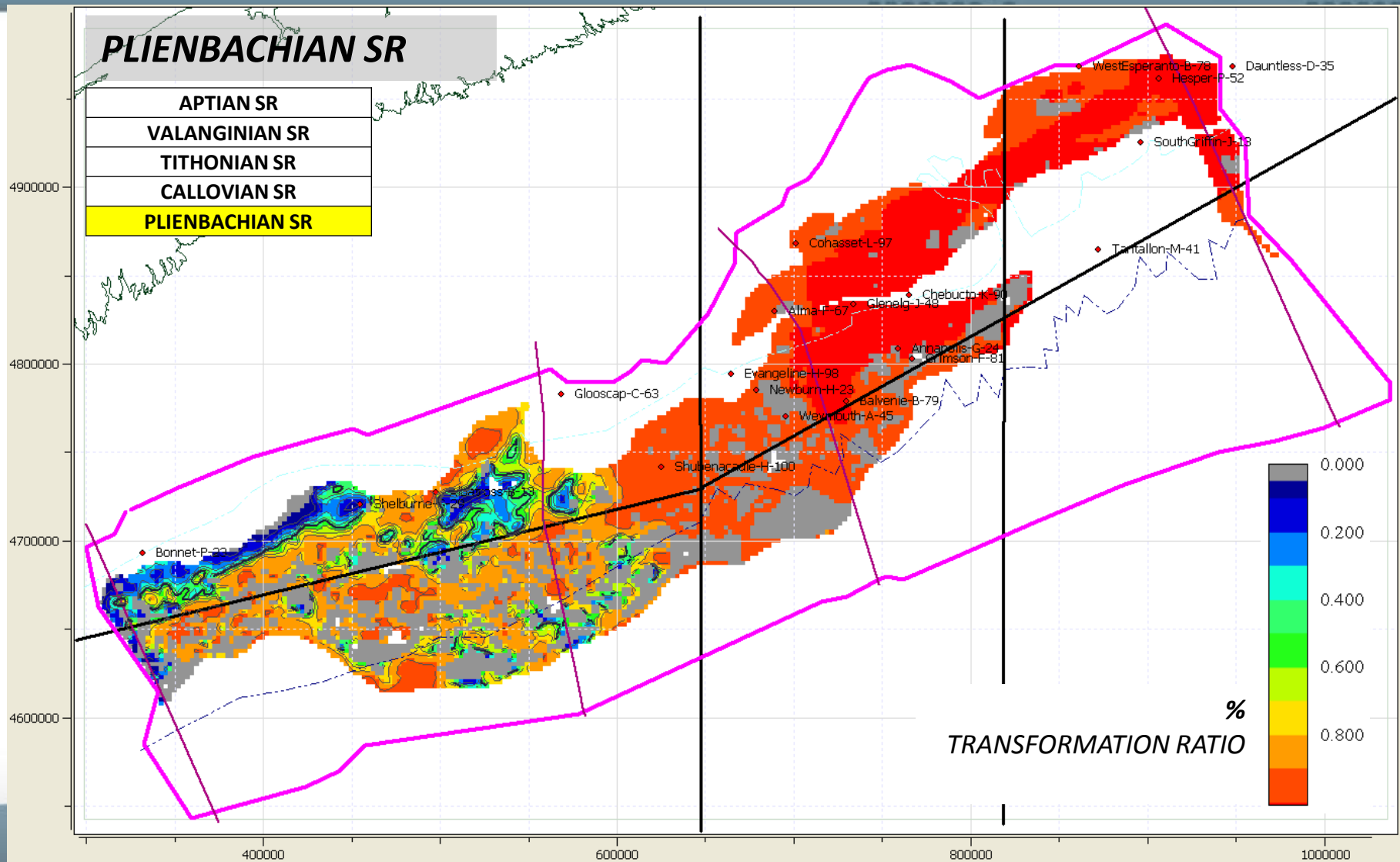
- Outlines of salt structures (Tari & Molnar, Maillard, Davison, Matias)
- Rafts and isolated diapirs (T&M)
- Diapiric salt and turtle structures (T&M)
- Canopy salt (T&M)
- Toe-thrust zone (T&M)
- Allochthonous salt (Hafid)
- Salt pillow (Hafid)
- Extent of halite (Labails)
- Extent of halite (Nemcok)

Isotope distribution - oils

Sofer diagram

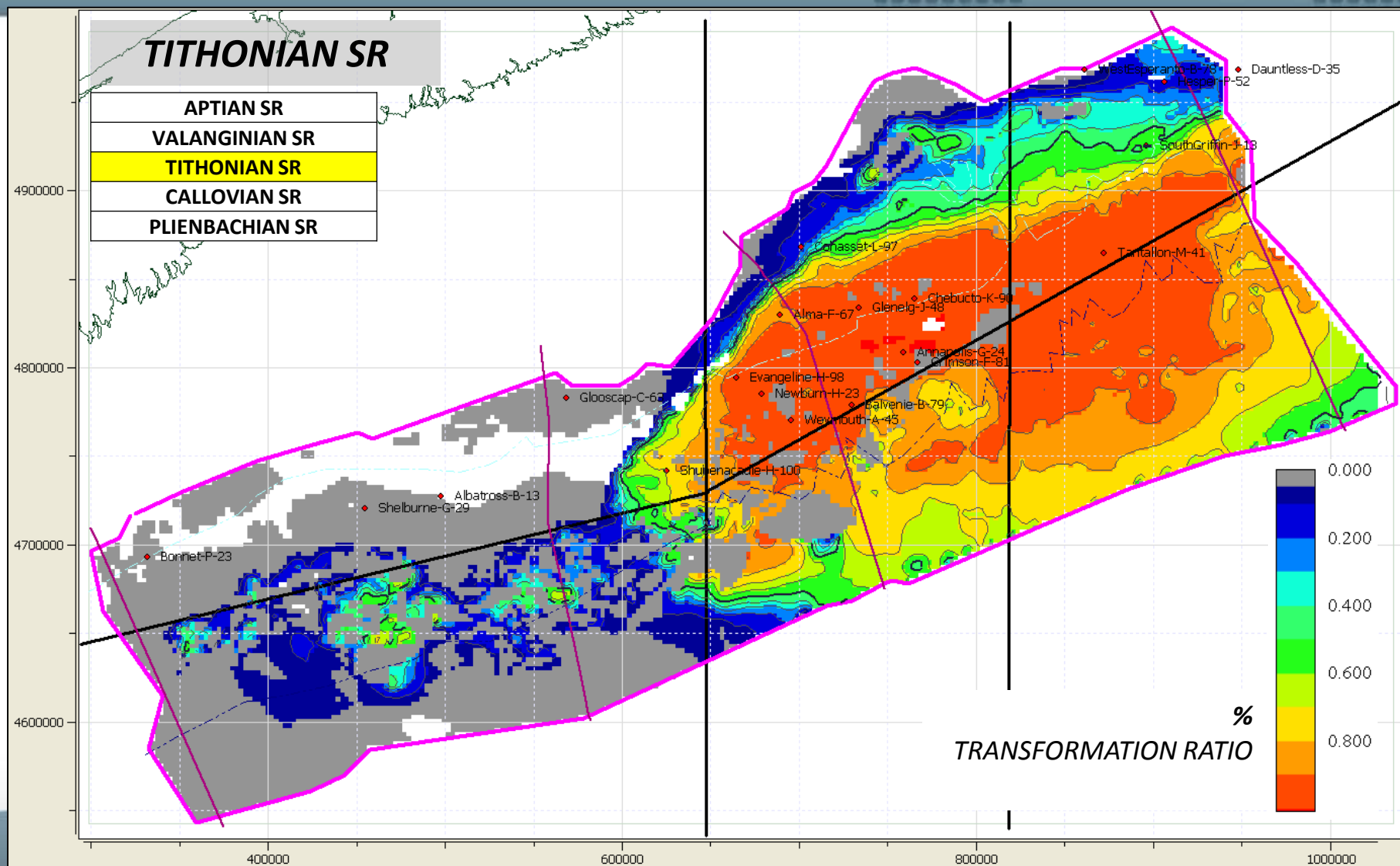


Source Rocks Modeling – Transformation Ratio

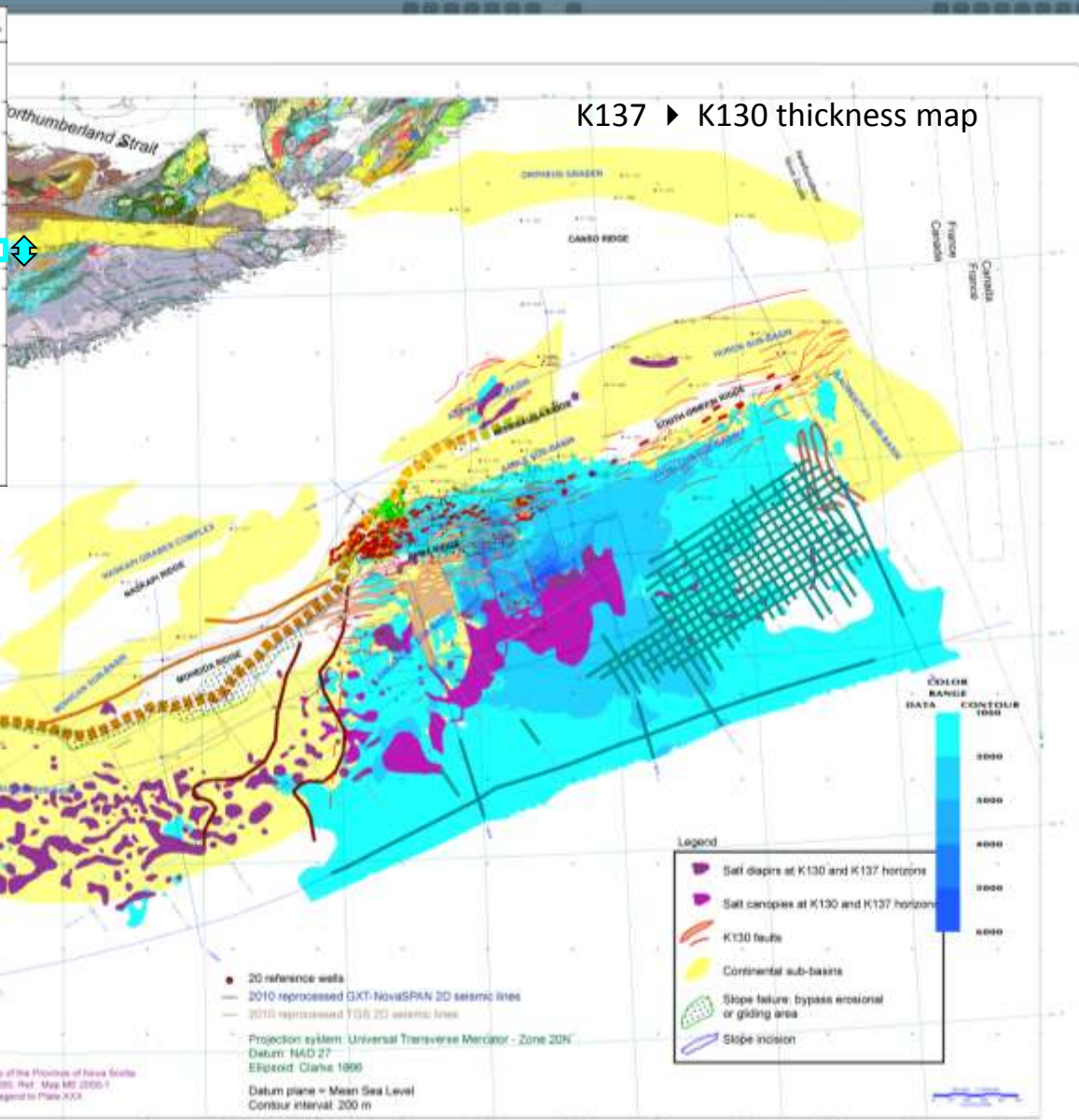
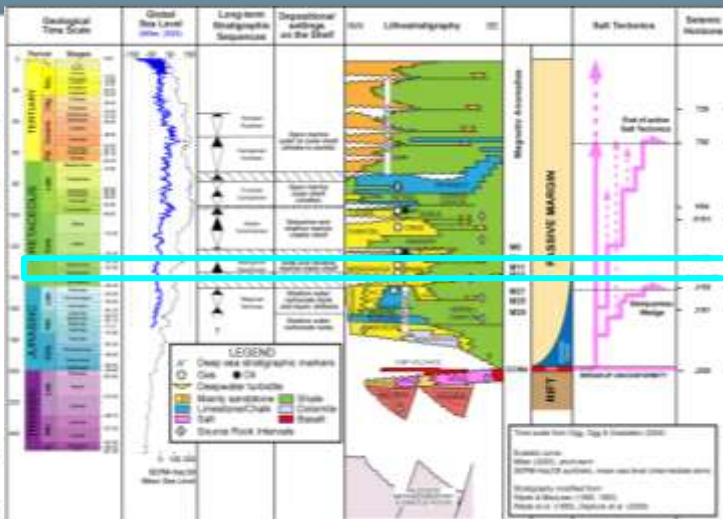


Source Rocks Modeling – Transformation Ratio

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Middle Missisauga seismic facies and geometries

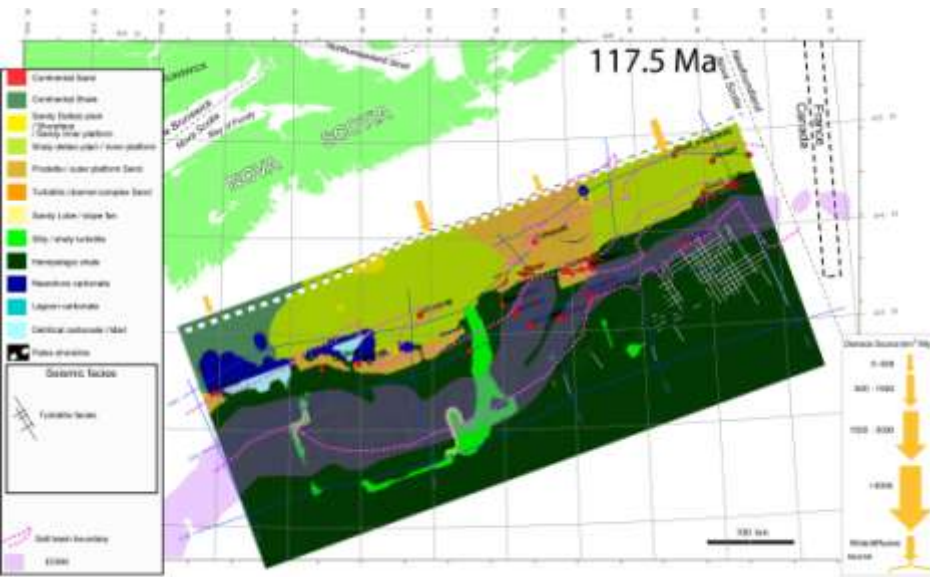


J150 ▶ K137 isopach map

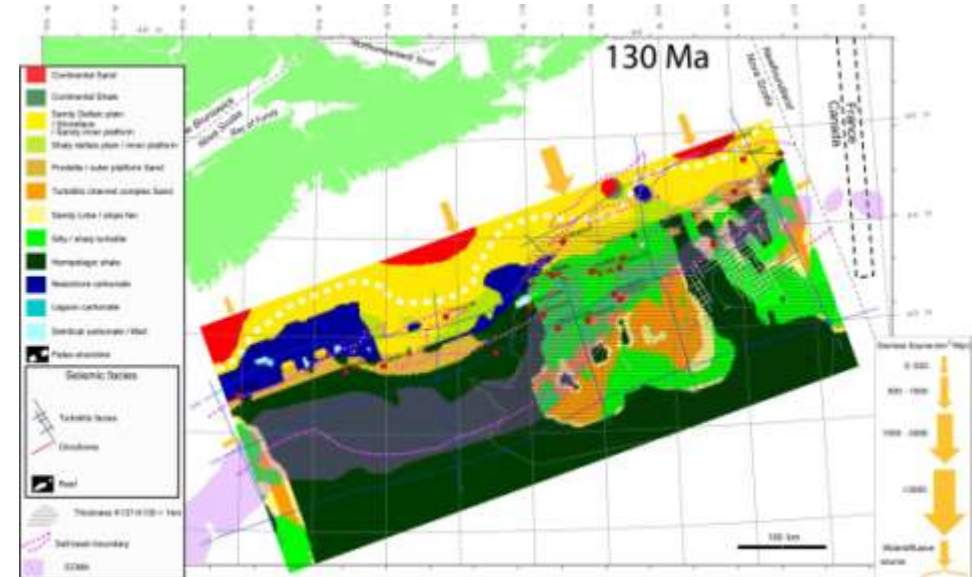
Cretaceous modeling results :

GDE maps for key stratigraphic intervals

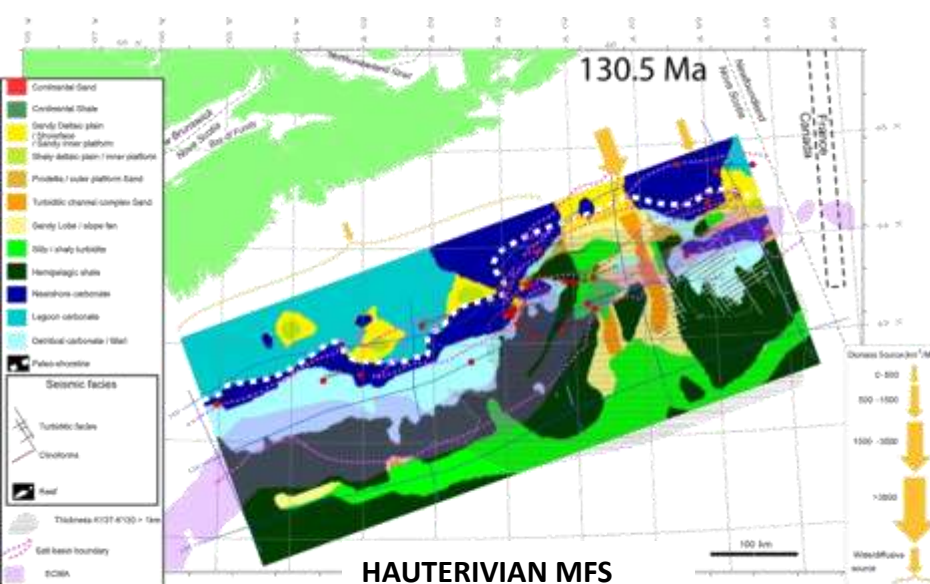
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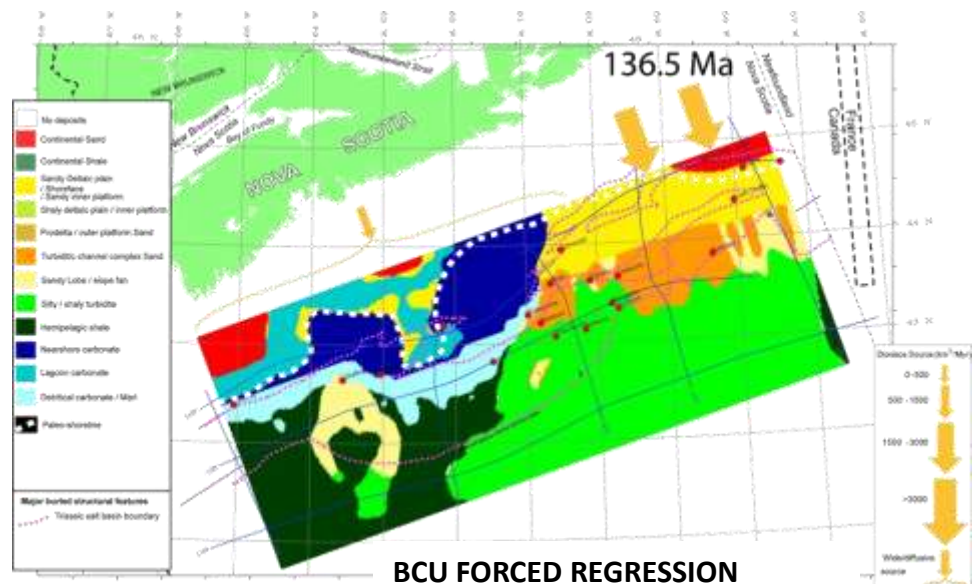
APTIAN TRANSGRESSION



BARREMIAN FORCED REGRESSION

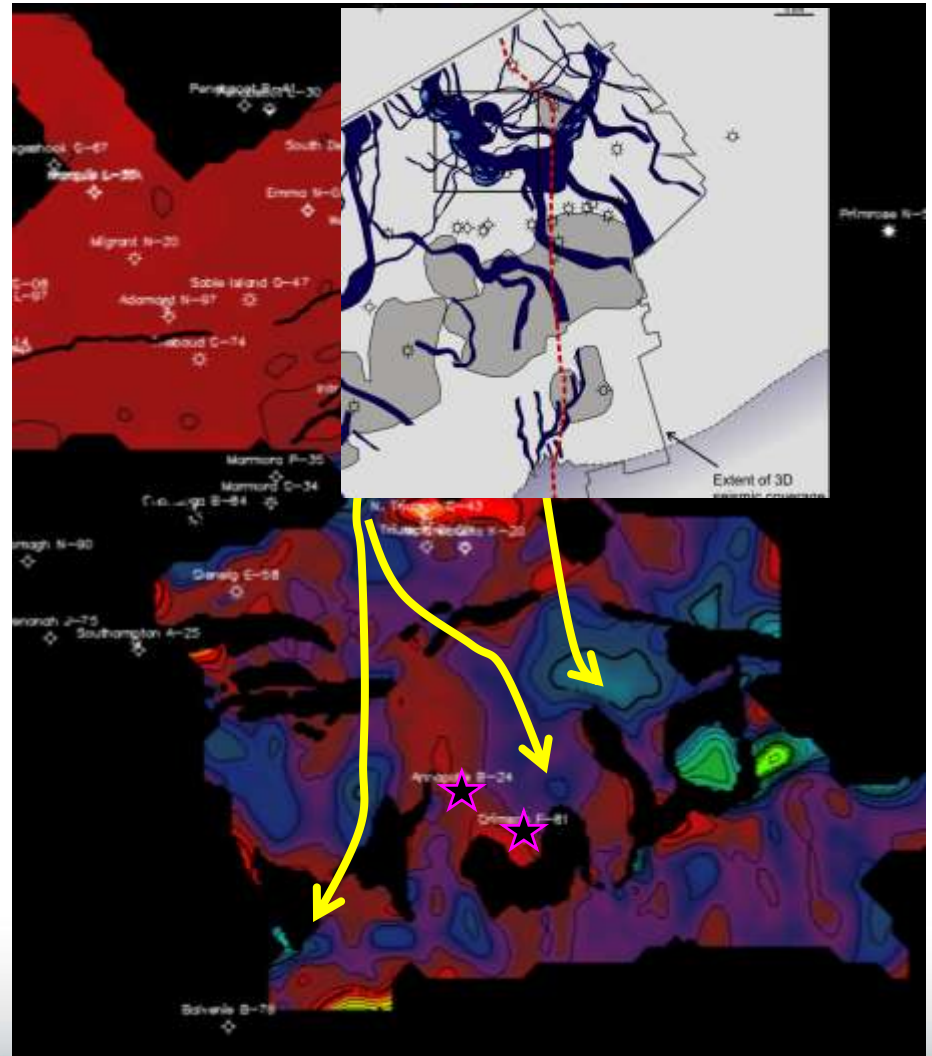


HAUTERIVIAN MFS



BCU FORCED REGRESSION

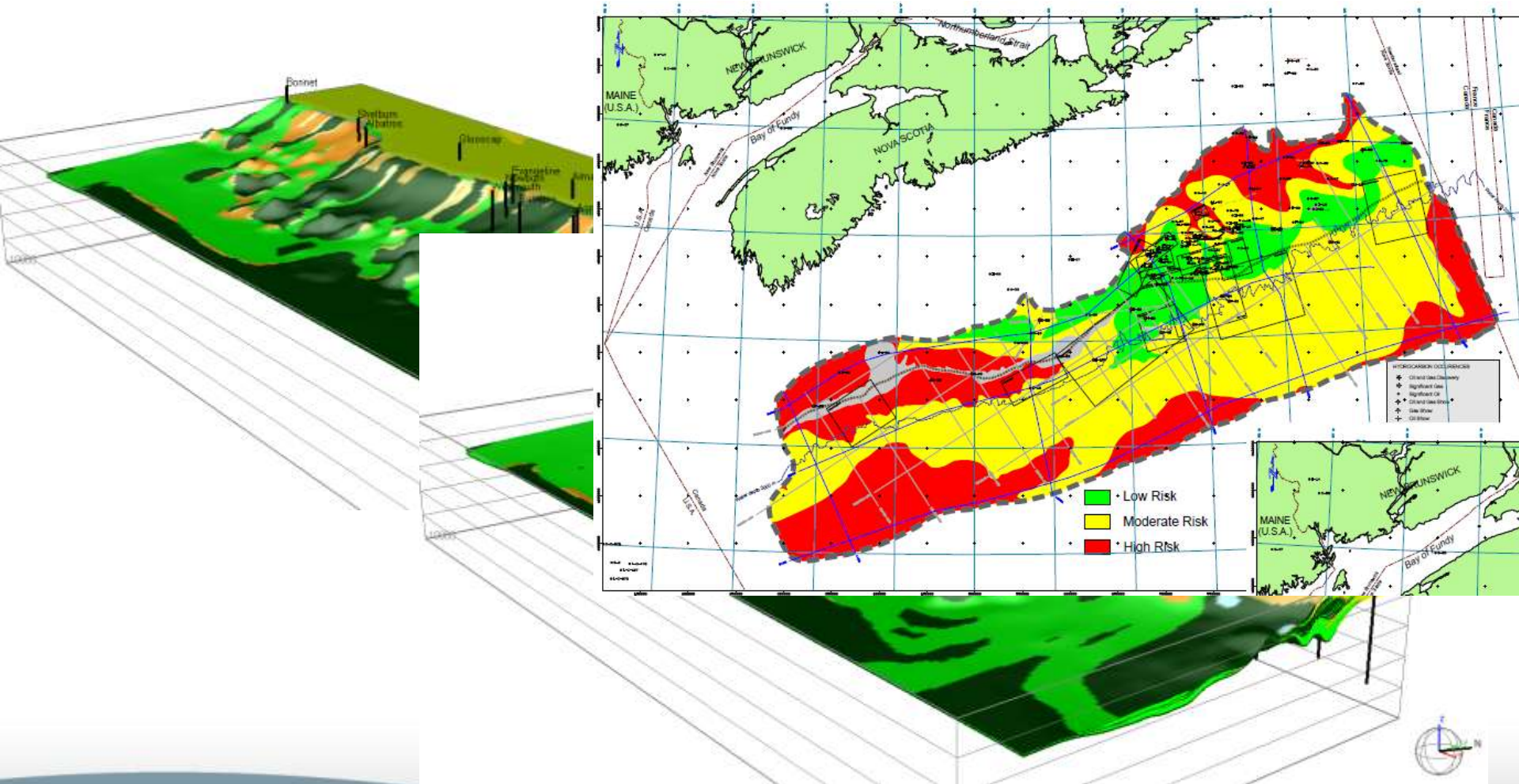
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TY.

Albian GDE, Cenomanian Seal, Albian CCRS

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NEW GEOSCIENCE. NEW OPPORTUNITY.

Leads K94 Structure



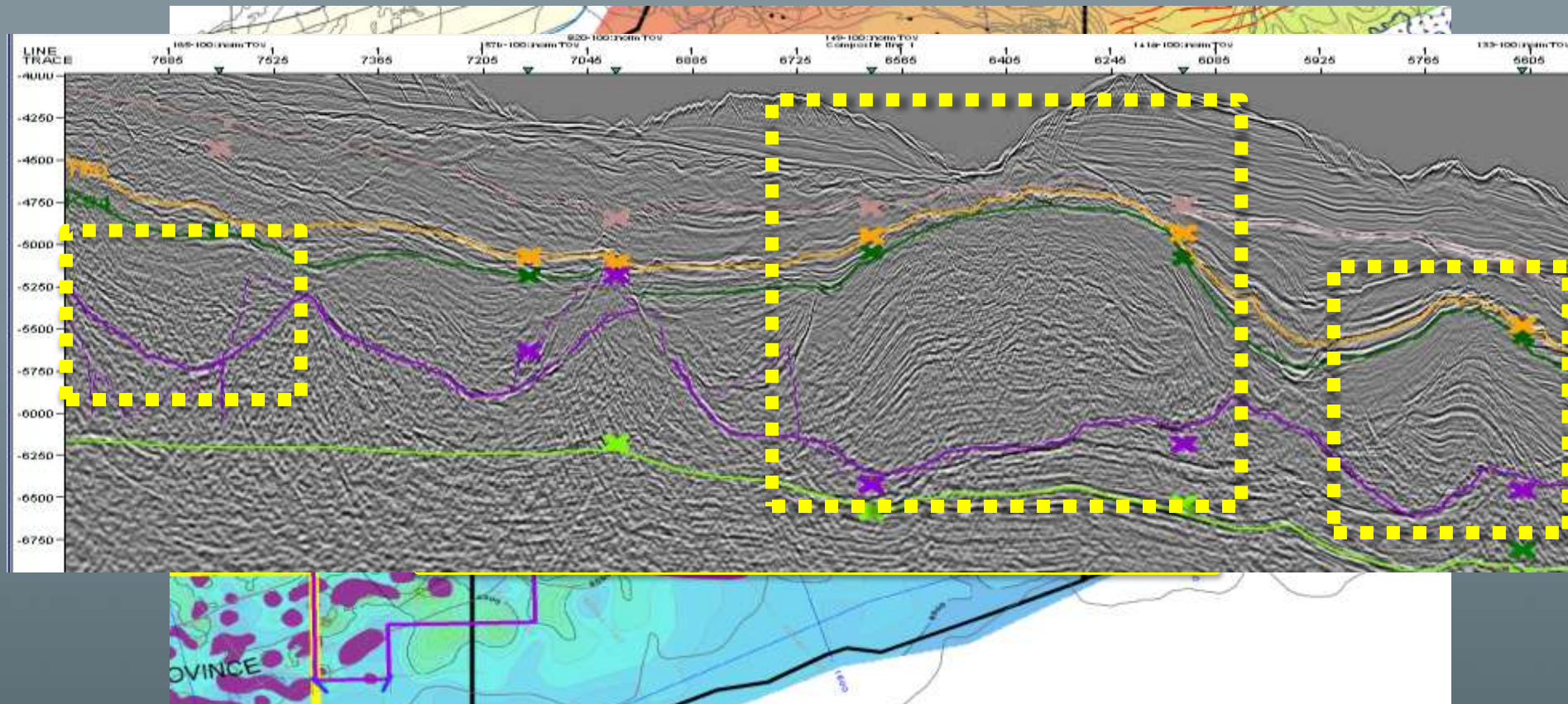
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Total Potential Gas: 22.38 TCF_(mean)

Total Potential Oil: 10.6 BBbbl_(mean)

Water Depth: 1500-3100 m

Trap: 4-Way Closure, Strat.

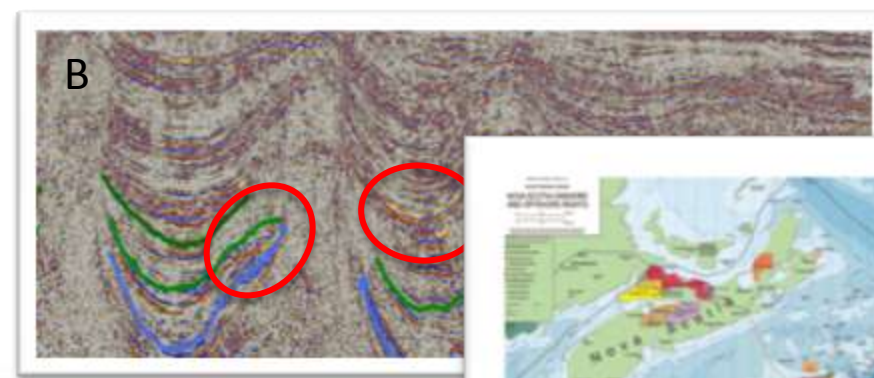
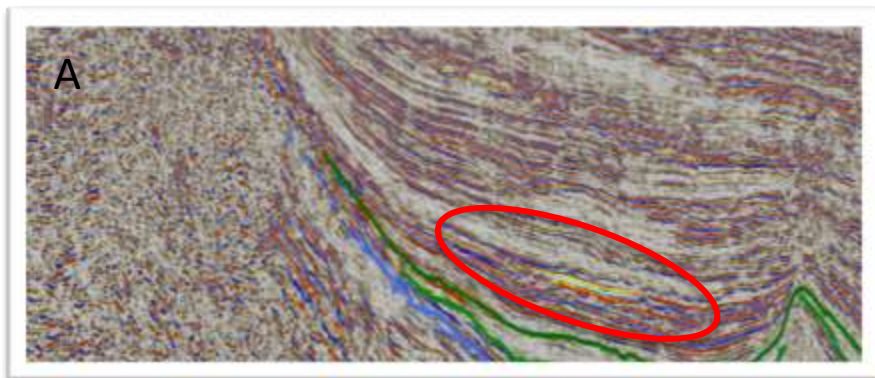
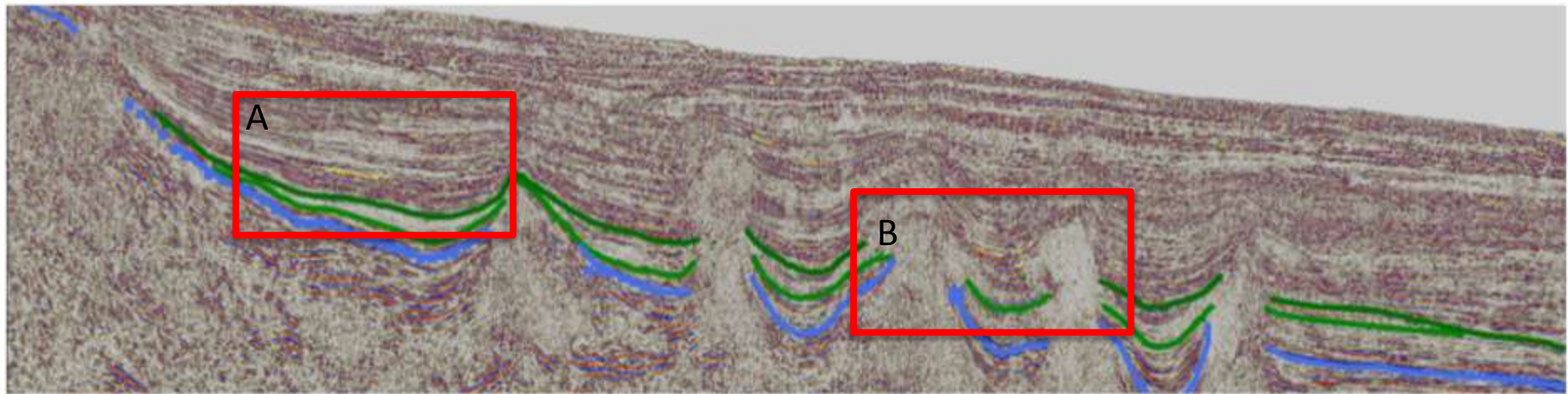


South West Stratigraphic Framework



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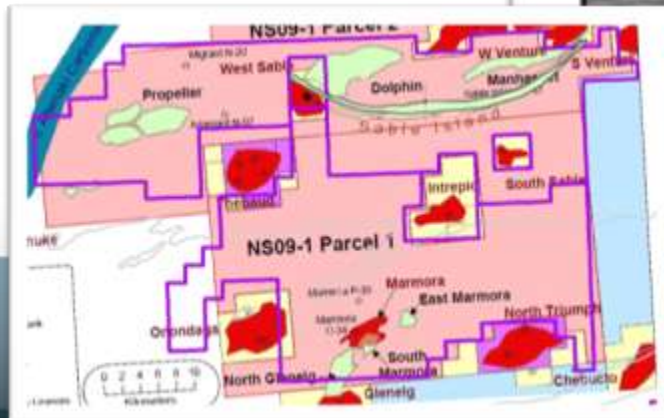
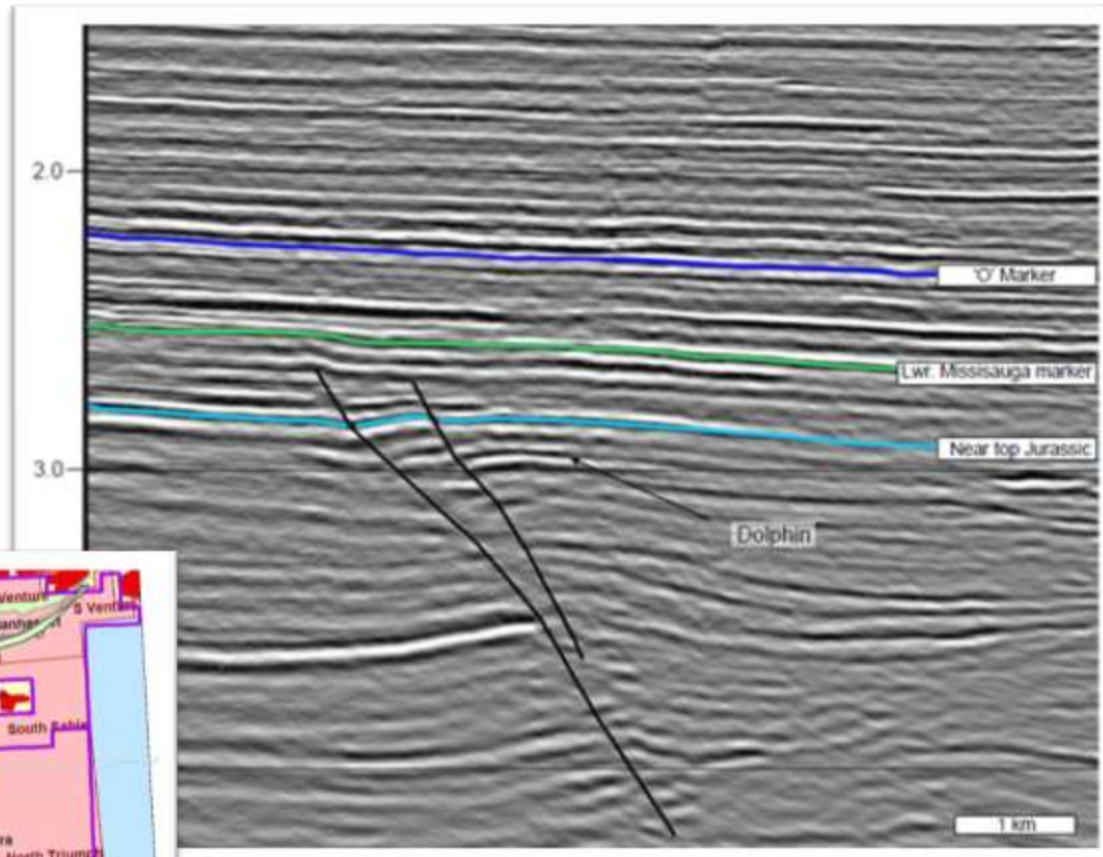
TGS NOPEC 228-109



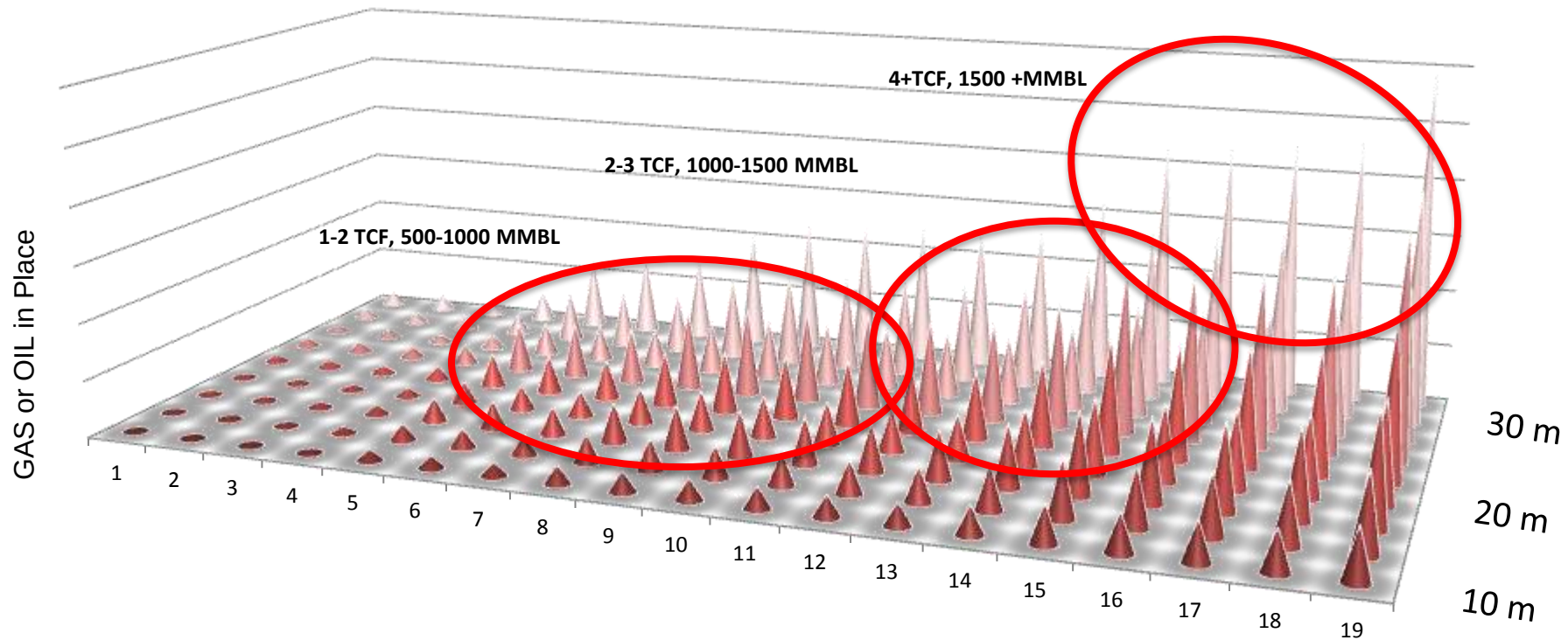
NEW GEOSCIENCE

Trapping

- The PFA Takes into account the simple 4 way closure only.
- Many more exist
 - 3-way fault dependent
 - Stratigraphic
 - Salt and sub salt
 - closed features



Trap Sizes

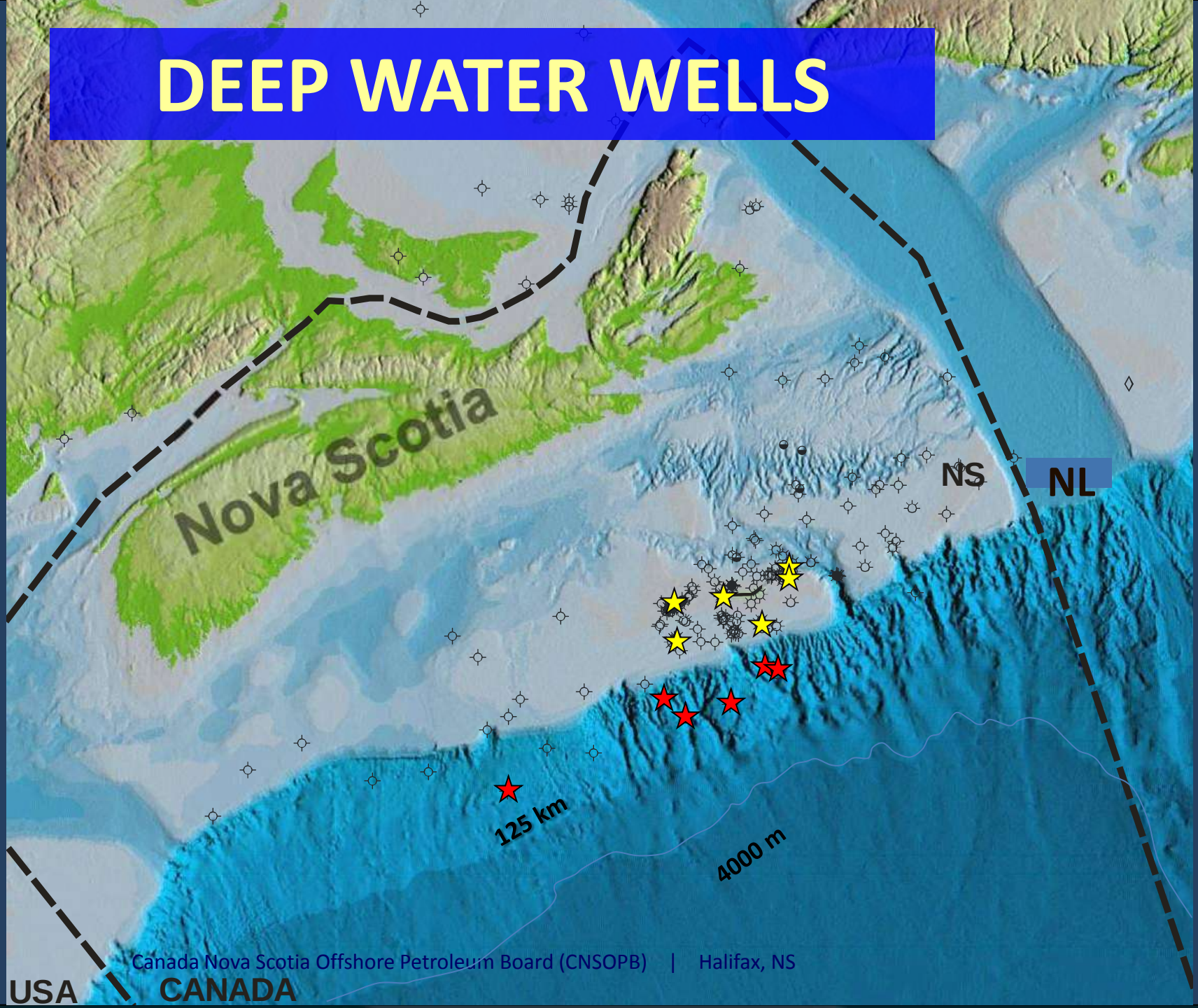


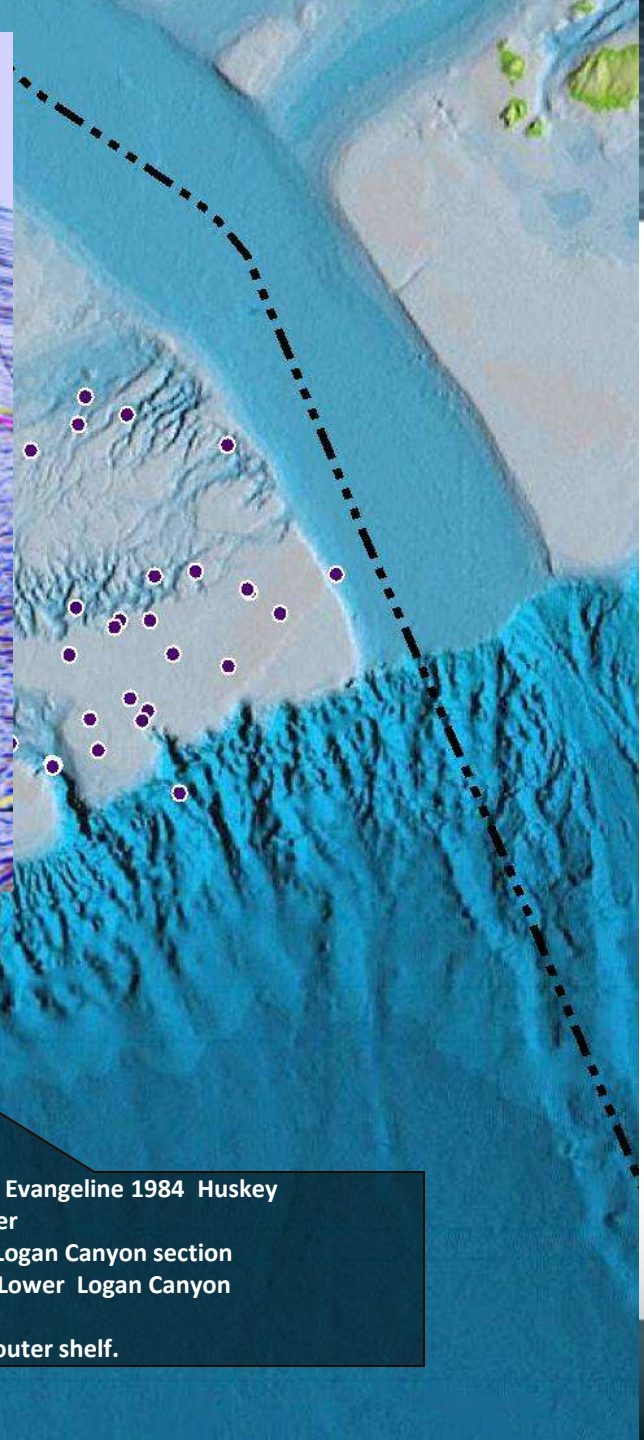
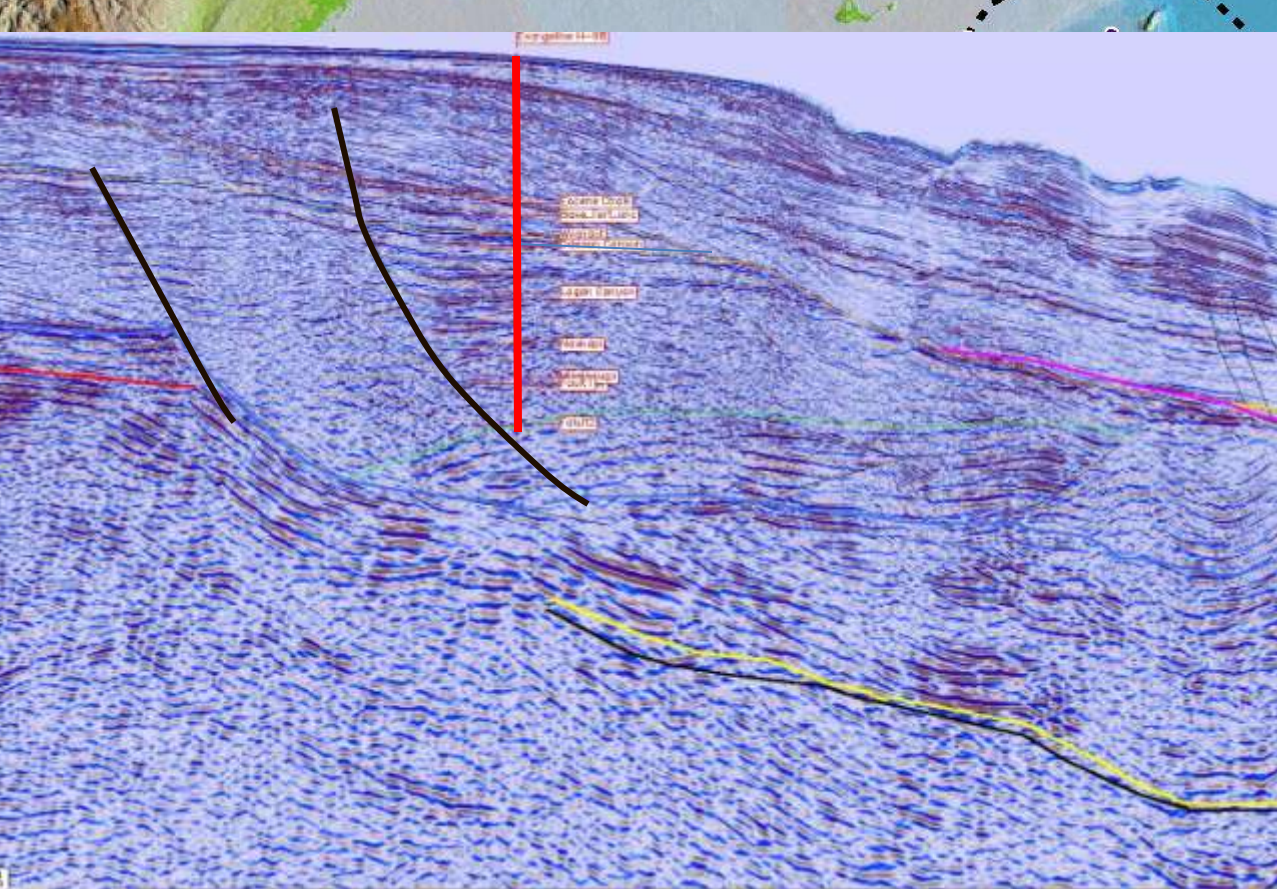


Why has this not been found?

Because exploration has focused on drilling the large dip closed features without understanding the controls on reservoir distribution.....

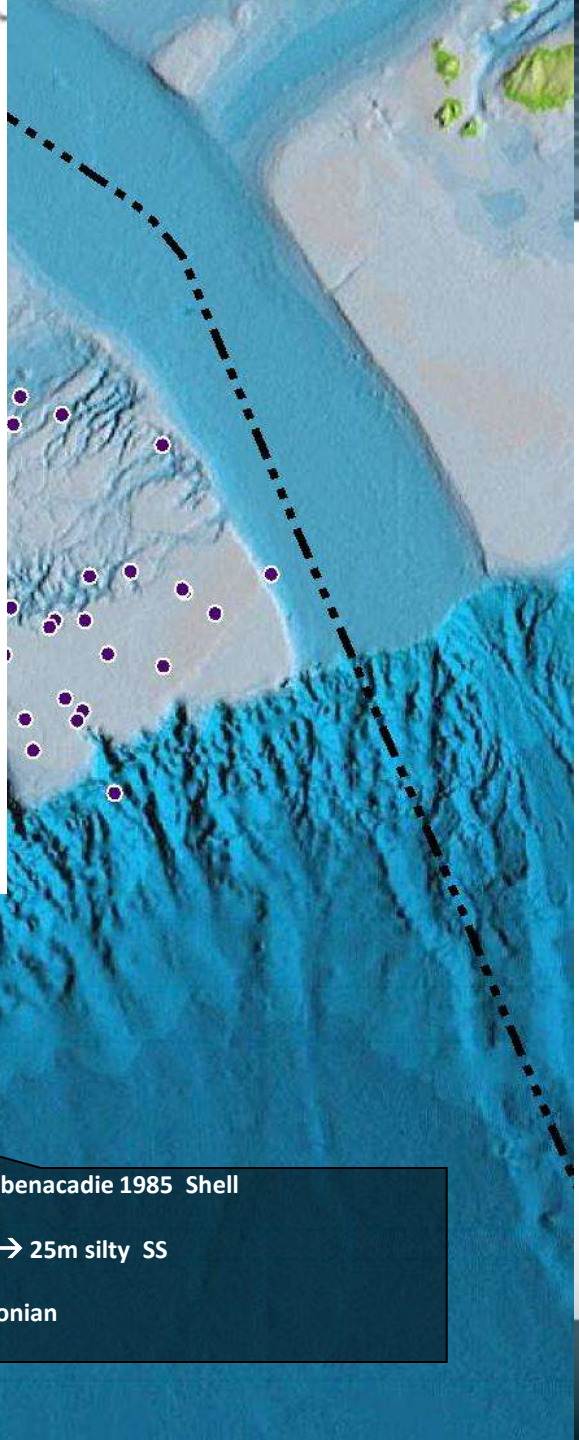
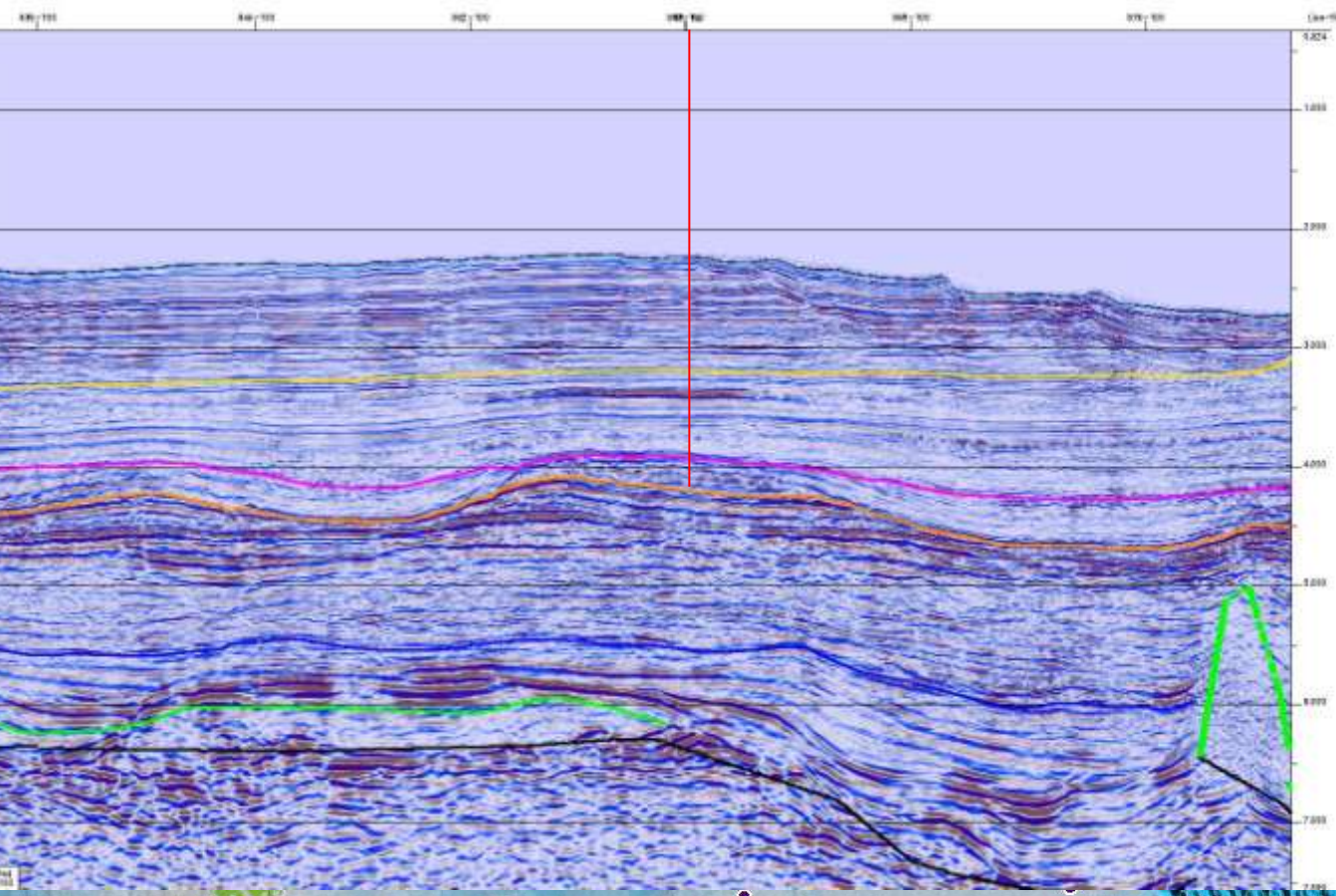
DEEP WATER WELLS





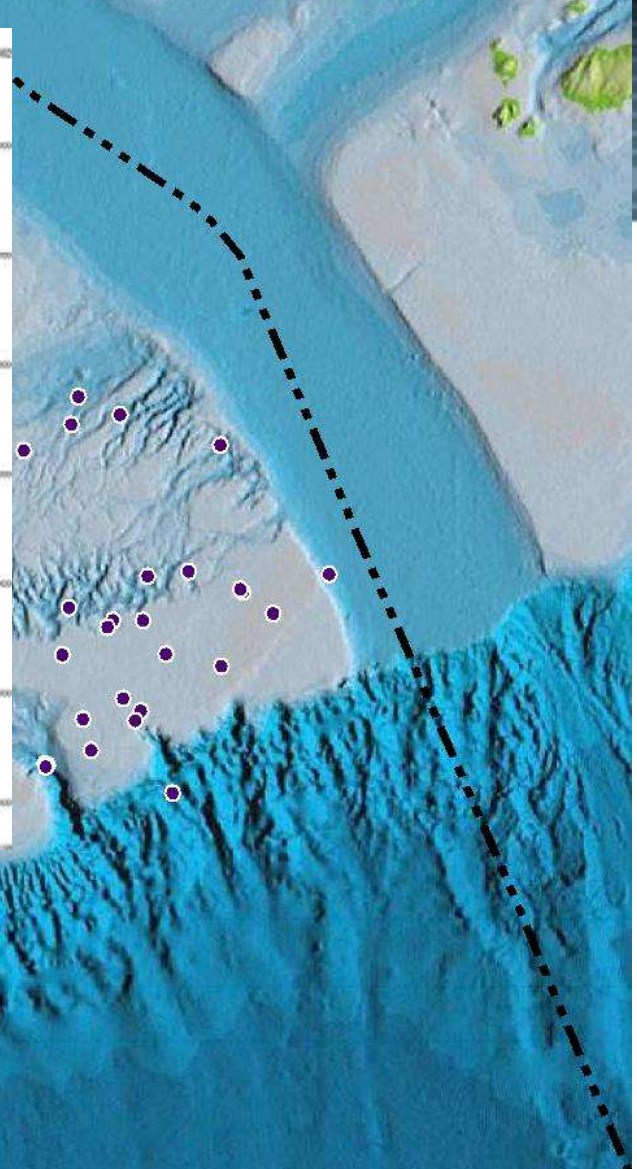
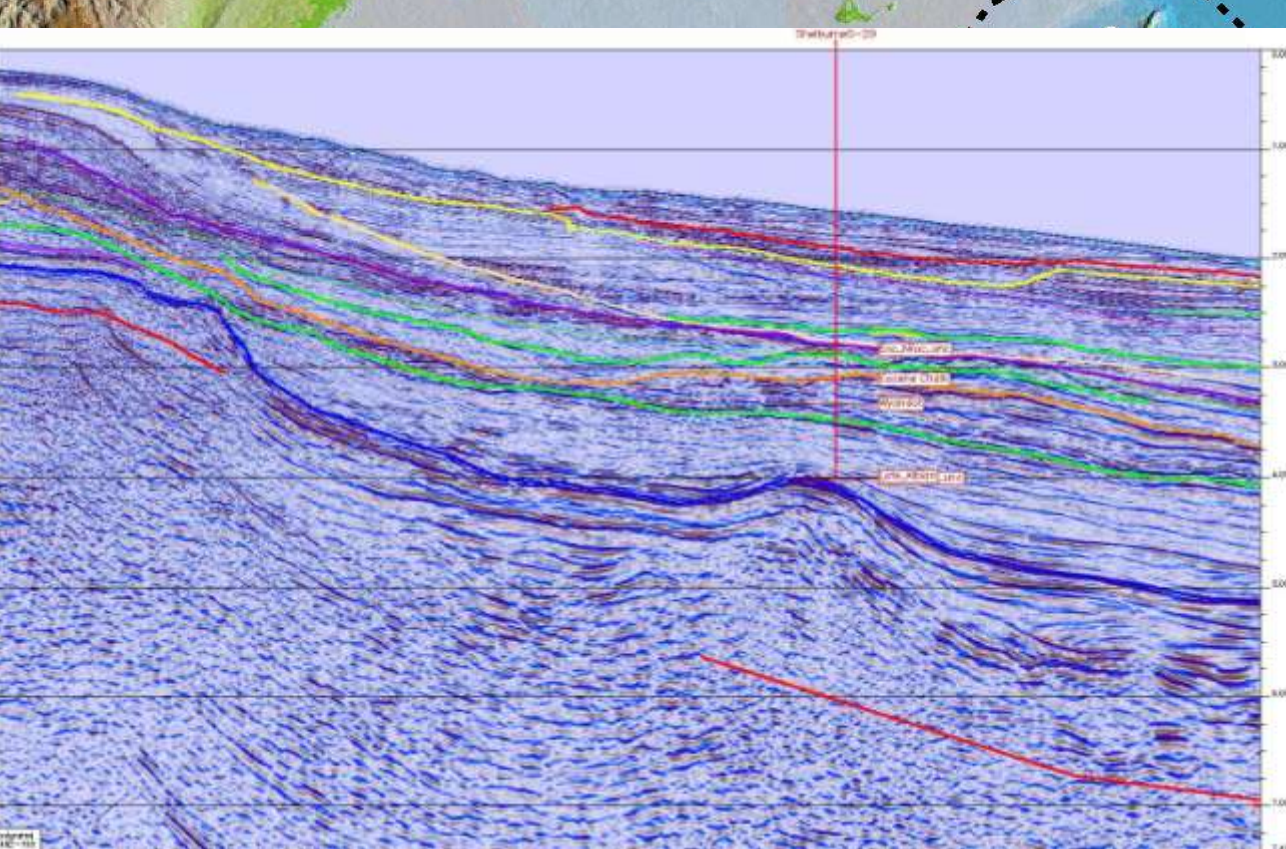
Evangeline 1984 Huskey

- 174 m water
- Expanded Logan Canyon section
- TD 5044m Lower Logan Canyon
- No sand.
- Middle to outer shelf.



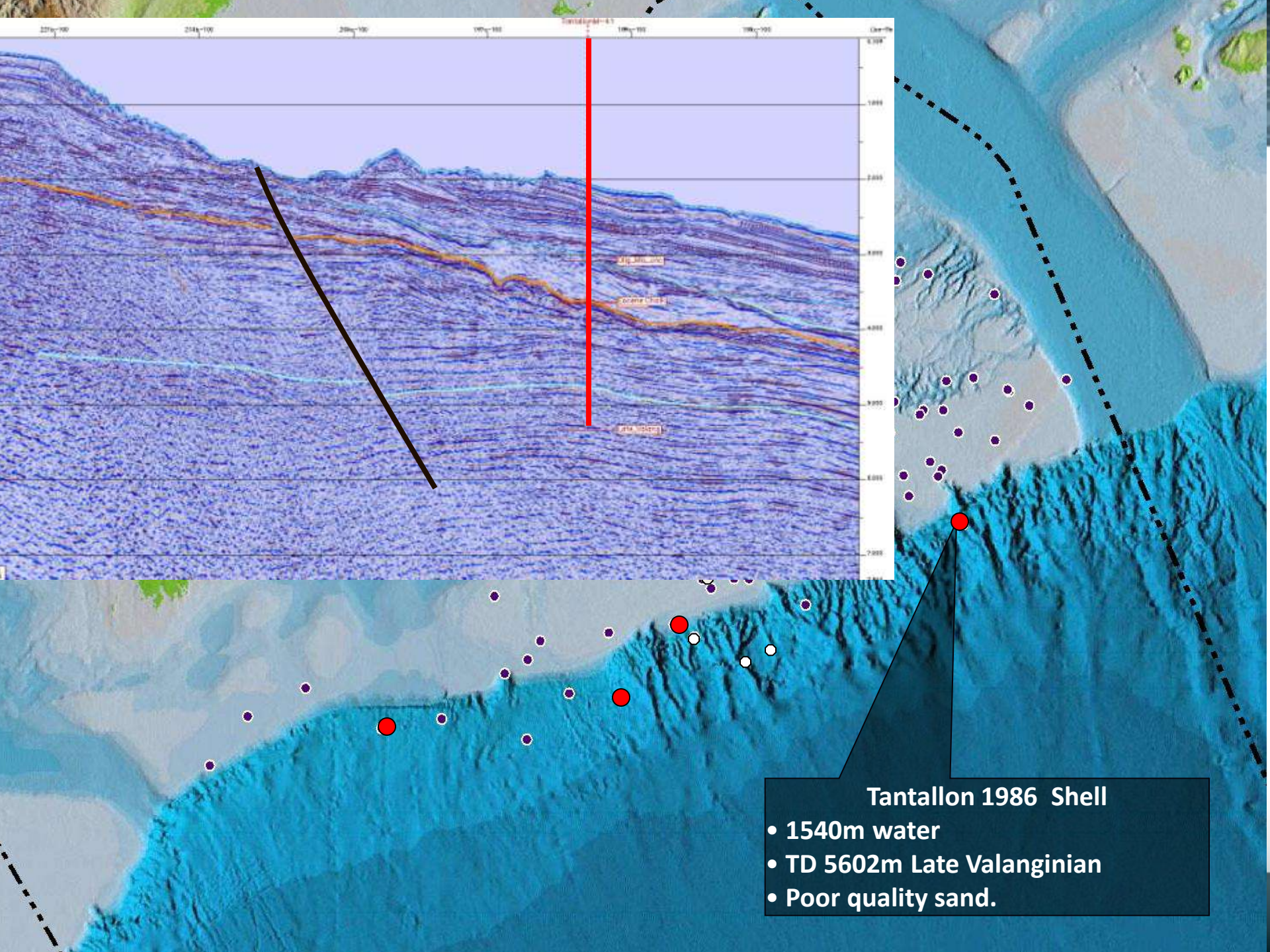
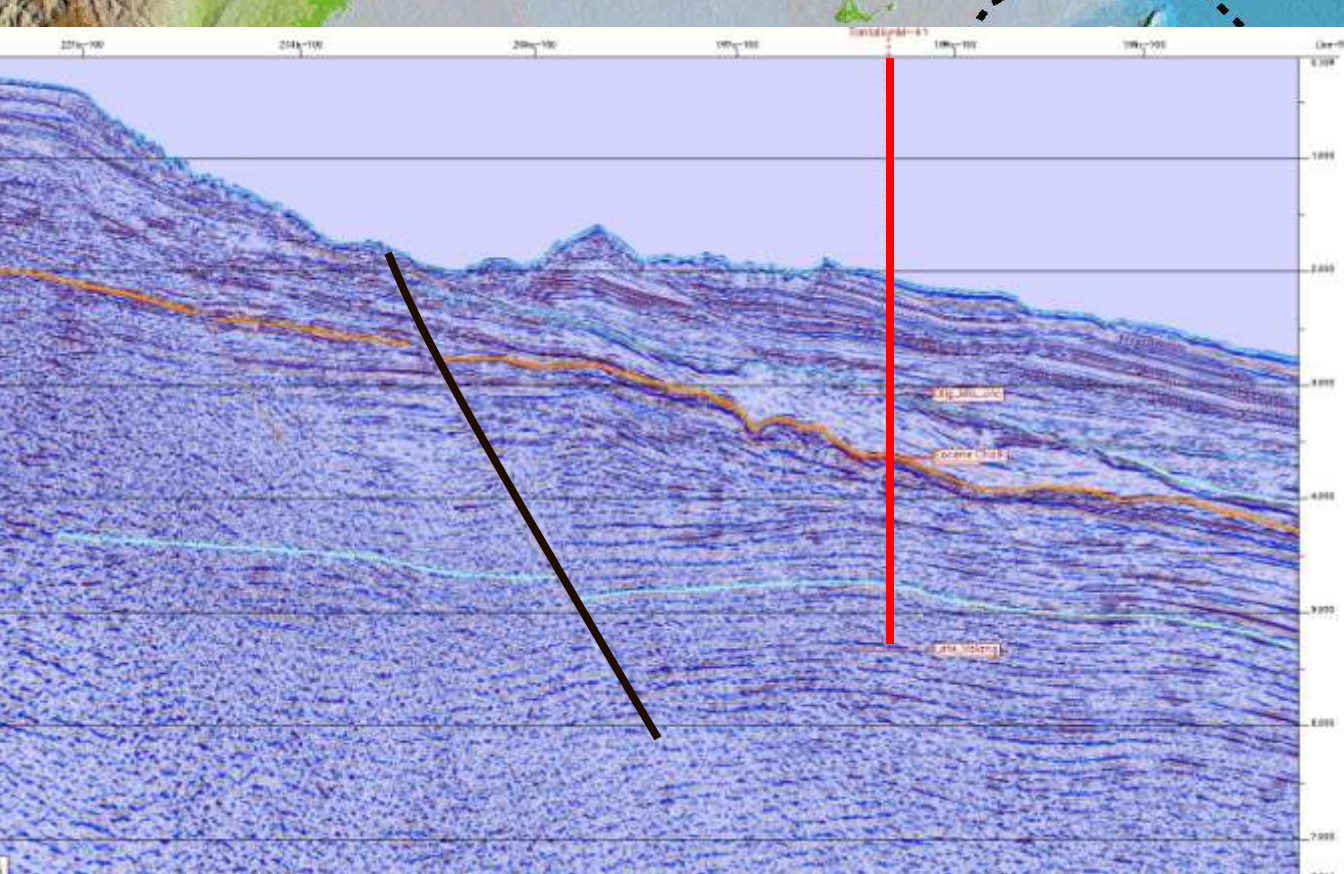
Shubenacadie 1985 Shell

- 1471m water
- Pliocene bright spot → 25m silty SS
- Erosional remnant.
- TD 4200m M Cenemonian
- No sand.



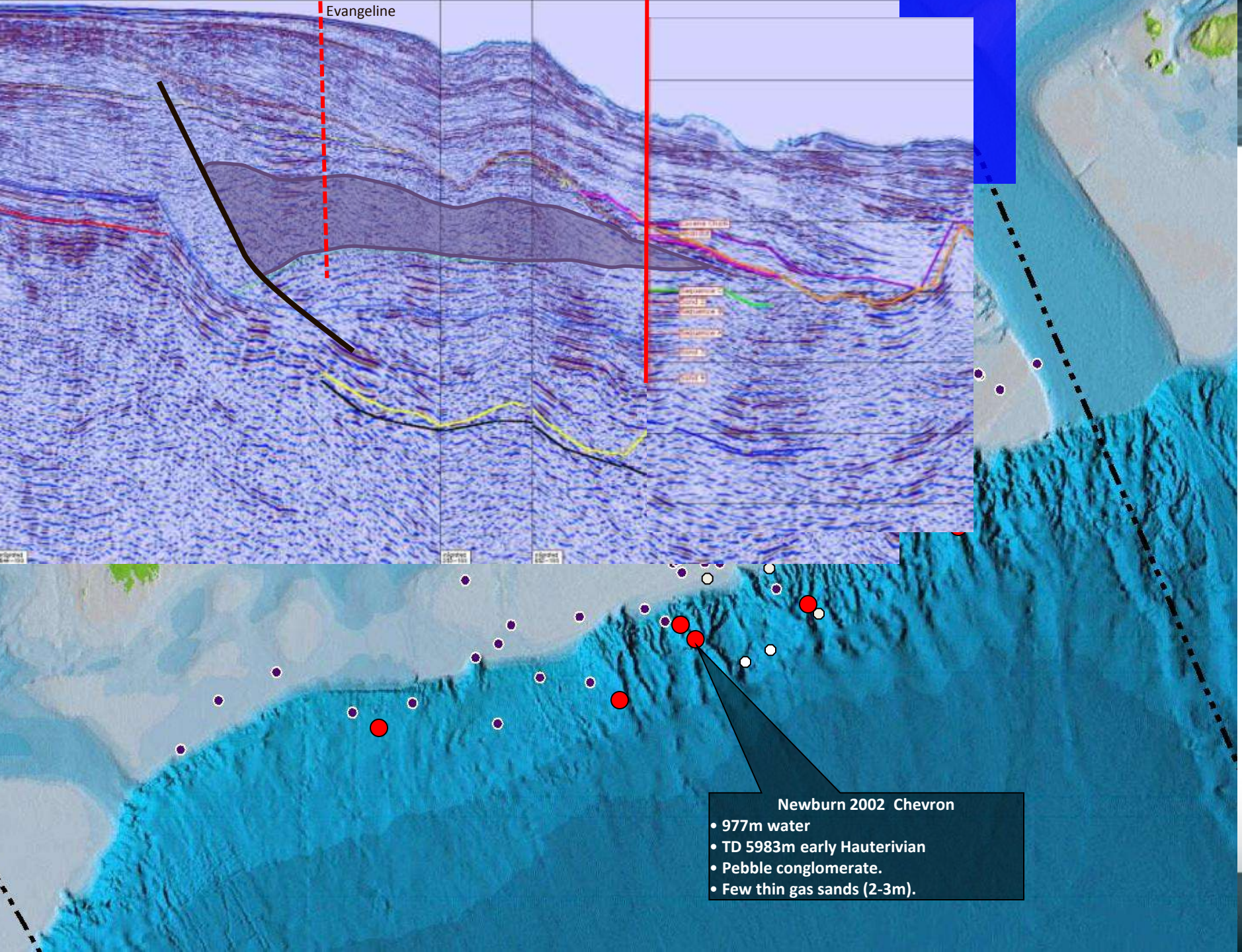
Shelburne 1985 PEX

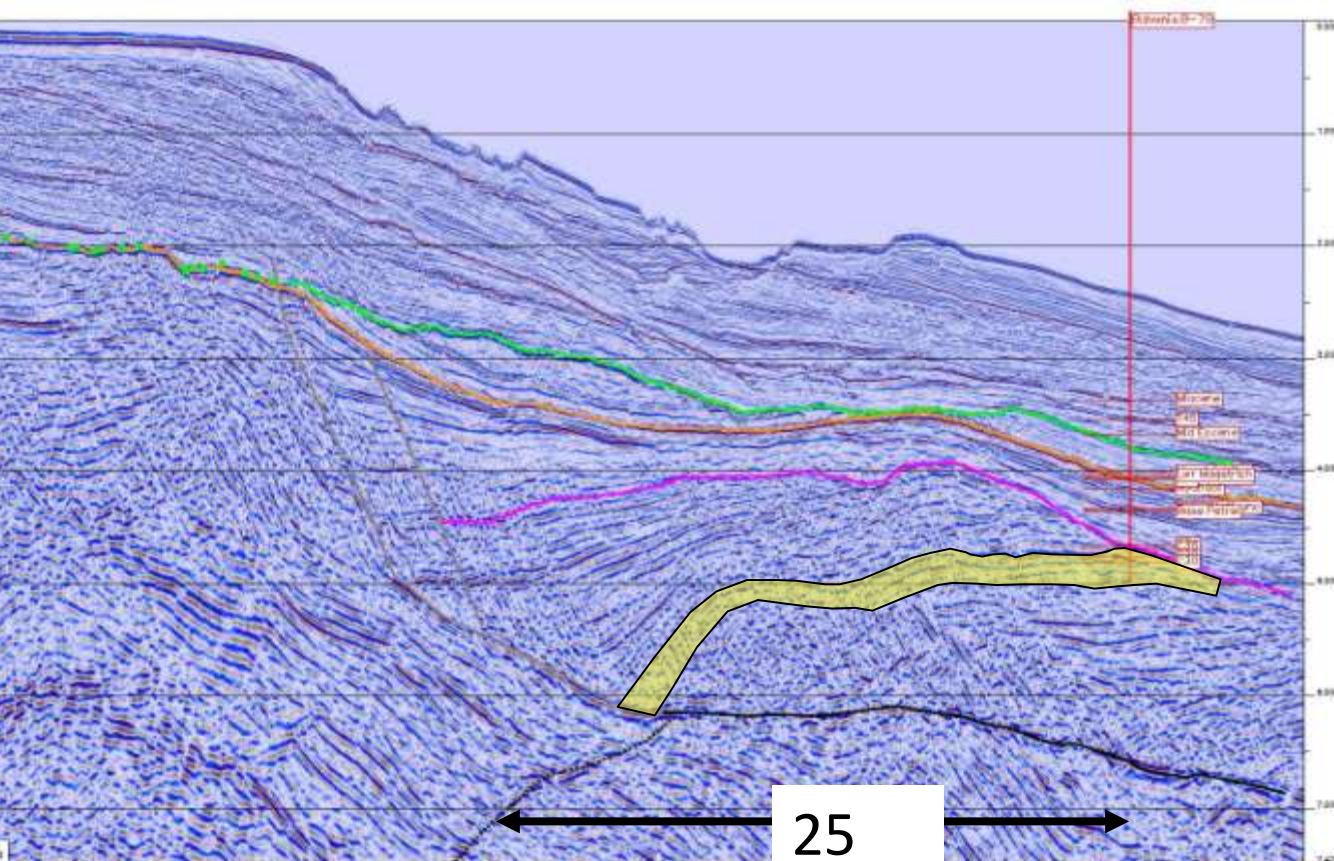
- 1154m water
- Erosional remnant.
- TD 4005 m Top Jurassic
- Upper slope.



Tantallon 1986 Shell

- 1540m water
- TD 5602m Late Valanginian
- Poor quality sand.





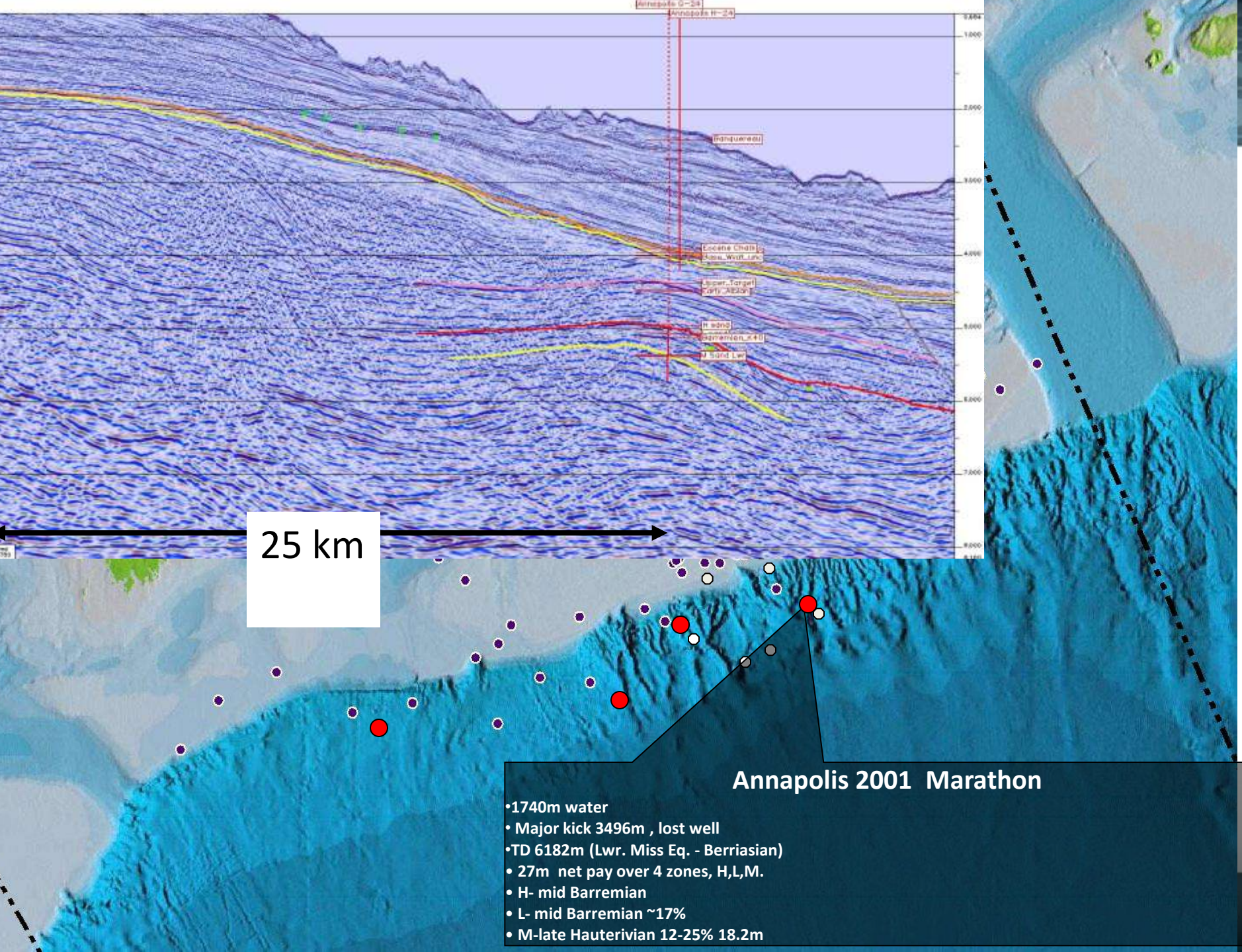
25
km

- Balvenie 2003 Imperial
- 1803m water
 - Only 515m tested.
 - TD 4750m Early Aptian (C30)
 - Gas charged silt stone.



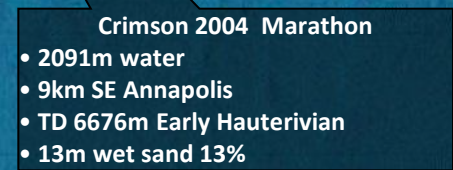
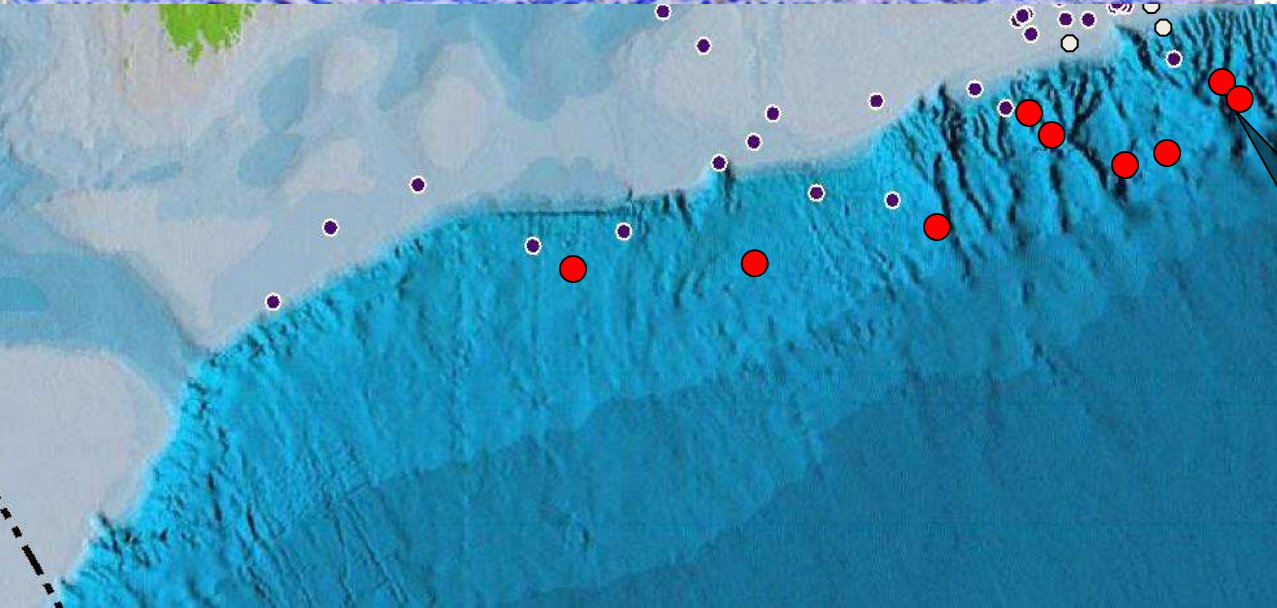
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Annapolis & Crimson



Annapolis 2001 Marathon

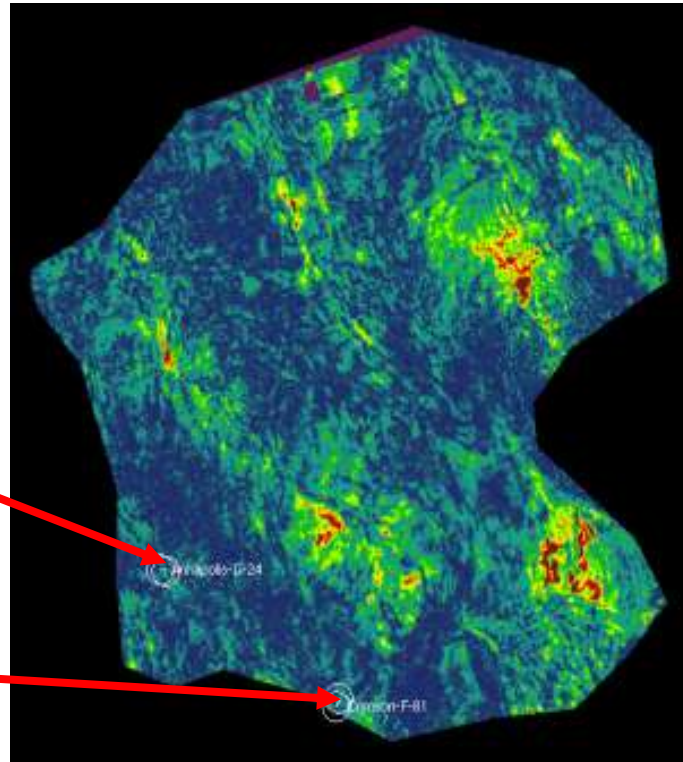
- 1740m water
- Major kick 3496m , lost well
- TD 6182m (Lwr. Miss Eq. - Berriasian)
- 27m net pay over 4 zones, H,L,M.
- H- mid Barremian
- L- mid Barremian ~17%
- M-late Hauterivian 12-25% 18.2m



Annapolis Attributes Map



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Annapolis G-24
(gas discovery)

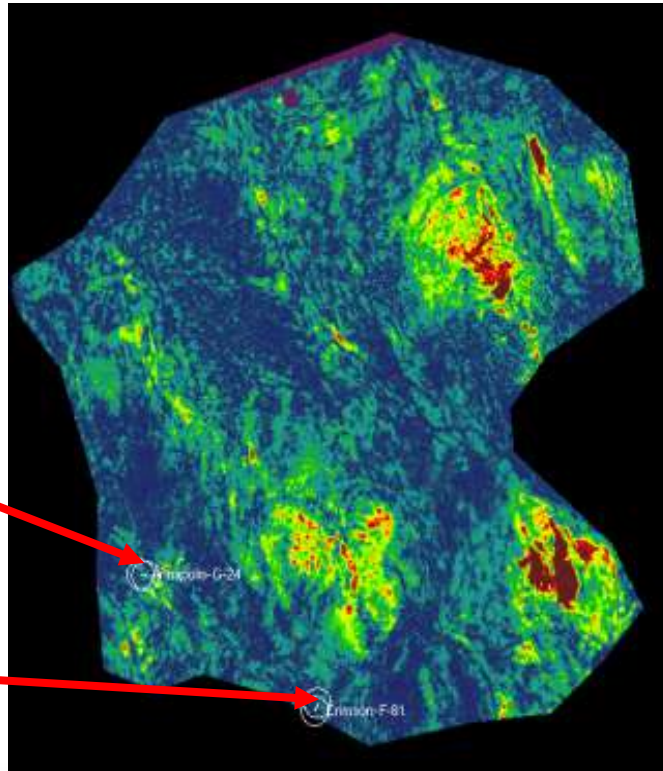
Crimson F-81
(wet)

- Haut MFS, -80 to -40ms, RMS Amp

Annapolis Attributes Map



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Annapolis G-24
(gas discovery)

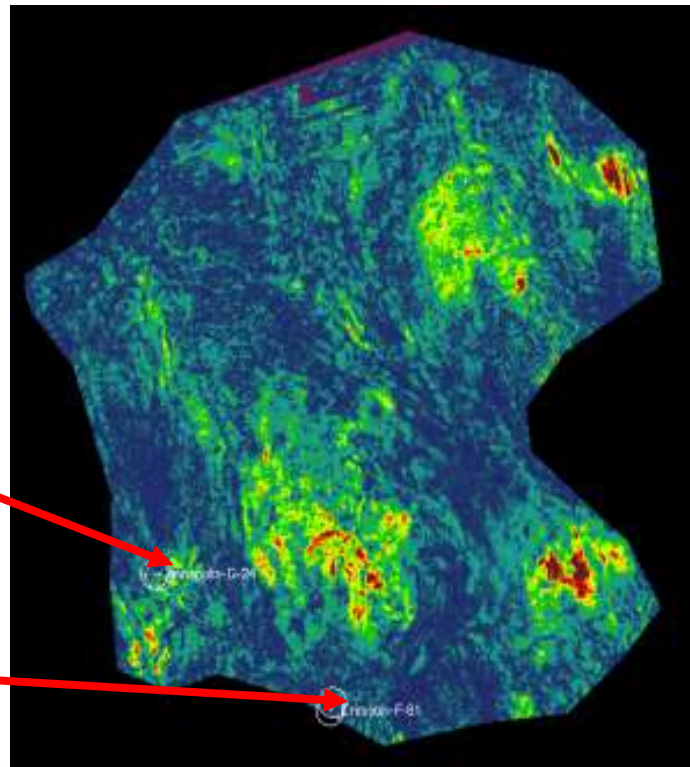
Crimson F-81
(wet)

- Haut MFS, -40 to 0ms, RMS Amp

Annapolis Attributes Map



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Annapolis G-24
(gas discovery)

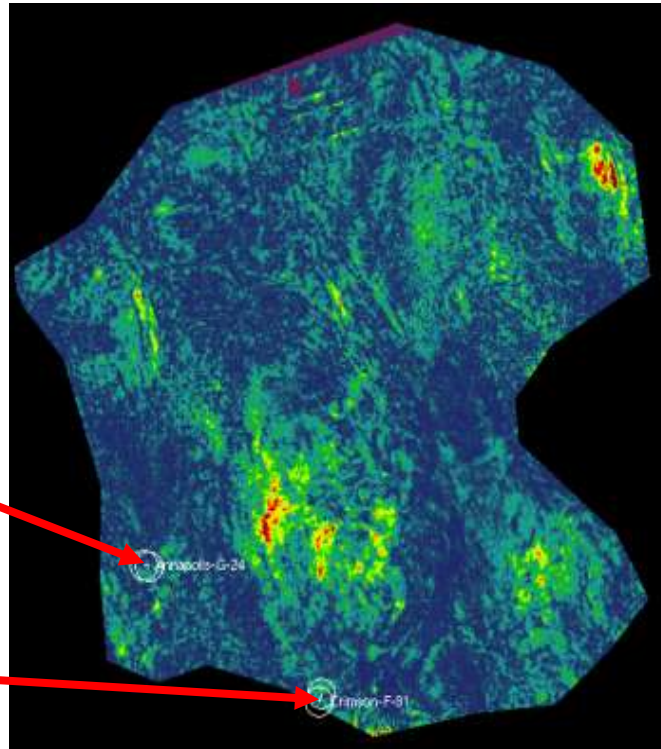
Crimson F-81
(wet)

- Haut MFS, 0 to +40ms, RMS Amp

Annapolis Attributes Map



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Annapolis G-24
(gas discovery)

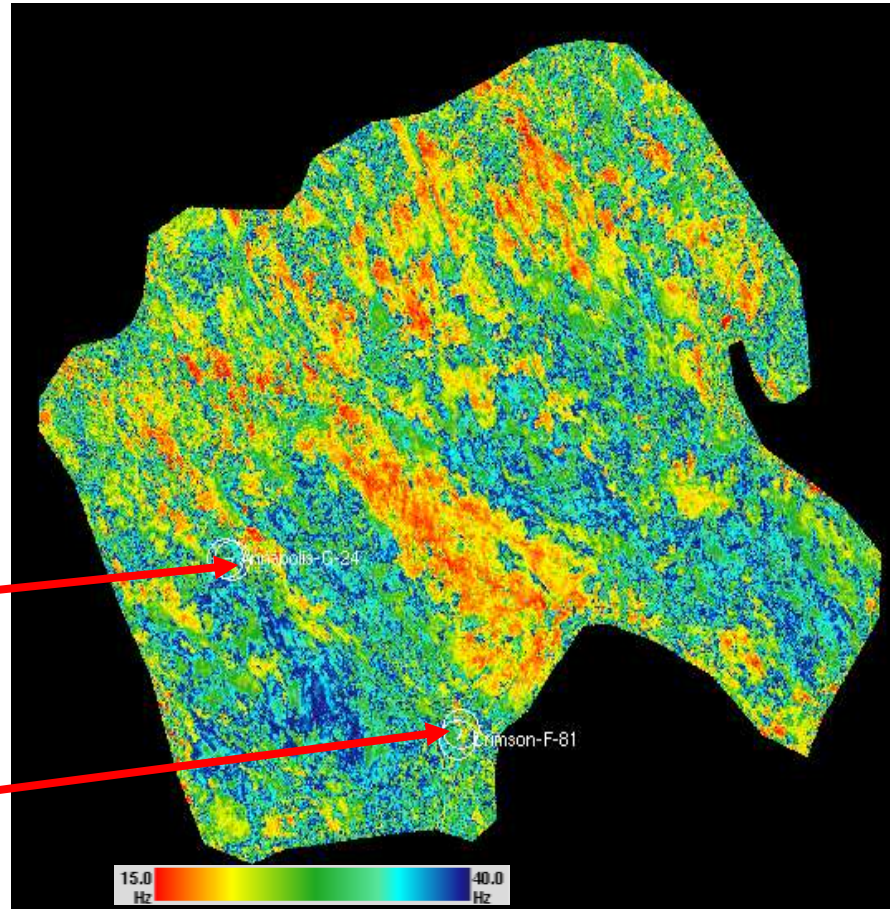
Crimson F-81
(wet)

- Haut MFS, +40 to +80ms, RMS Amp

Annapolis Attributes Map



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Annapolis G-24
(gas discovery)

Crimson F-81
(wet)

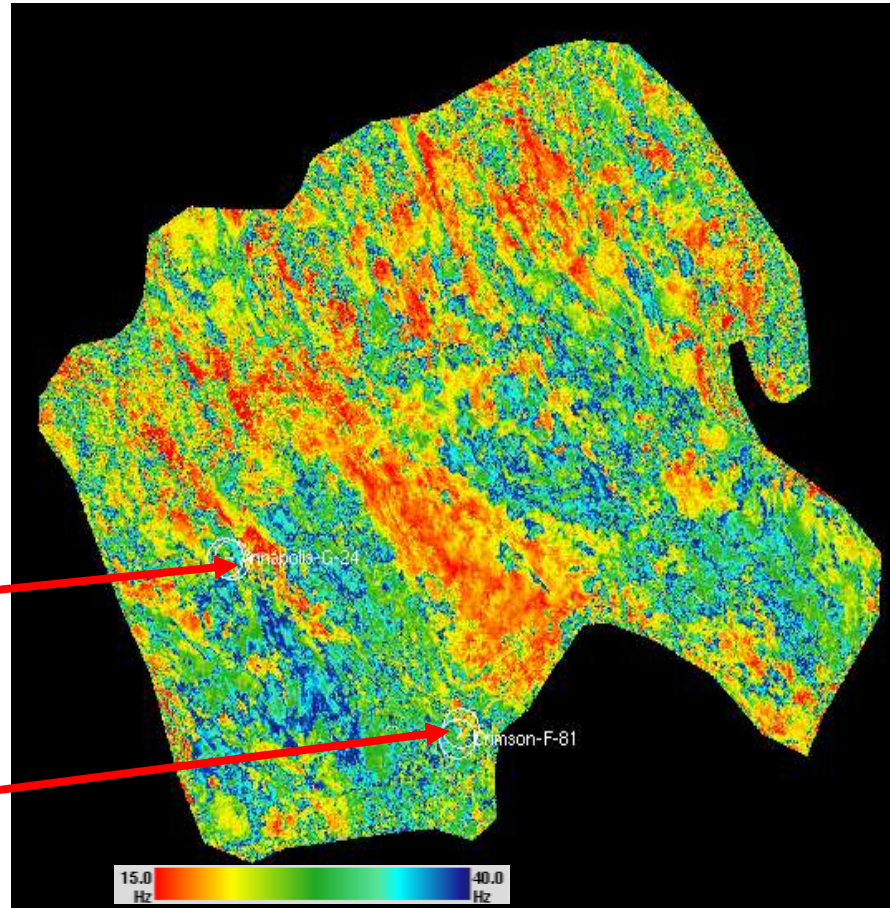
- B24_01, 0 to +100ms, Max Instantaneous frequency

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Annapolis Attributes Map



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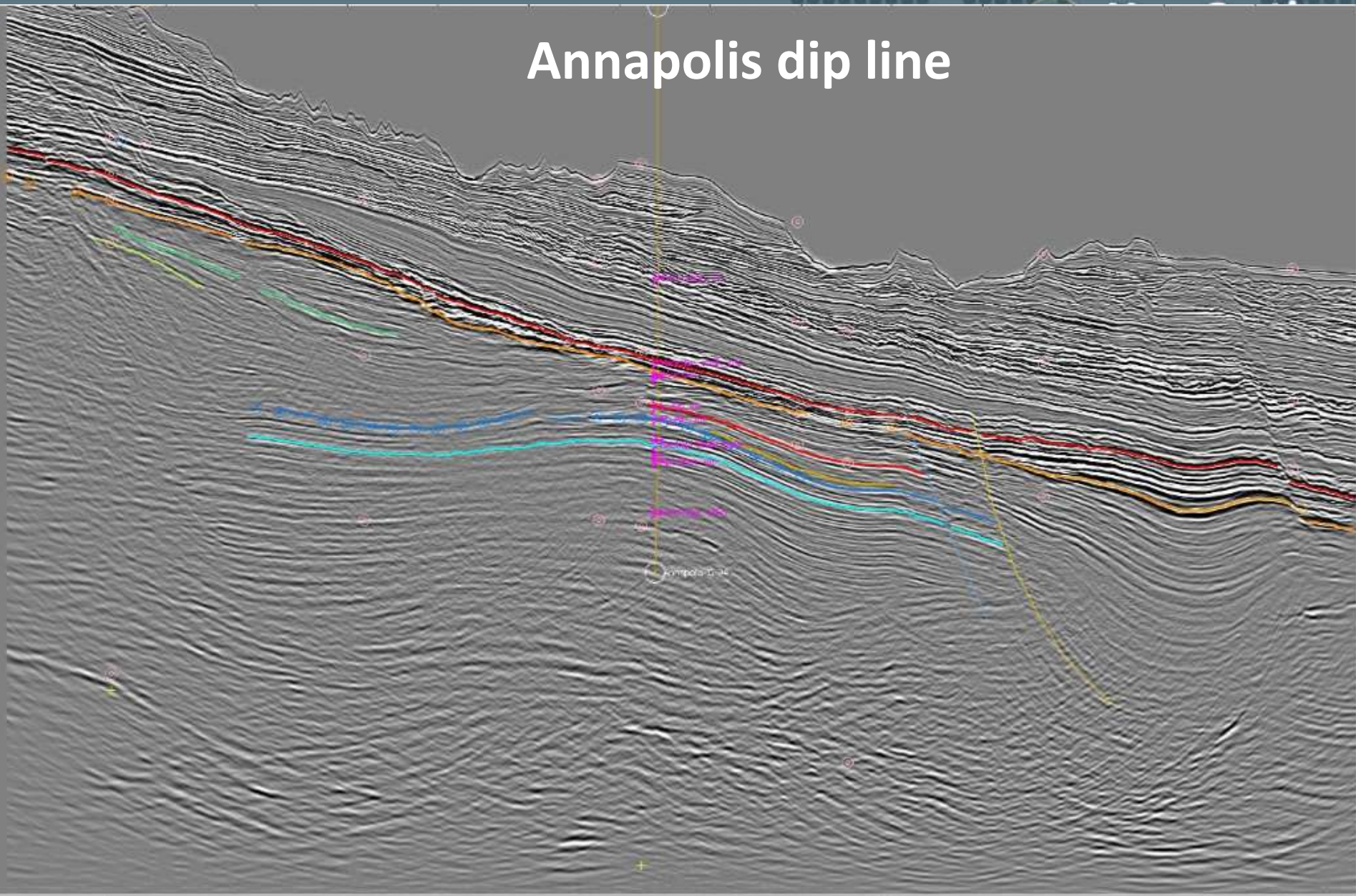
Annapolis G-24
(gas discovery)

Crimson F-81
(wet)

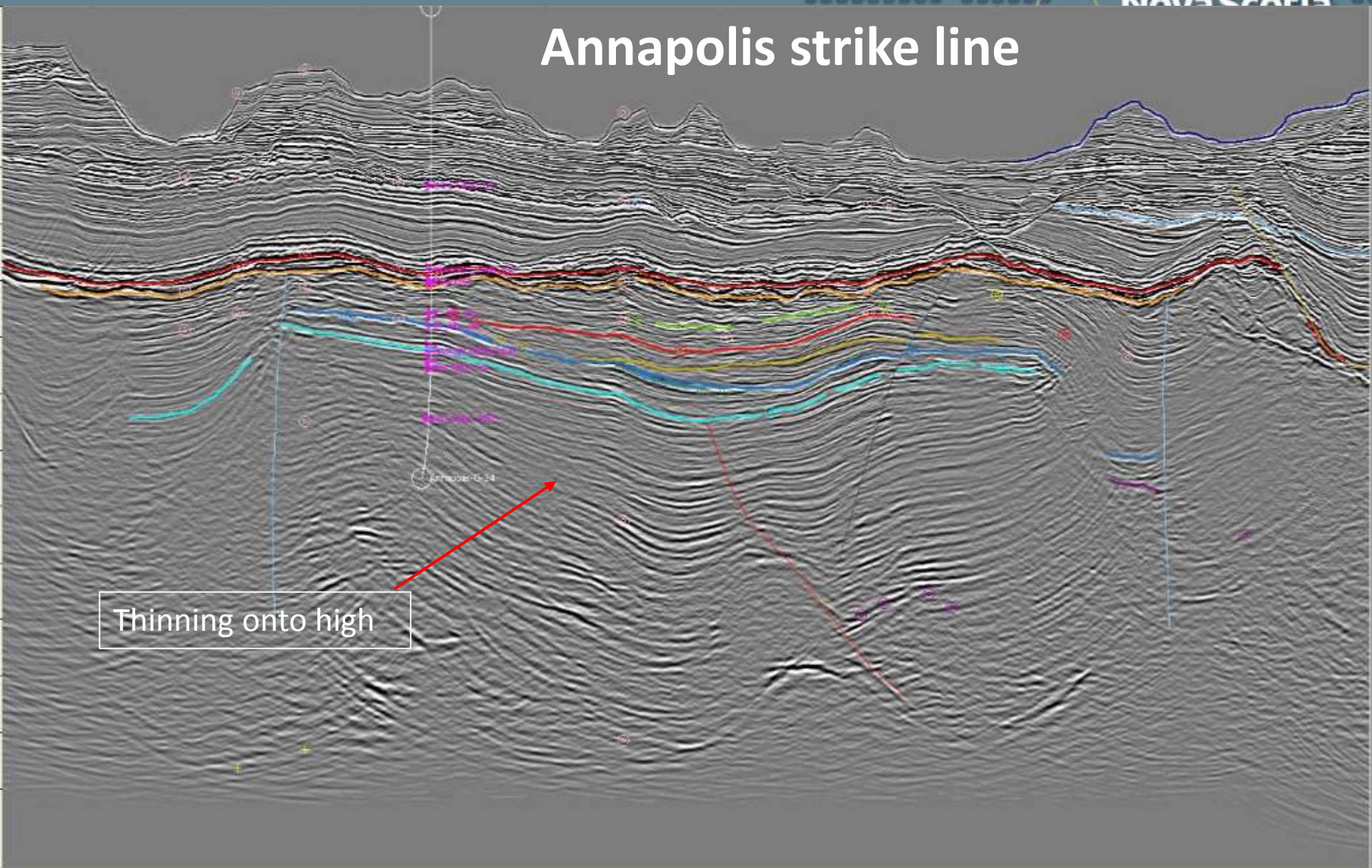
- B24_01, +20 to +80ms, Max Instantaneous frequency

NEW GEOSCIENCE. NEW OPPORTUNITY.

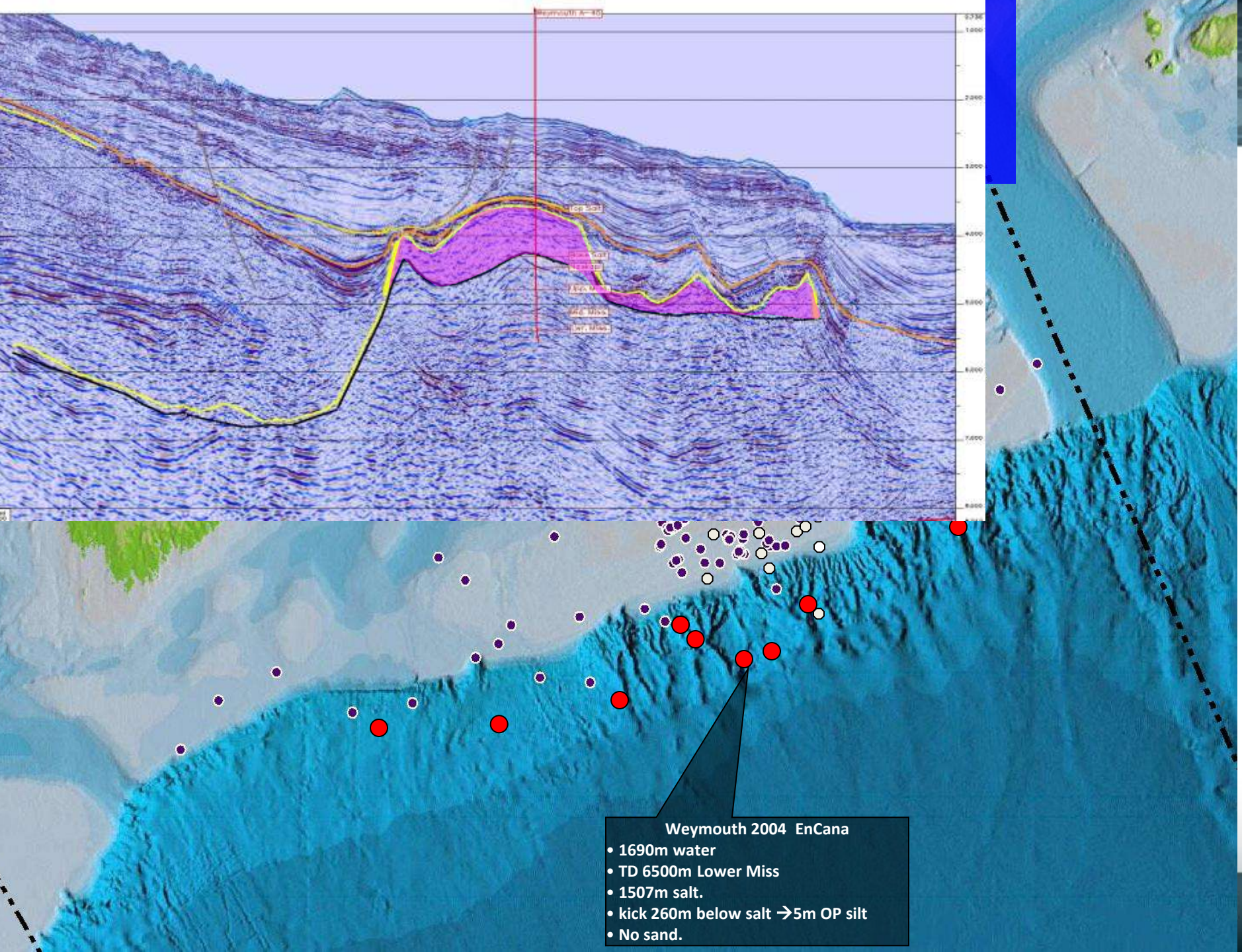
Annapolis dip line



Annapolis strike line



Thinning onto high







- Set up long term funding to ensure the geoscience work is kept 'evergreen'
 - Updated with new results
 - Further regional studies
- Short term focus is on working up the technical case NE of Sable, likely to be the subject of future Call for Bids
 - Reservoir quality
 - Detailed well failure analysis
 - 'The oil rim'
 - New data