

Late K-Sandstone Turbidite.

Are there any analogies between the Foz do Amazonas basin in Brazil and the discoveries in Guyana-Suriname?

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GSSB GUYANA-SURINAME
BASIN

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**DISCOVERIES AND OPPORTUNITIES TO HARNESS
THE POTENTIAL OF A NEW OIL PATCH**

GEORGETOWN, GUYANA & ONLINE | 26 -28 OCT. 2022



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- ◆ INTRODUCTION
- ◆ BRAZILIAN EQUATORIAL MARGIN
- ◆ FOZ DO AMAZONAS BASIN (FZA) – STUDY AREA
- ◆ TECTONO-STRATIGRAPHIC EVOLUTION
- ◆ SEISMIC INTERPRETATION – MAIN PLAY & PETROLEUM SYSTEM EVALUATION
- ◆ FINAL REMARKS

The objective is to evaluate the untapped Late Cretaceous turbidite play potential in Brazil, analogous to the plays with world-class discoveries in Guyana-Suriname and correlated basins on the West African margin in recent years. The research evaluated the northwest portion of the Foz do Amazonas basin (FZA).

LATE CRETACEOUS SANDSTONE TURBIDITES RESERVOIR, WITH CENOMANIAN-TURONIAN SOURCE ROCK, IS THE MAIN PLAY IN BRAZILIAN DEEP WATER FZA BASIN

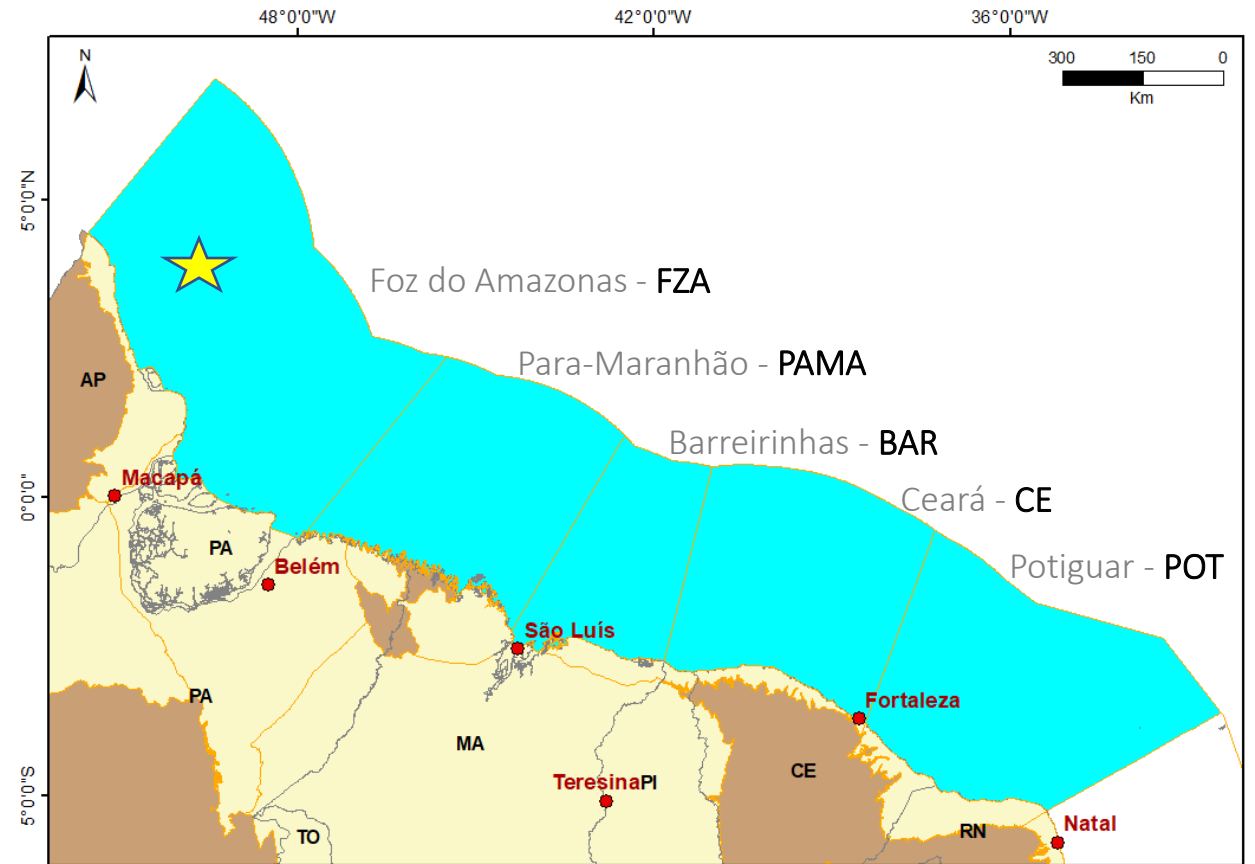
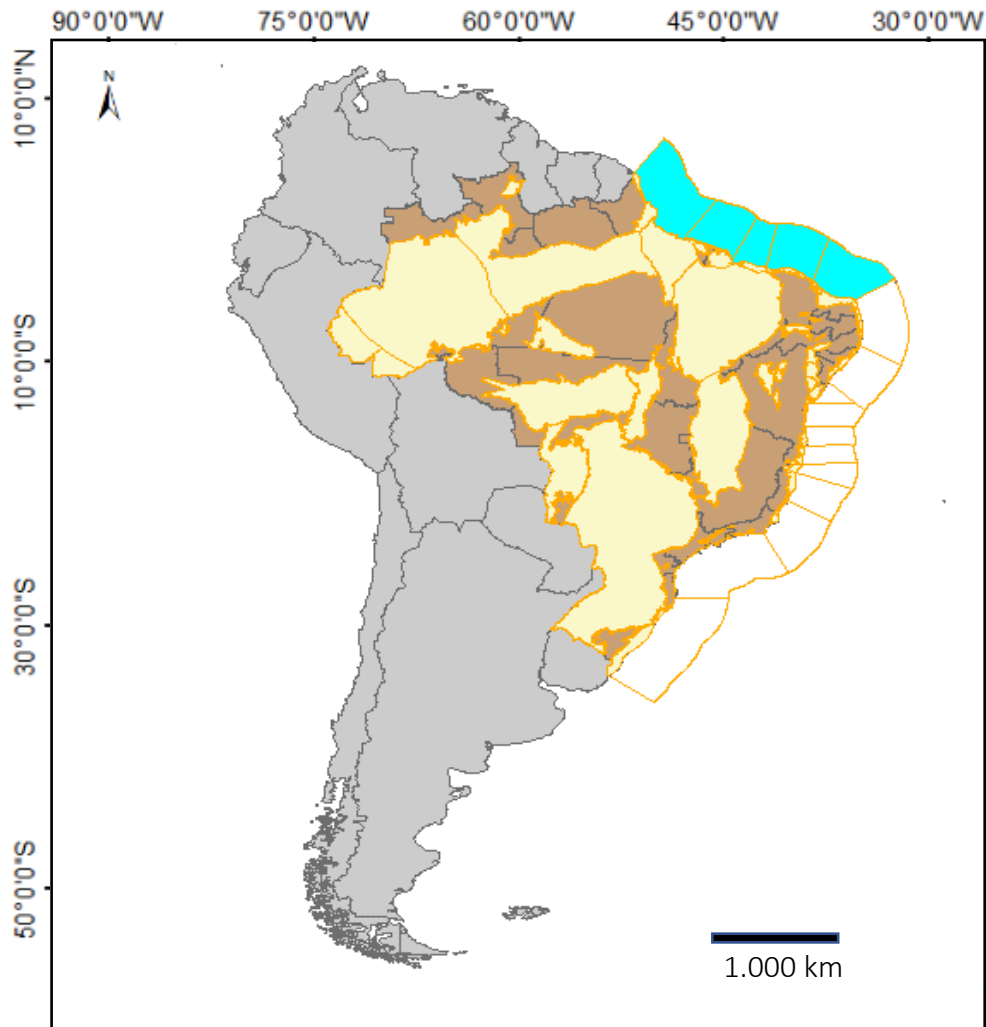
The FZA offshore sedimentary basin shares similarities and differences with the Guyana and Suriname basins. The degree of analogy is a consequence of the geological genetic history of the Atlantic Equatorial Margin, influenced by the Demerara Plateau, with implications for the elements of petroleum system of each basin. The study area encompasses deep and ultra-deepwater, covered by regional 2D and partially 3D seismic. This assessment is stratigraphically restricted to the Late Cretaceous sandstone turbidite play.

THE MAIN DEEP WATER EXPLORATORY PLAY IN FZA HAS NEVER BEEN DRILLED

IT'S AN EXPLORATORY FRONTIER!

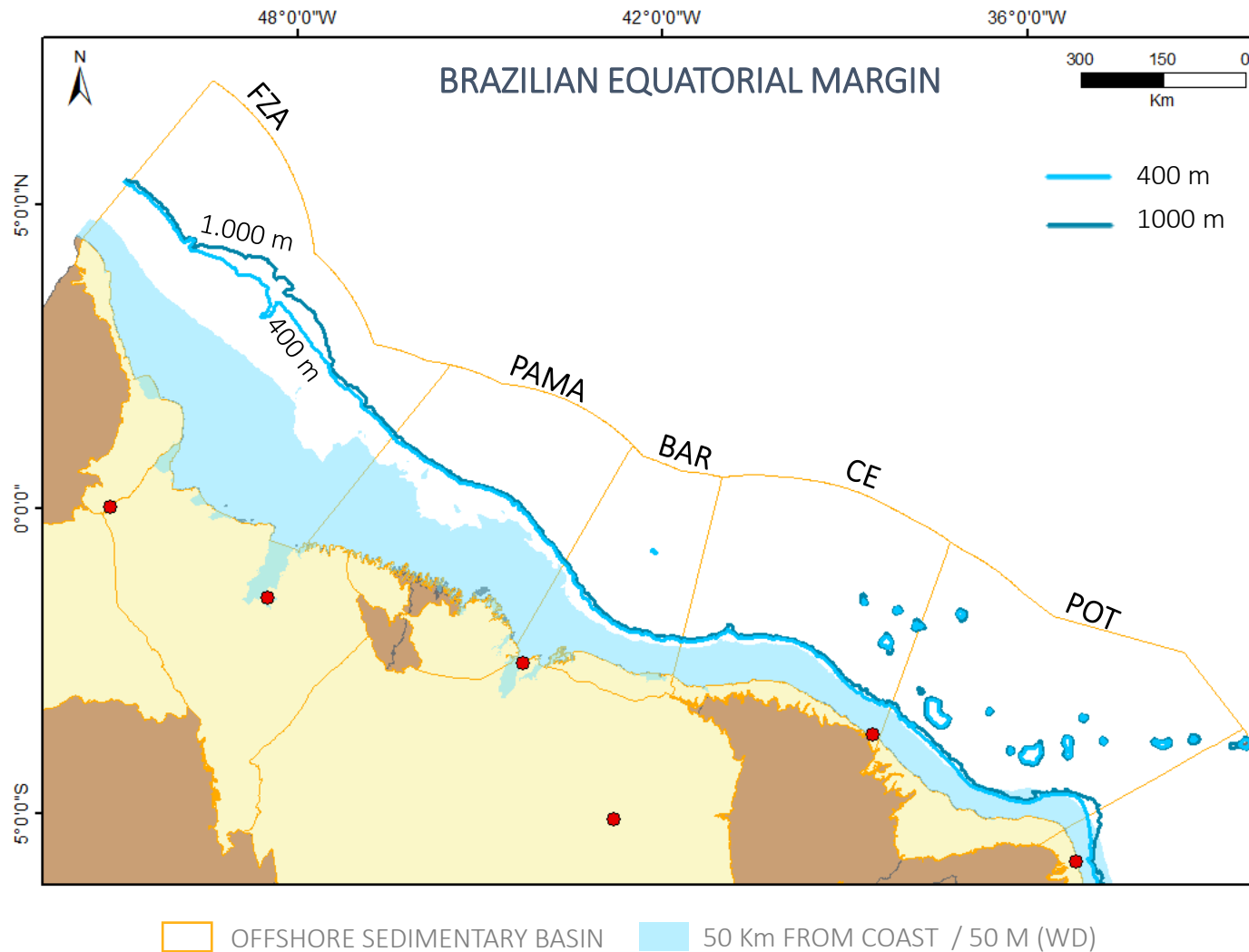


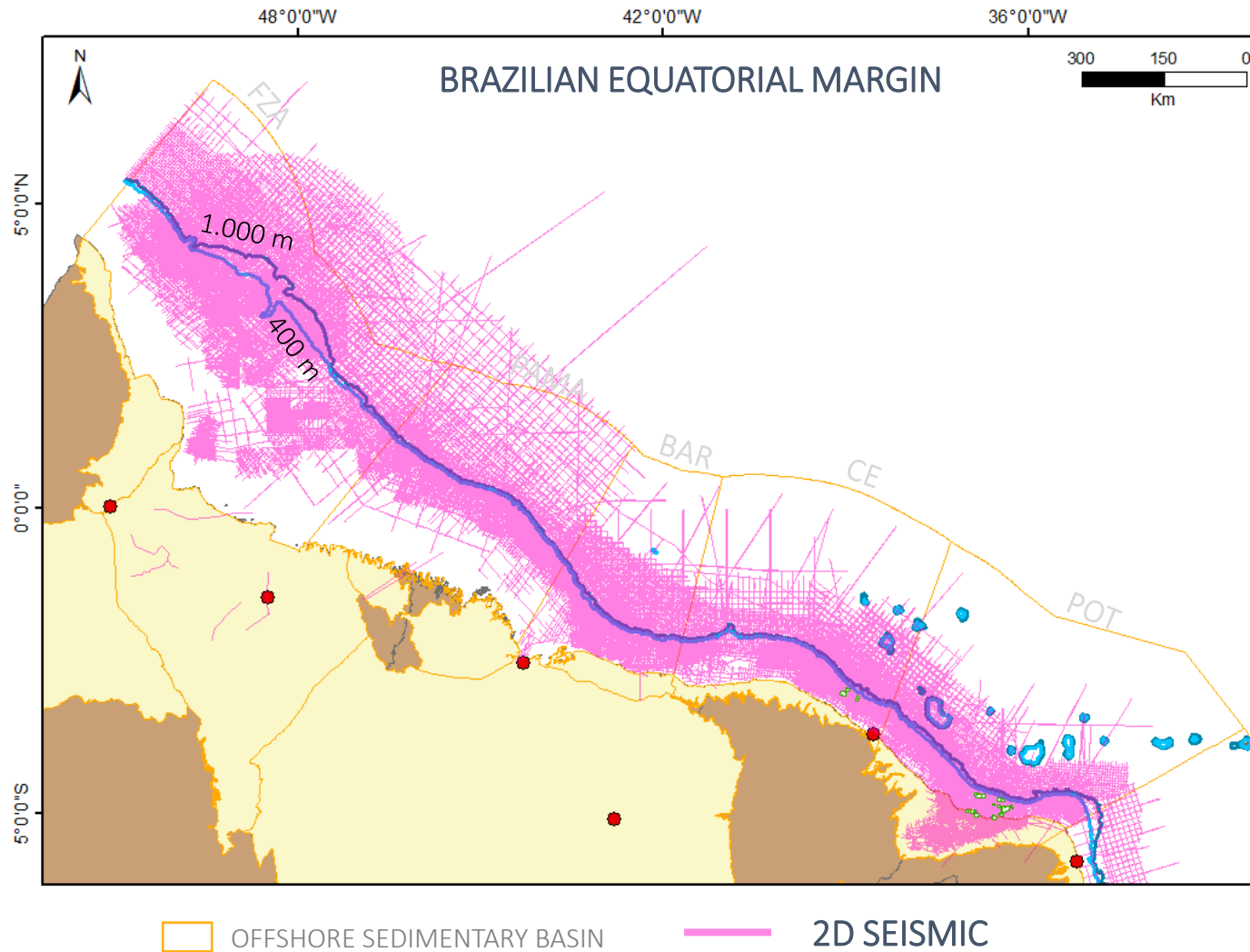
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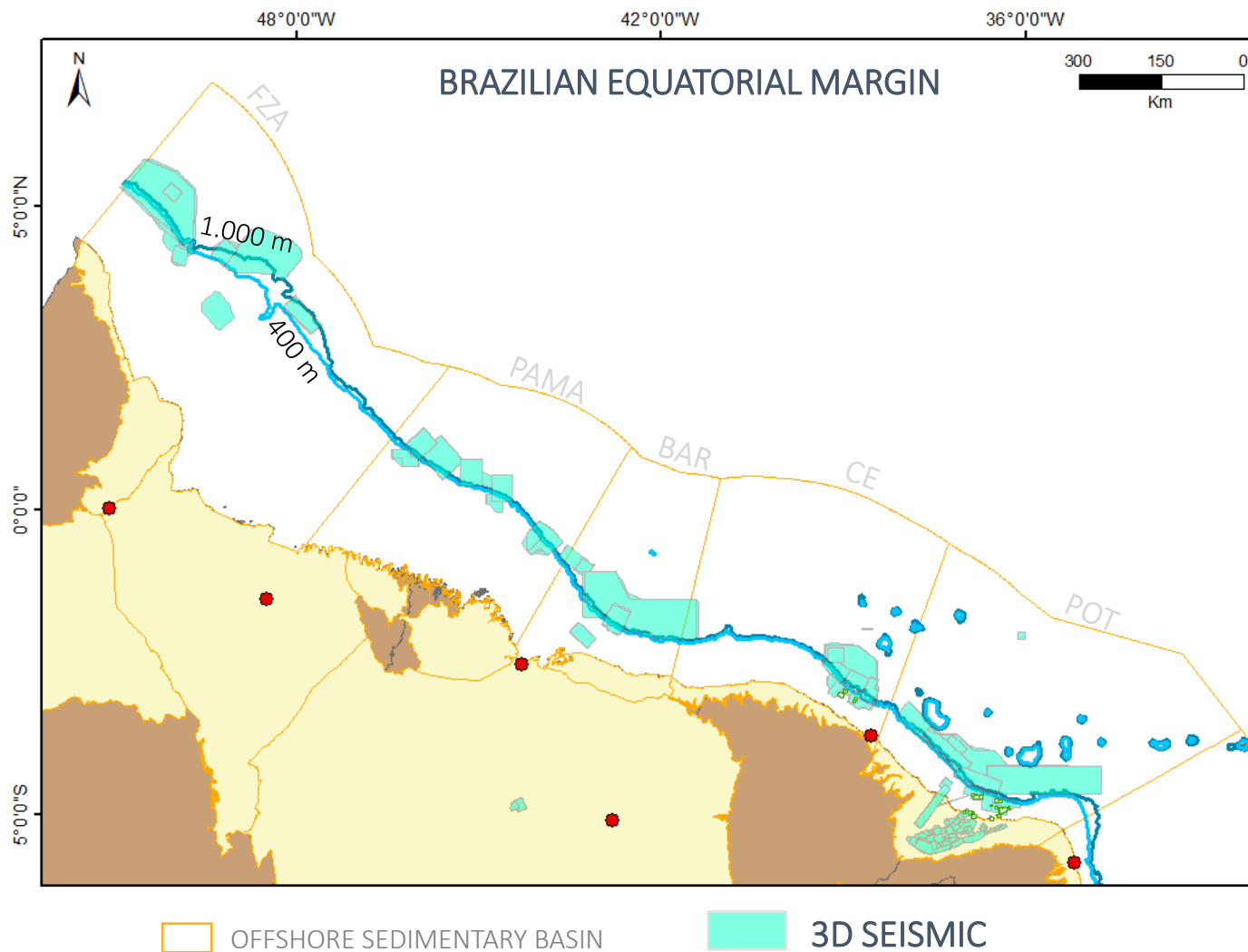


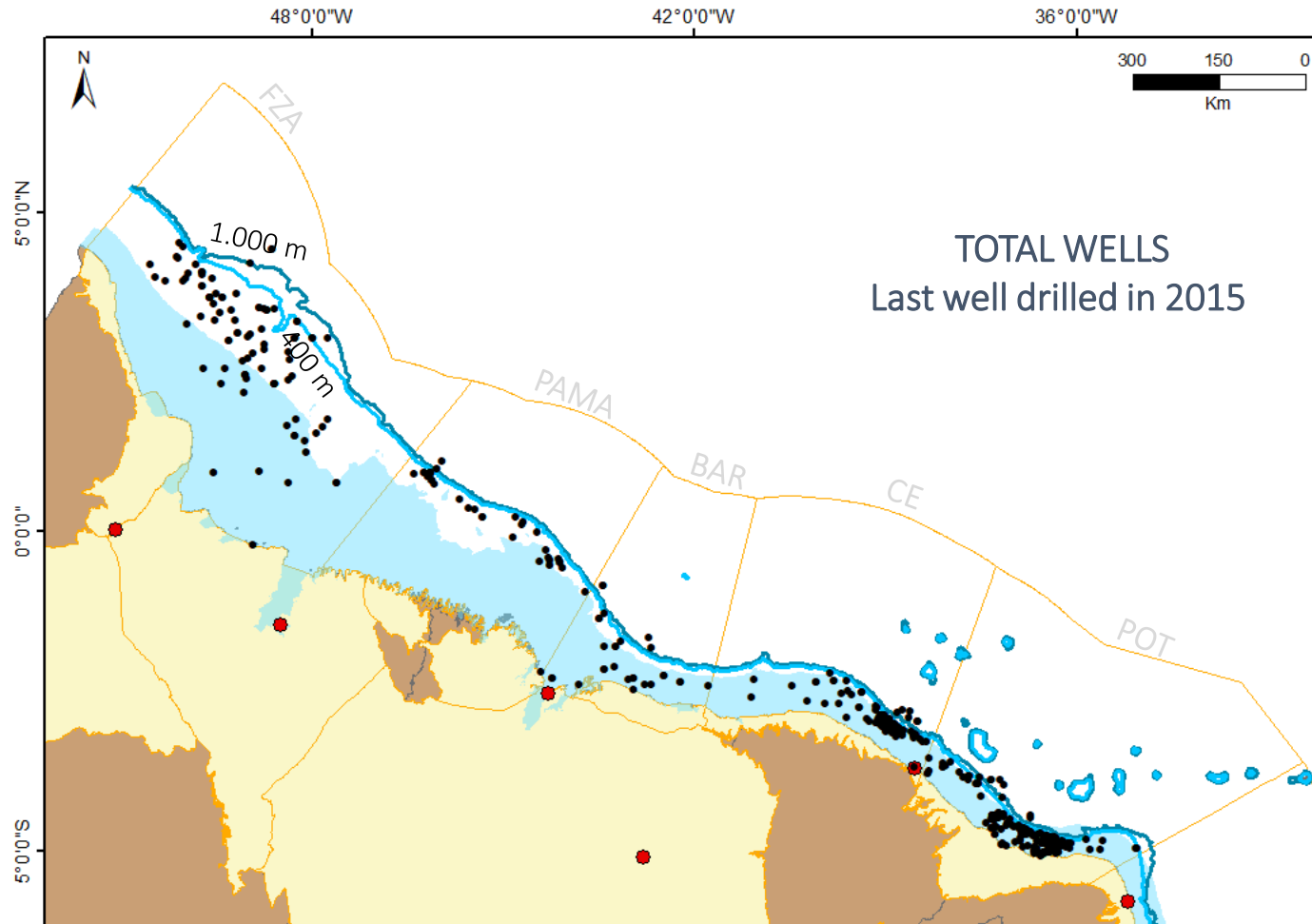
AREA: 884,535 sqm BRAZILIAN EQUATORIAL MARGIN

★ STUDY AREA - FOZ DO AMAZONAS BASIN - FZA



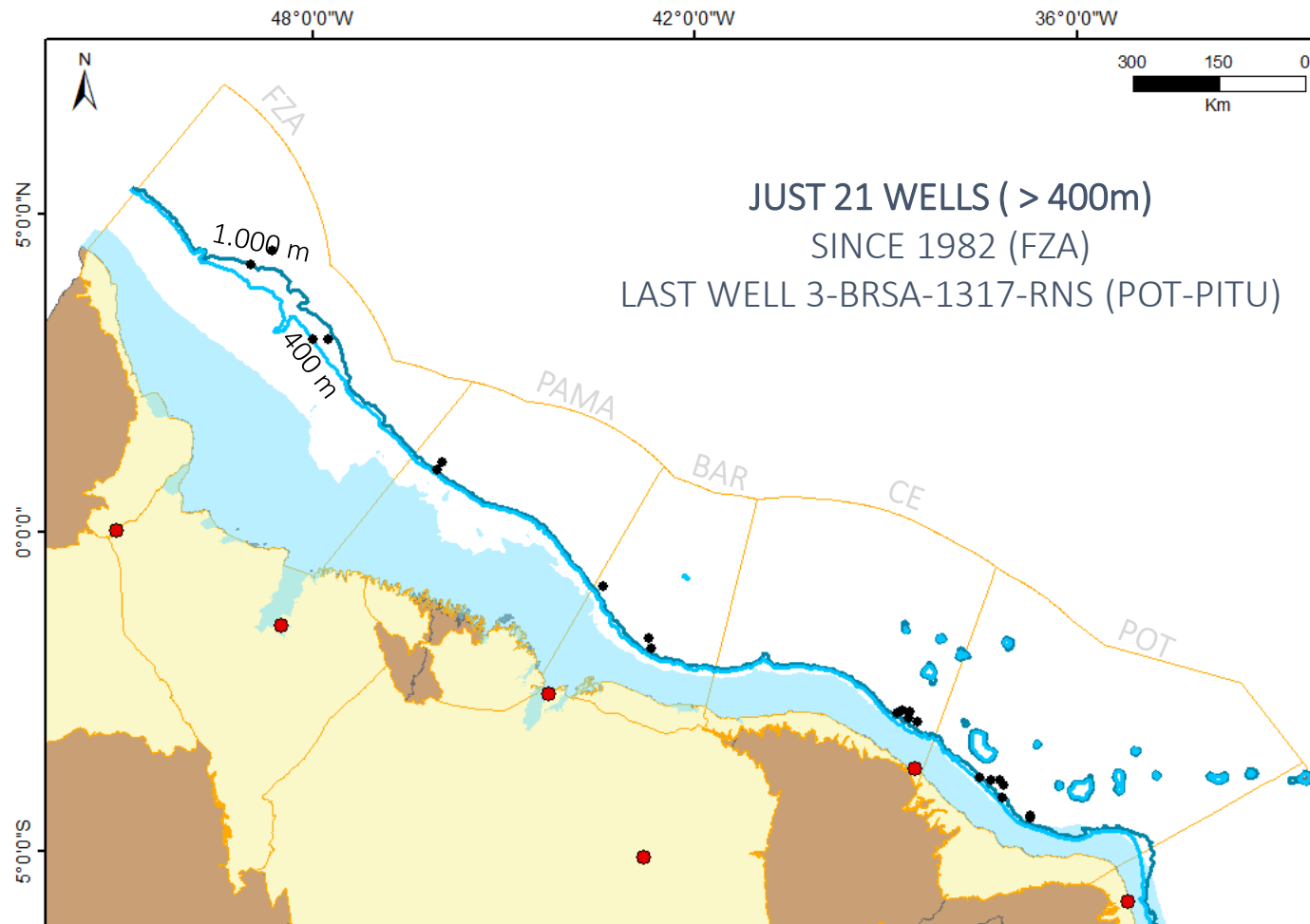






OFFSHORE SEDIMENTARY BASIN

Well Data – Deep & UD Water



OFFSHORE SEDIMENTARY BASIN

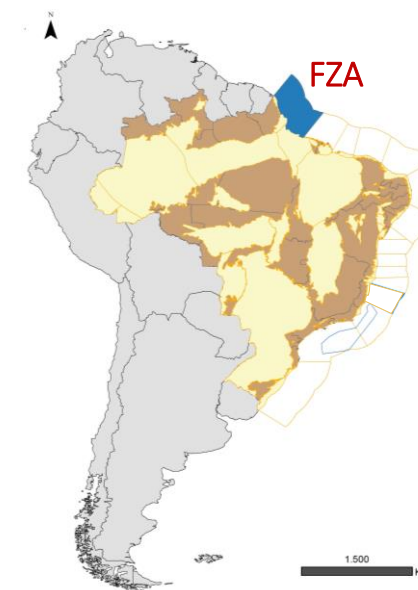
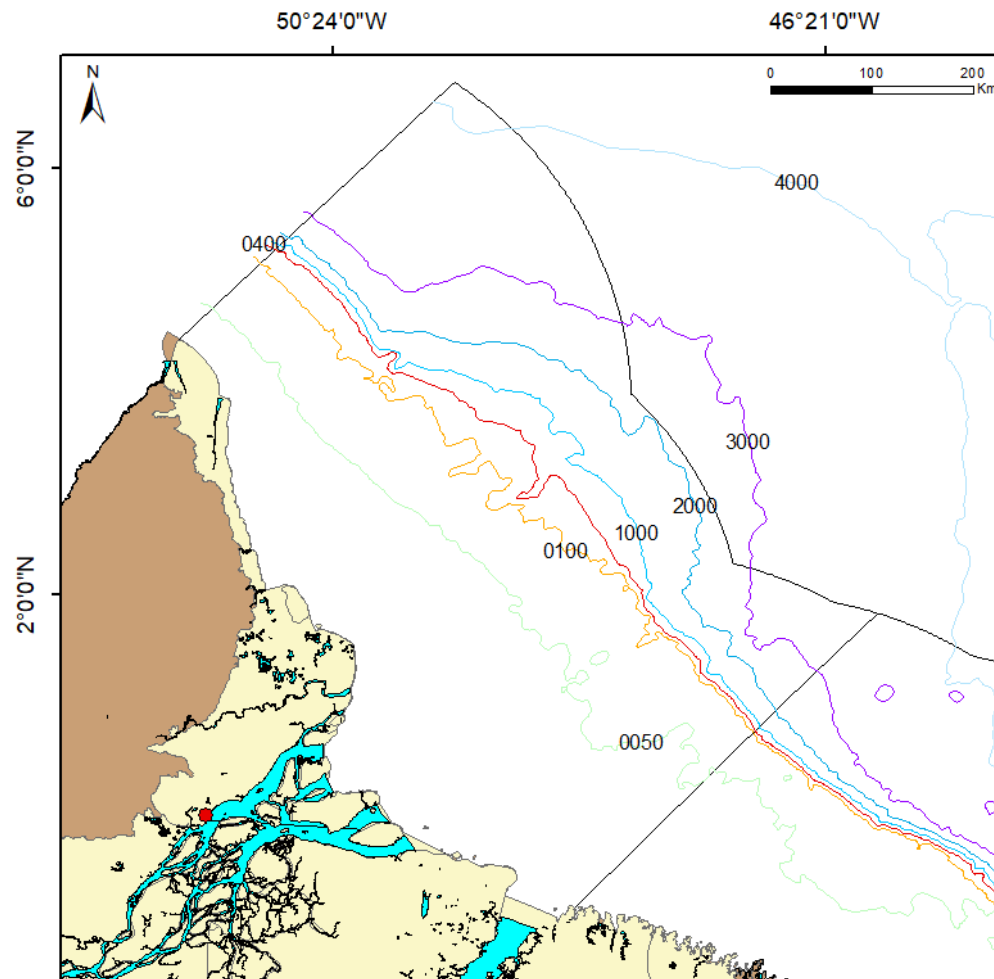


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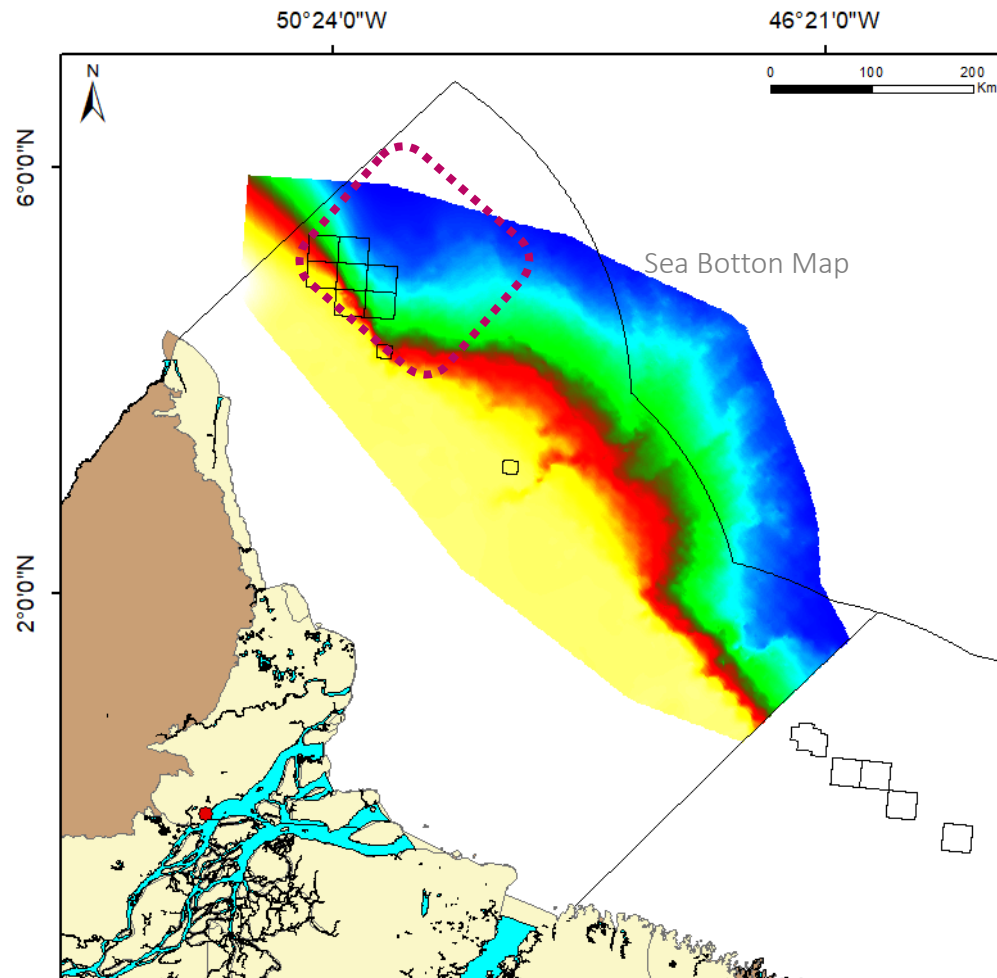
Foz do Amazonas Basin (FZA)

STUDY AREA

*Foz do Amazonas Offshore
Sedimentary Basin*

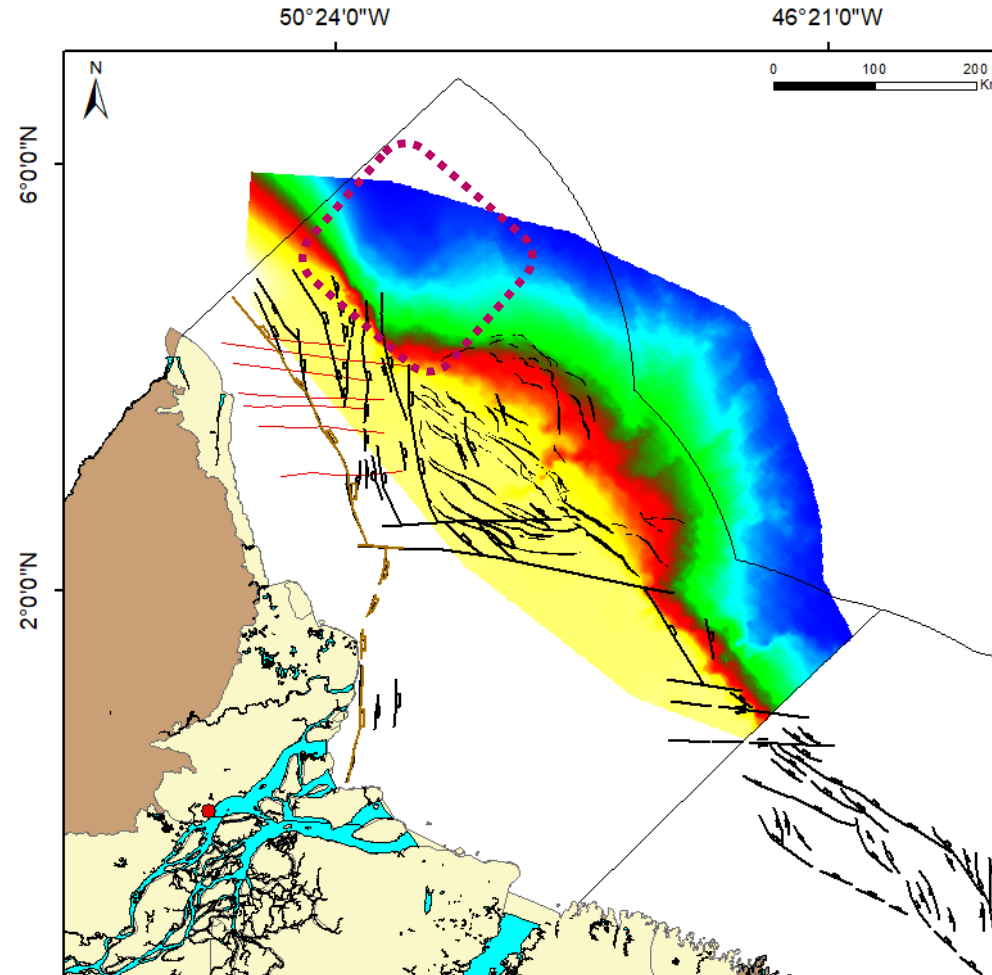


STUDY AREA
NW of Amazonas Fan



- ONGOING CONTRACTS
- ⊞ TARGET AREA

STUDY AREA
NW of Amazonas Fan

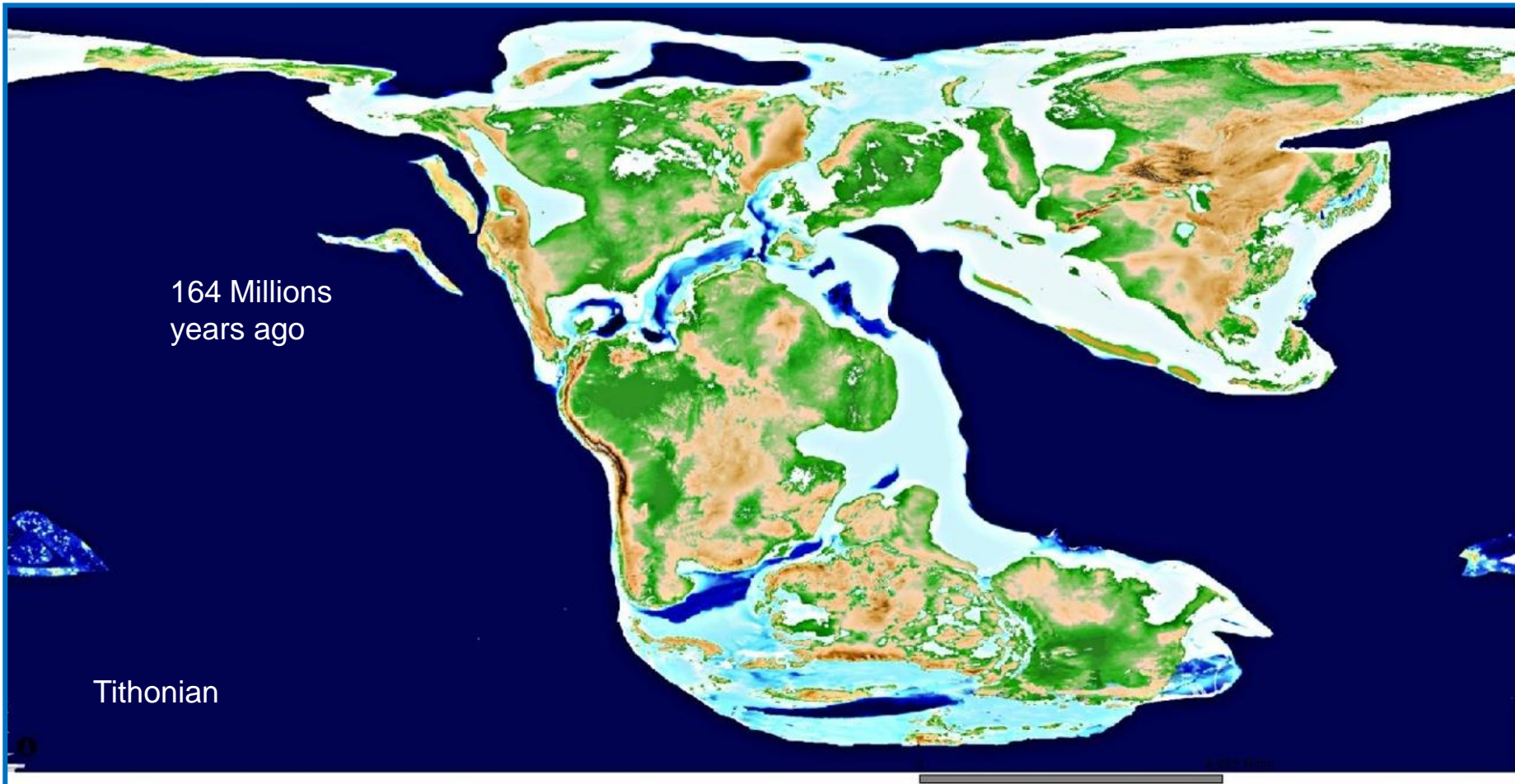




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TECTONO-STRATIGRAPHIC EVOLUTION



164 Millions
years ago

Tithonian

SINBPA/Petrobras
Scotese

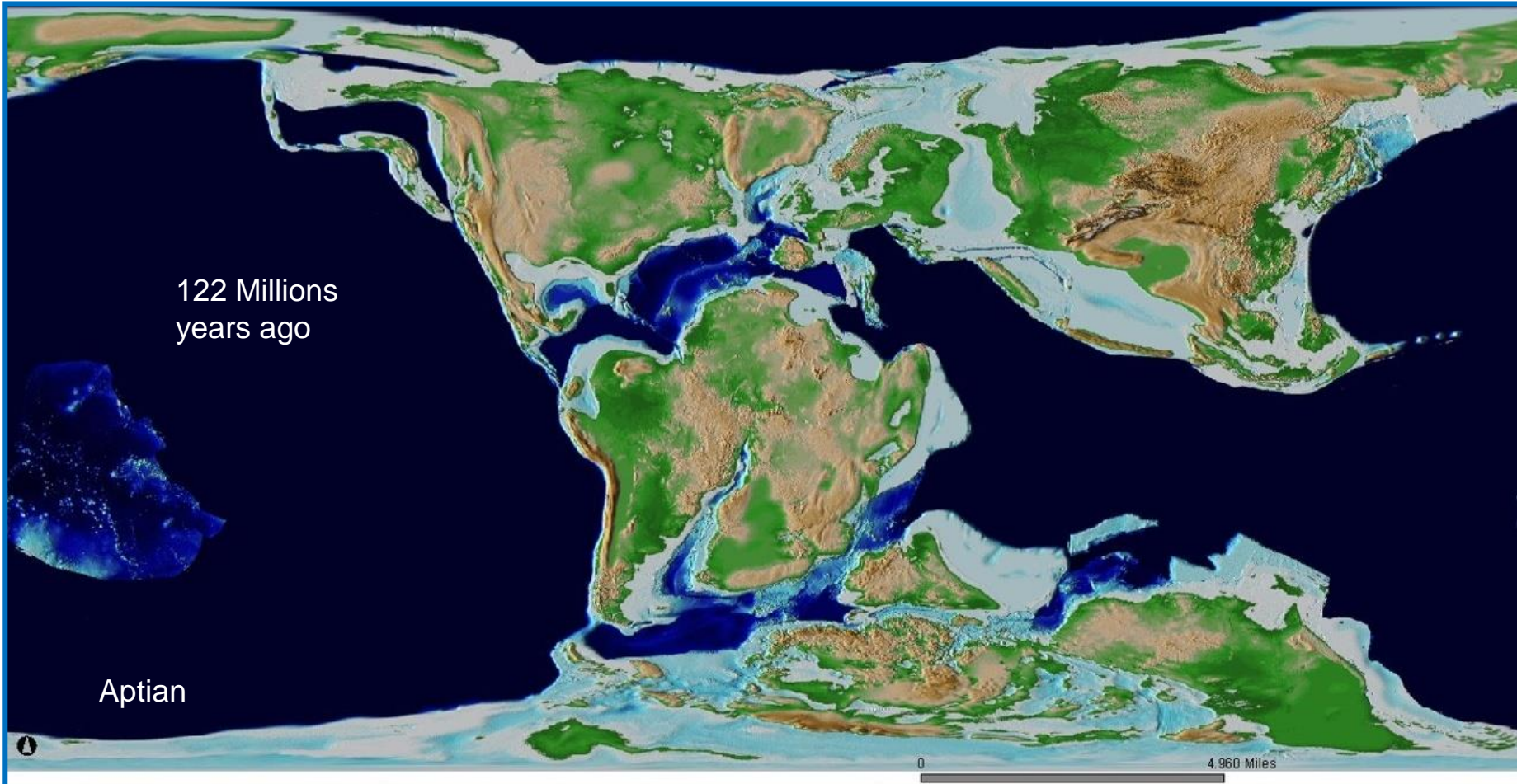
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TECTONO-STRATIGRAPHIC EVOLUTION

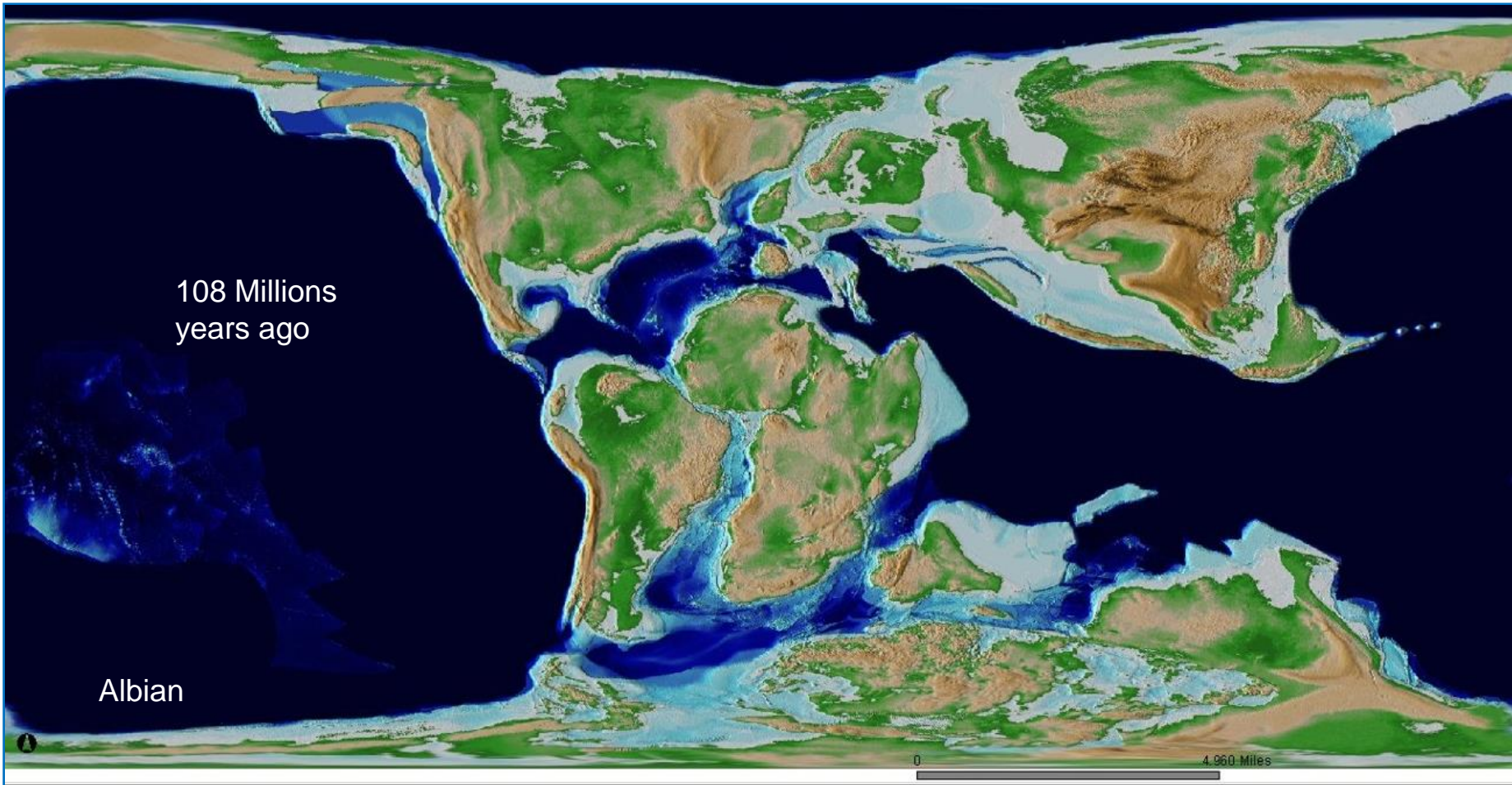


SINBPA/Petrobras
Scotese

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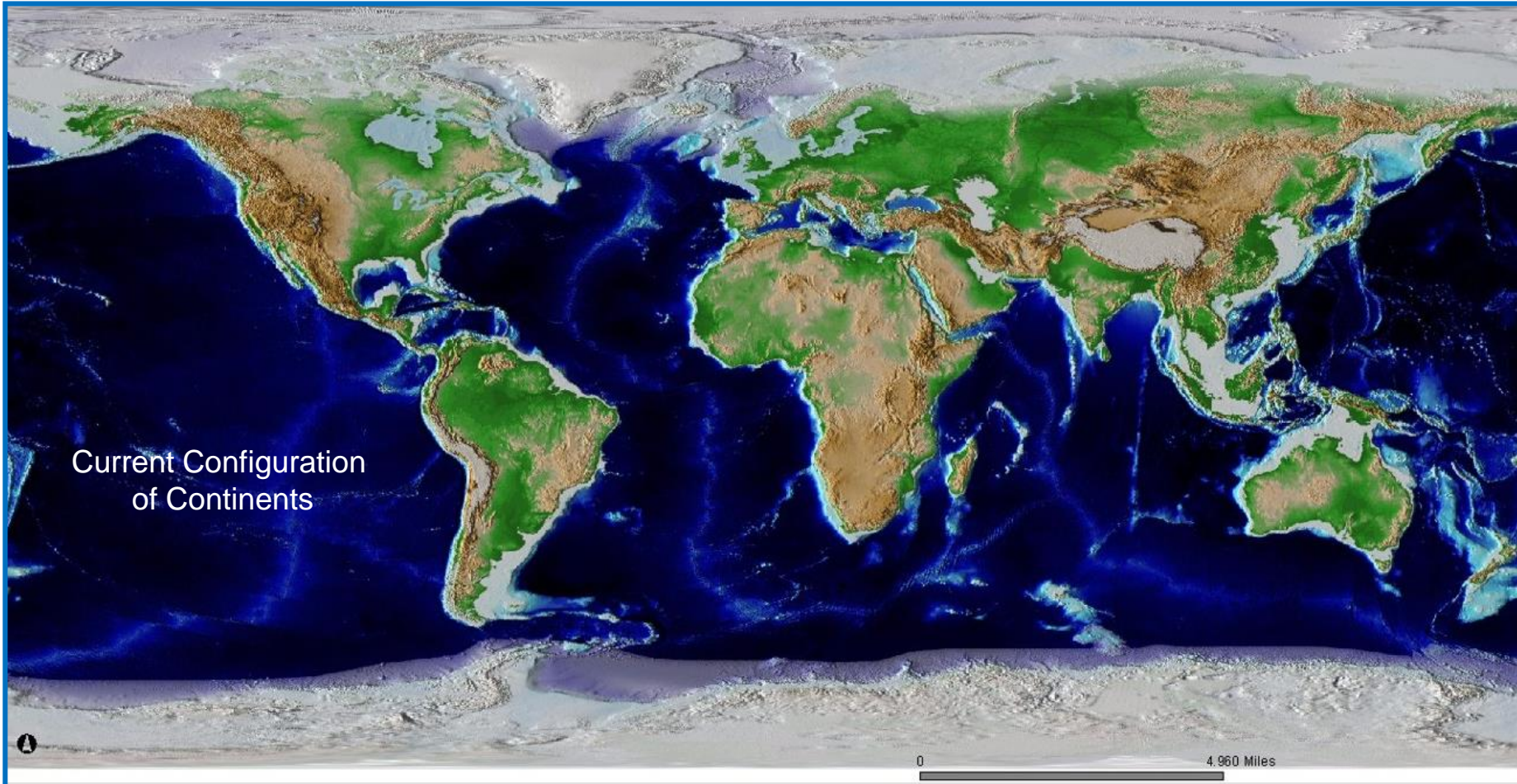
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TECTONO-STRATIGRAPHIC EVOLUTION



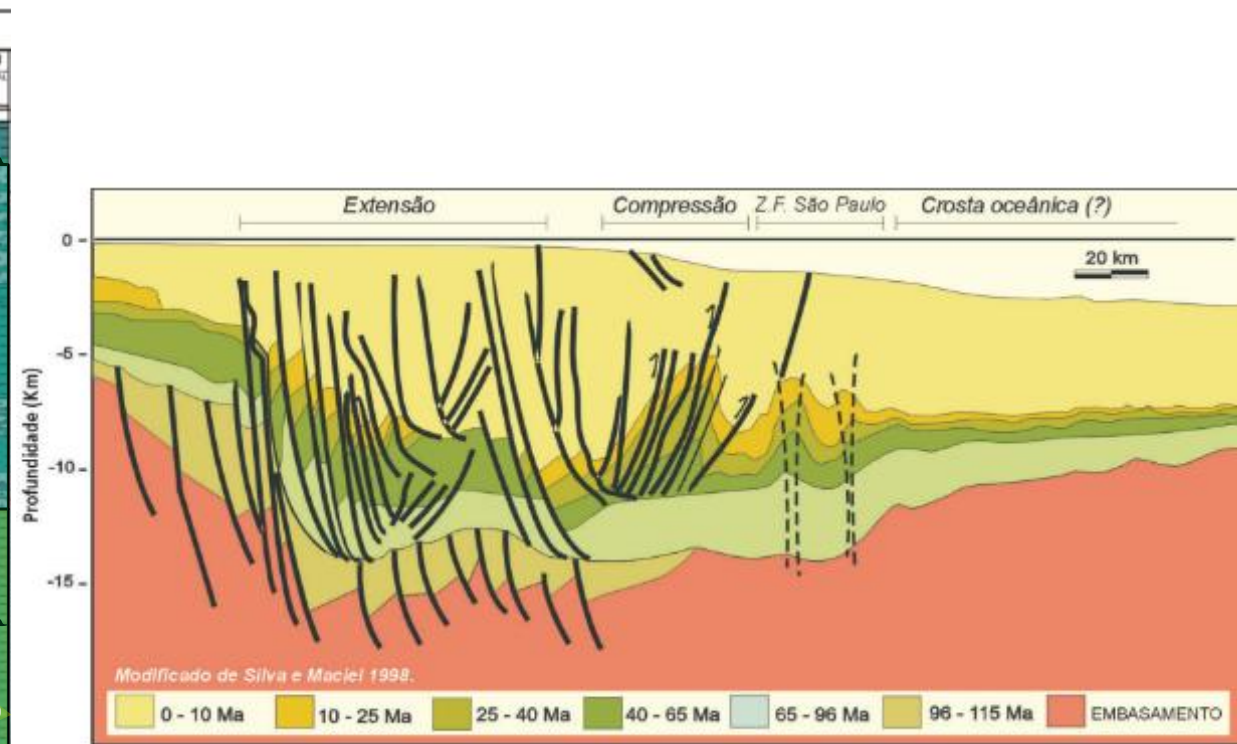
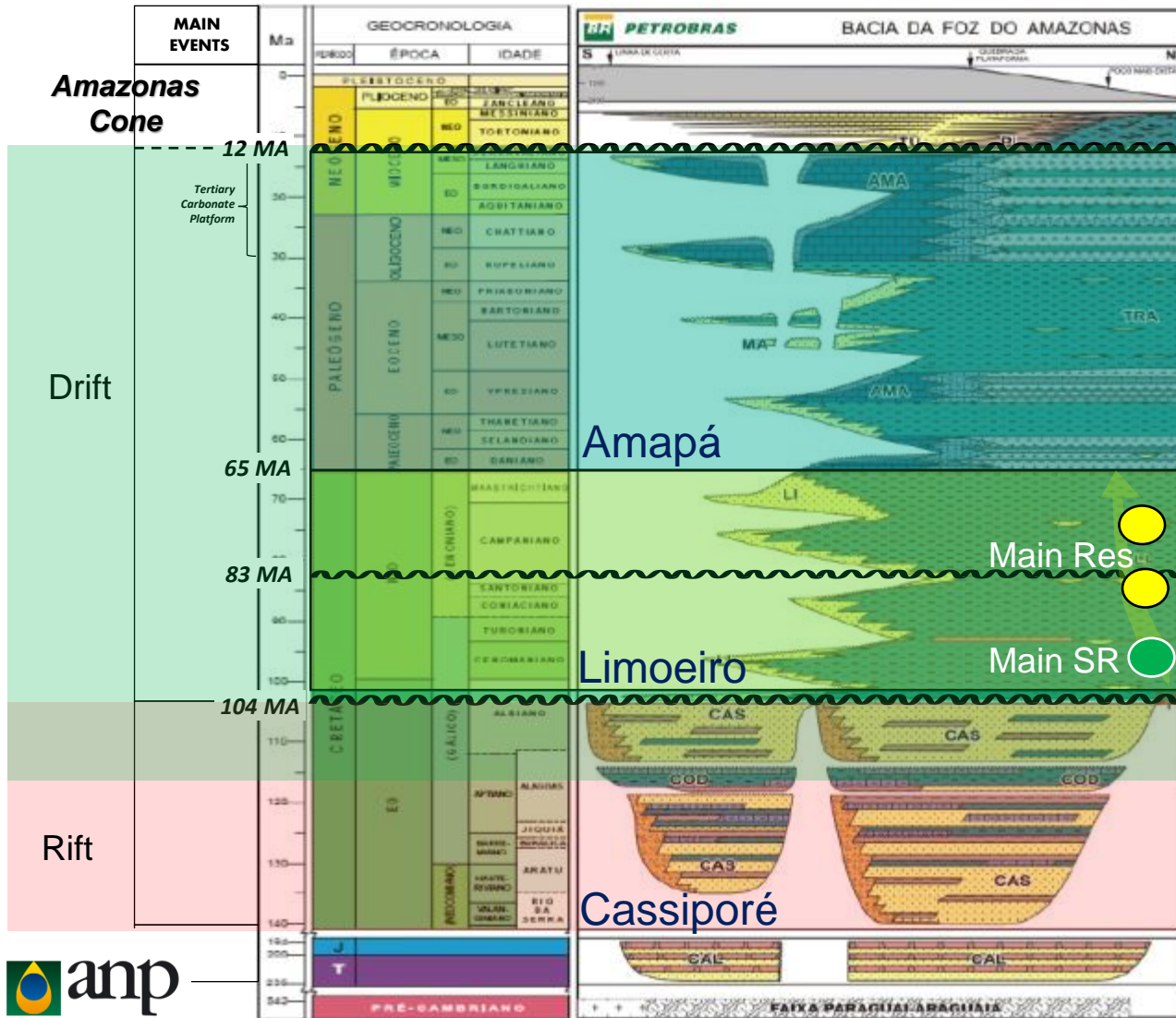
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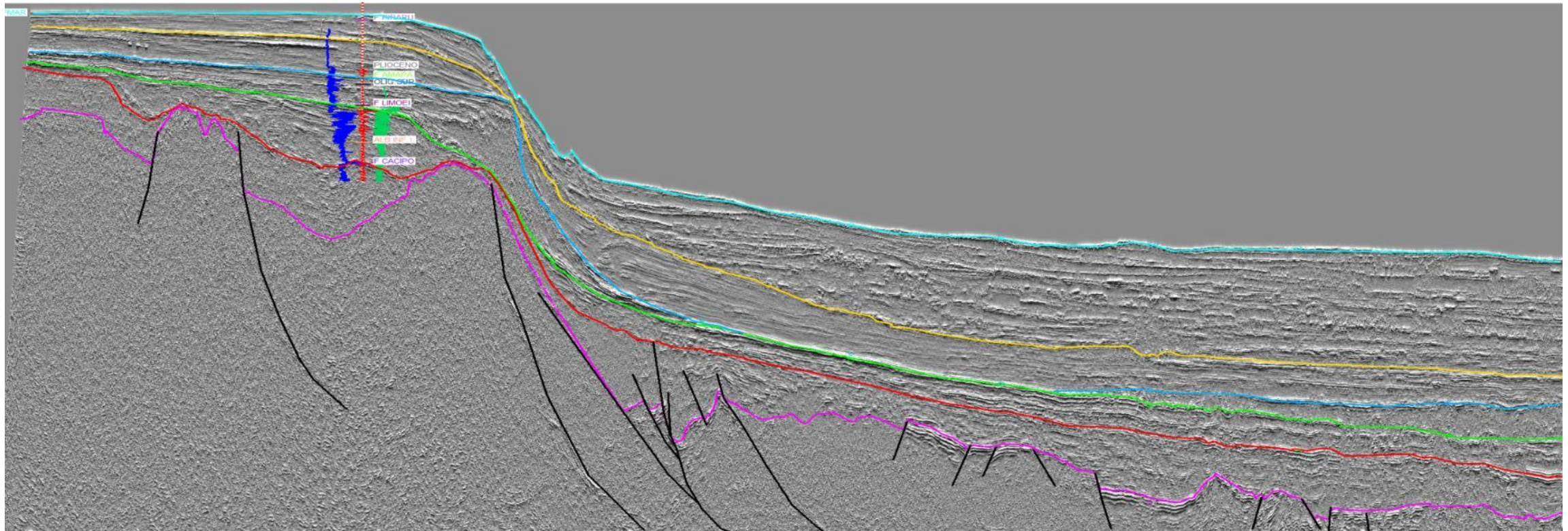
SINBPA/Petrobras
Scotese

Tectono-stratigraphic Evolution

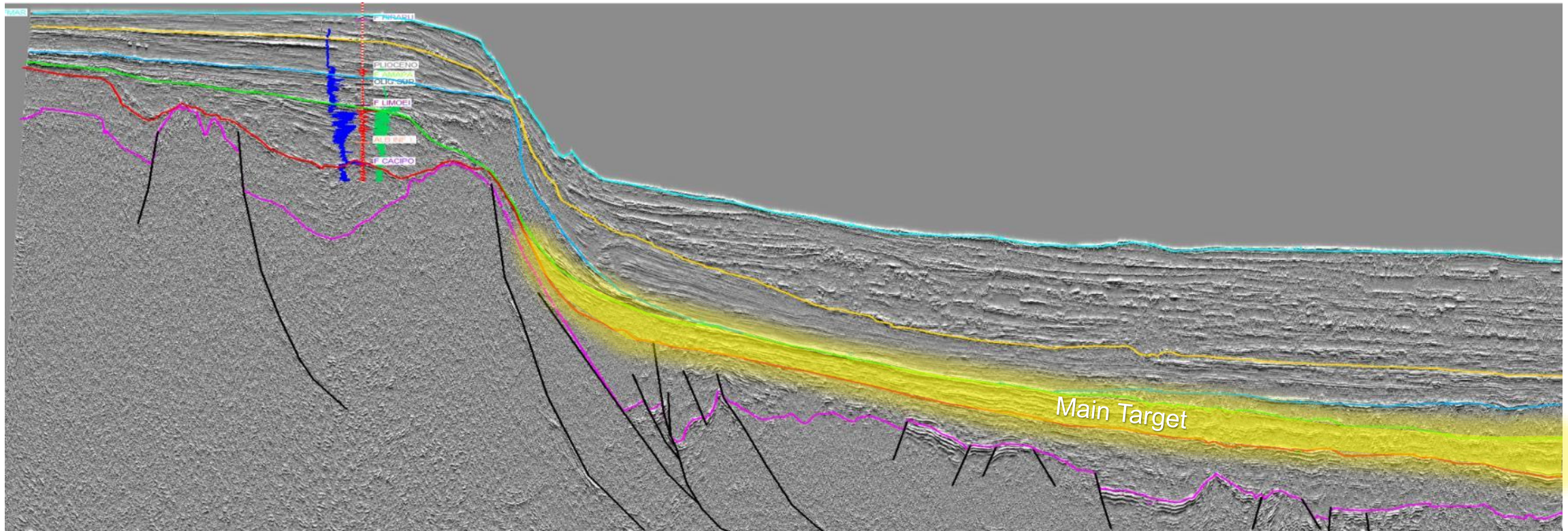




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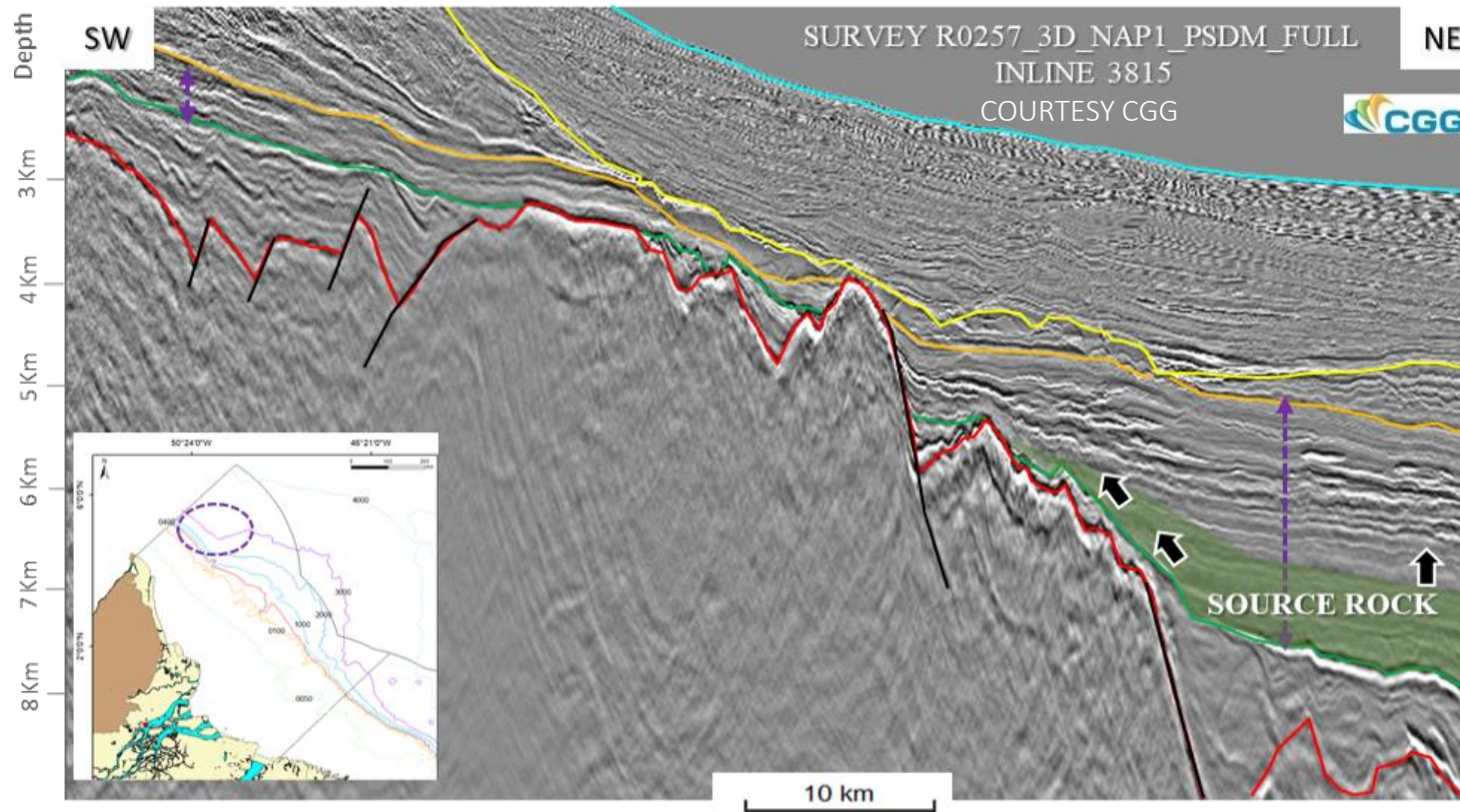


Public Line – DIP _TecVA Attribute



Public Line – DIP_TecVA Attribute

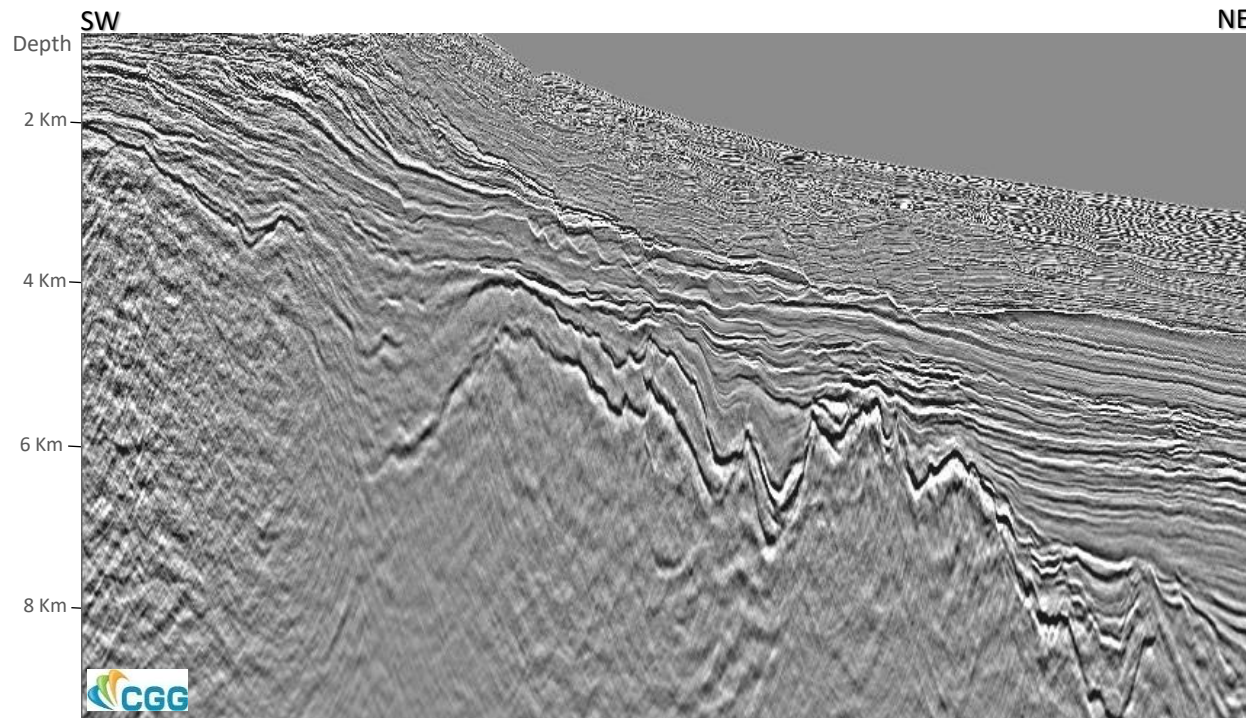
FZA – Study Area



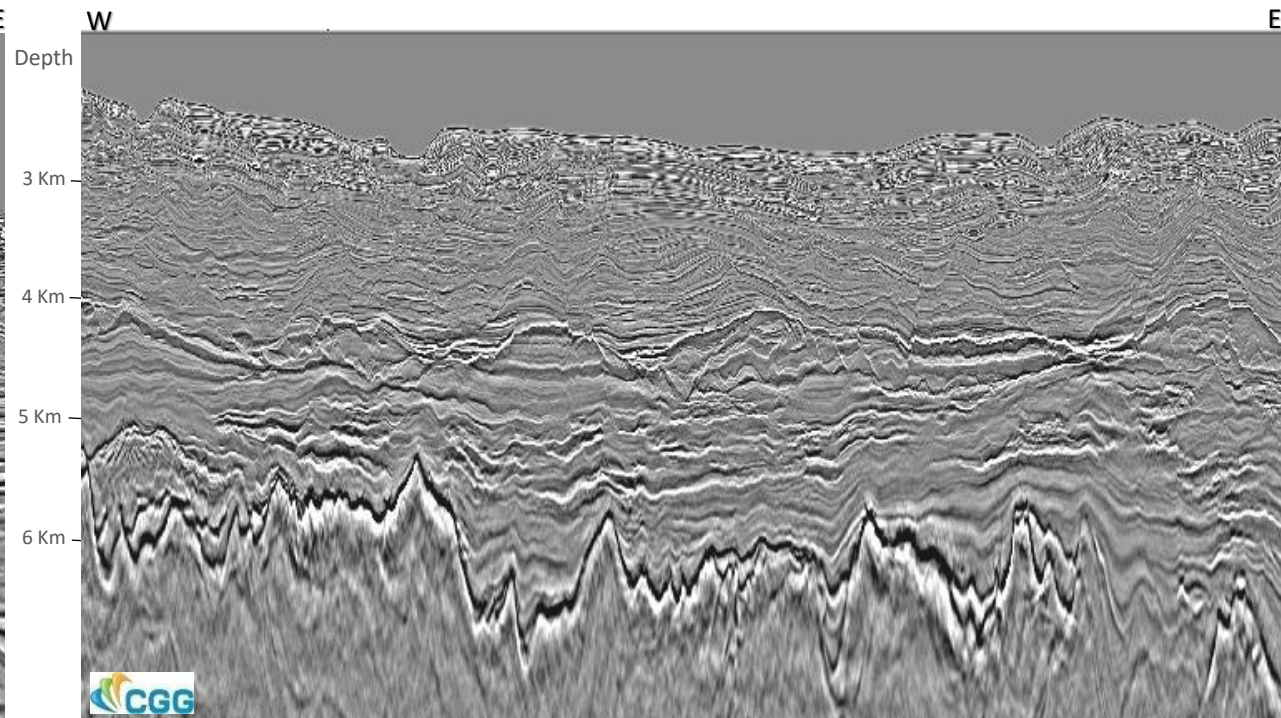
The green polygon represents the Cenomanian-Turonian source rock.

The black arrows indicate the hydrocarbon migration routes.

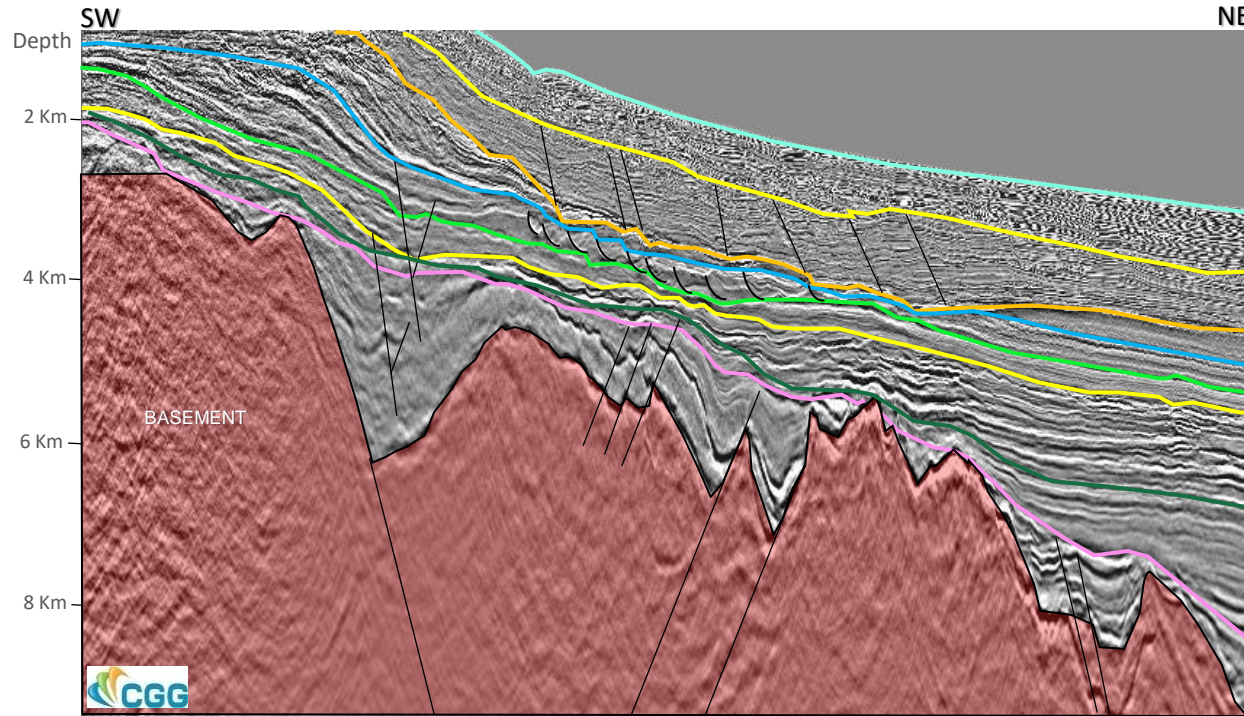
The double-headed purple arrows indicate the stratigraphic interval of interest.



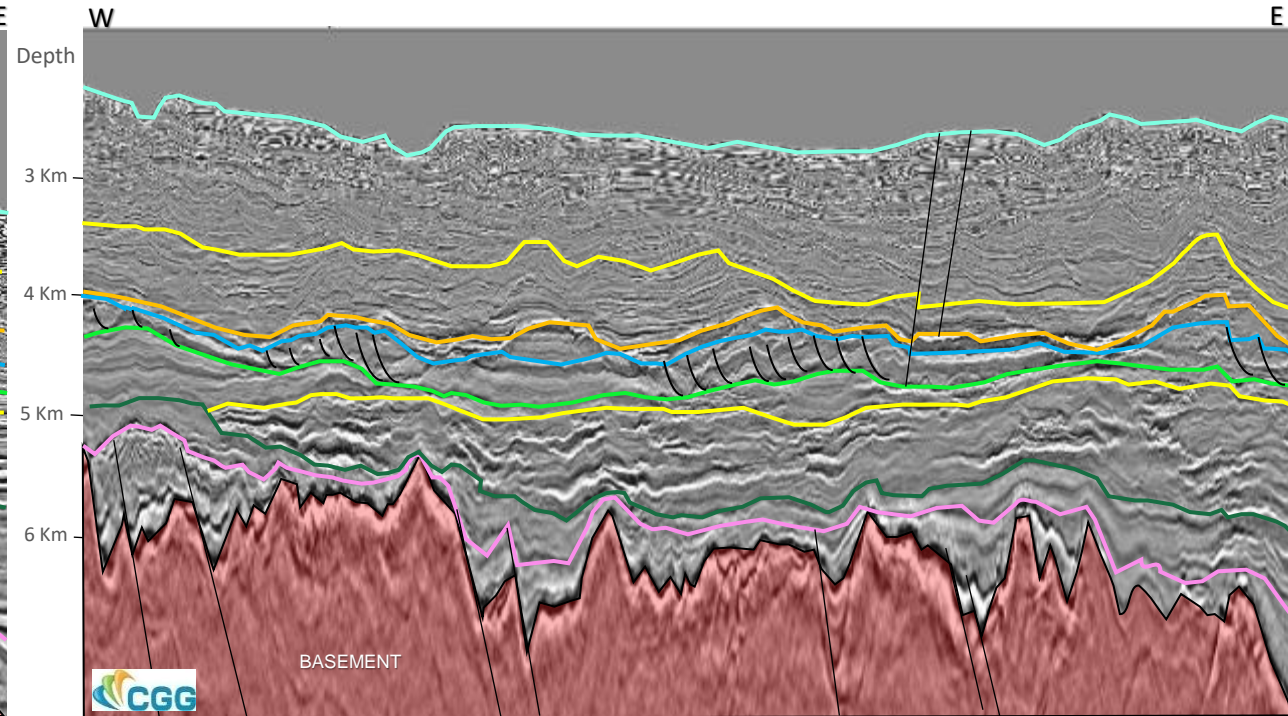
COURTESY CGG - R0257_3D_NAP1_PSDM_FULL (DIP-IL)



COURTESY CGG - R0257_3D_NAP1_PSDM_FULL (STRIKE-ARBITRARY LINE)

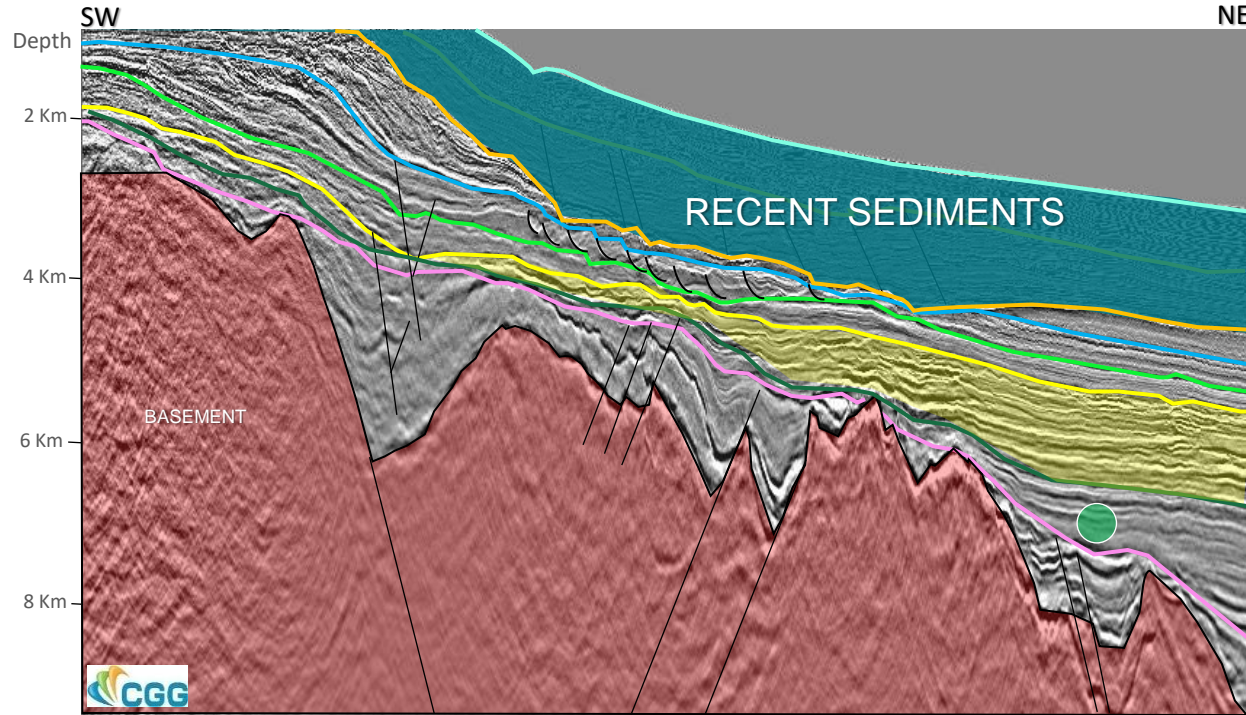


COURTESY CGG - R0257_3D_NAP1_PSDM_FULL (DIP-IL)

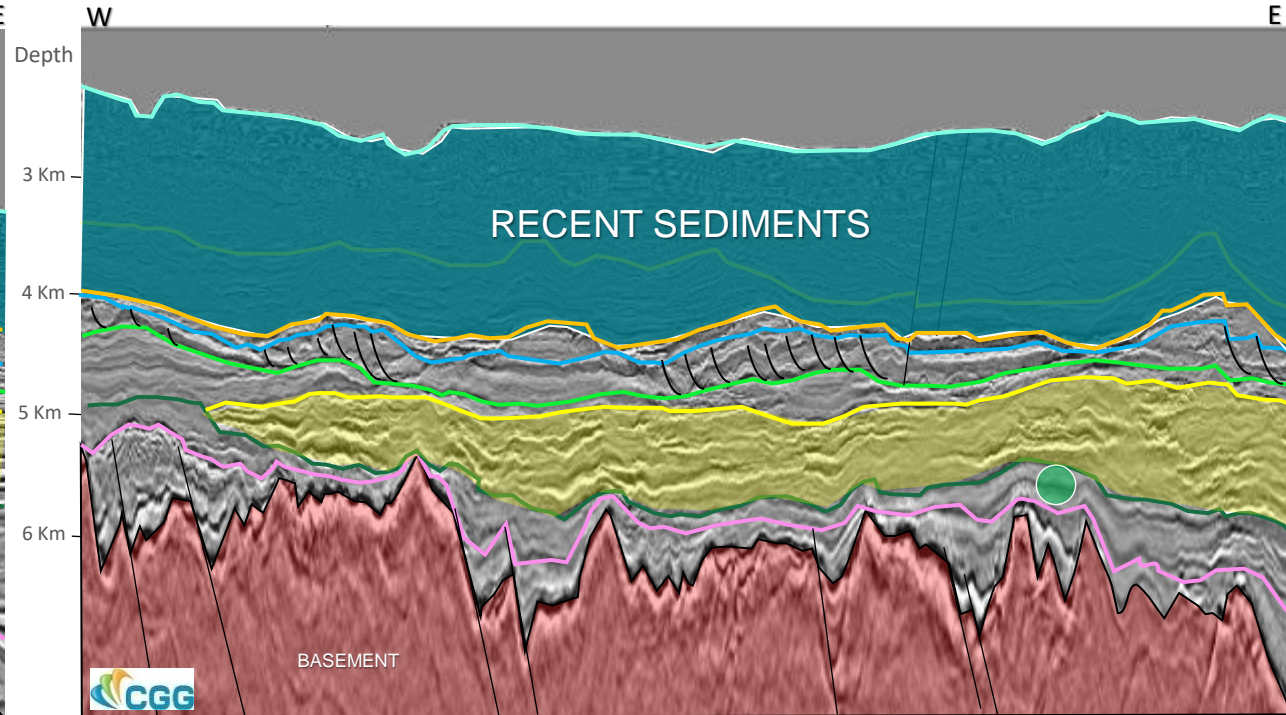


COURTESY CGG - R0257_3D_NAP1_PSDM_FULL (STRIKE-ARBITRARY LINE)

— Sea Bottom — Base Pleistocene — Base Pliocene — Base Oligocene — Top Maastrichtian — Top Campanian — Coniacian-Santonian — Albian (BREAK UP)



COURTESY CGG - R0257_3D_NAP1_PSDM_FULL (DIP-IL)

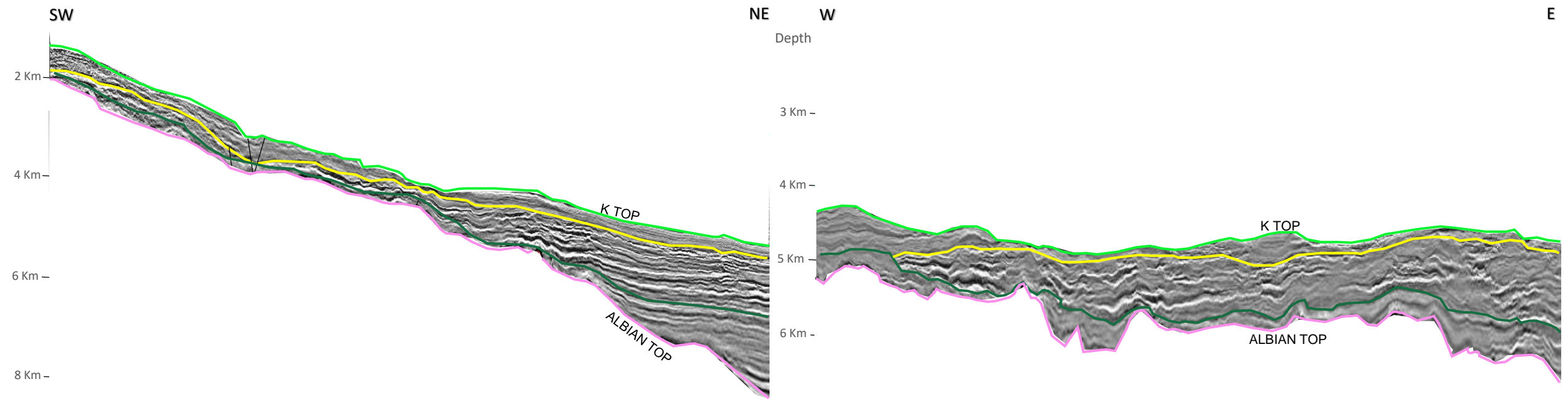


COURTESY CGG - R0257_3D_NAP1_PSDM_FULL (STRIKE-ARBITRARY LINE)

MAIN RESERVOIR INTERVAL
 MAIN SOURCE ROCK

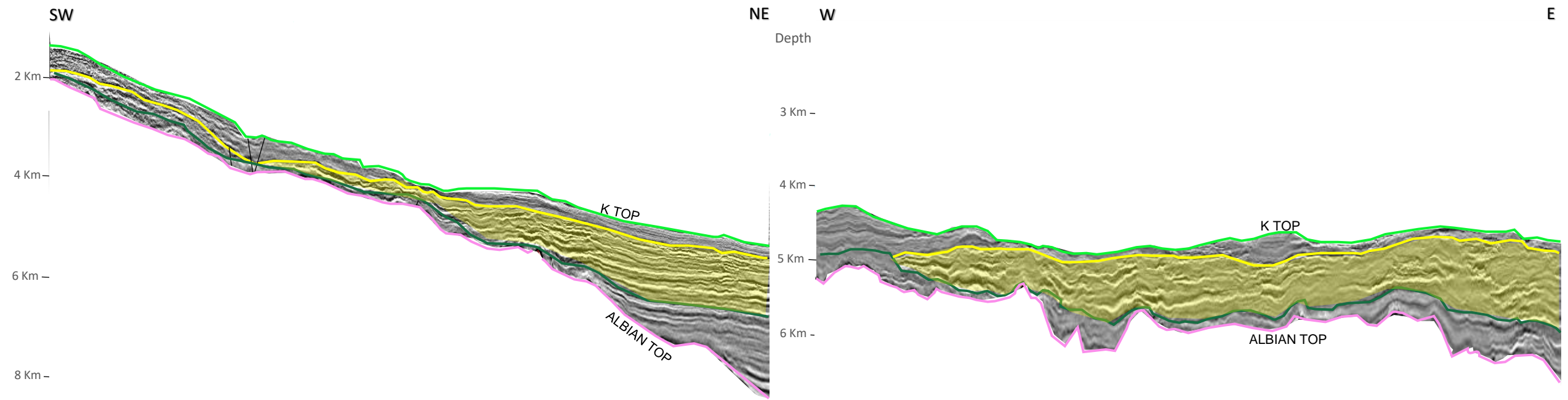


FZA – Study Area





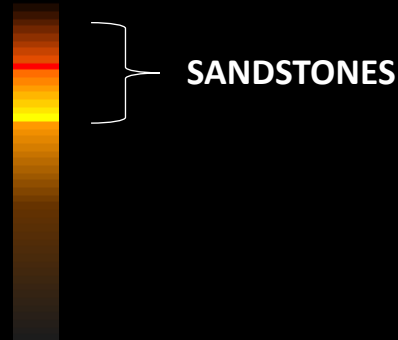
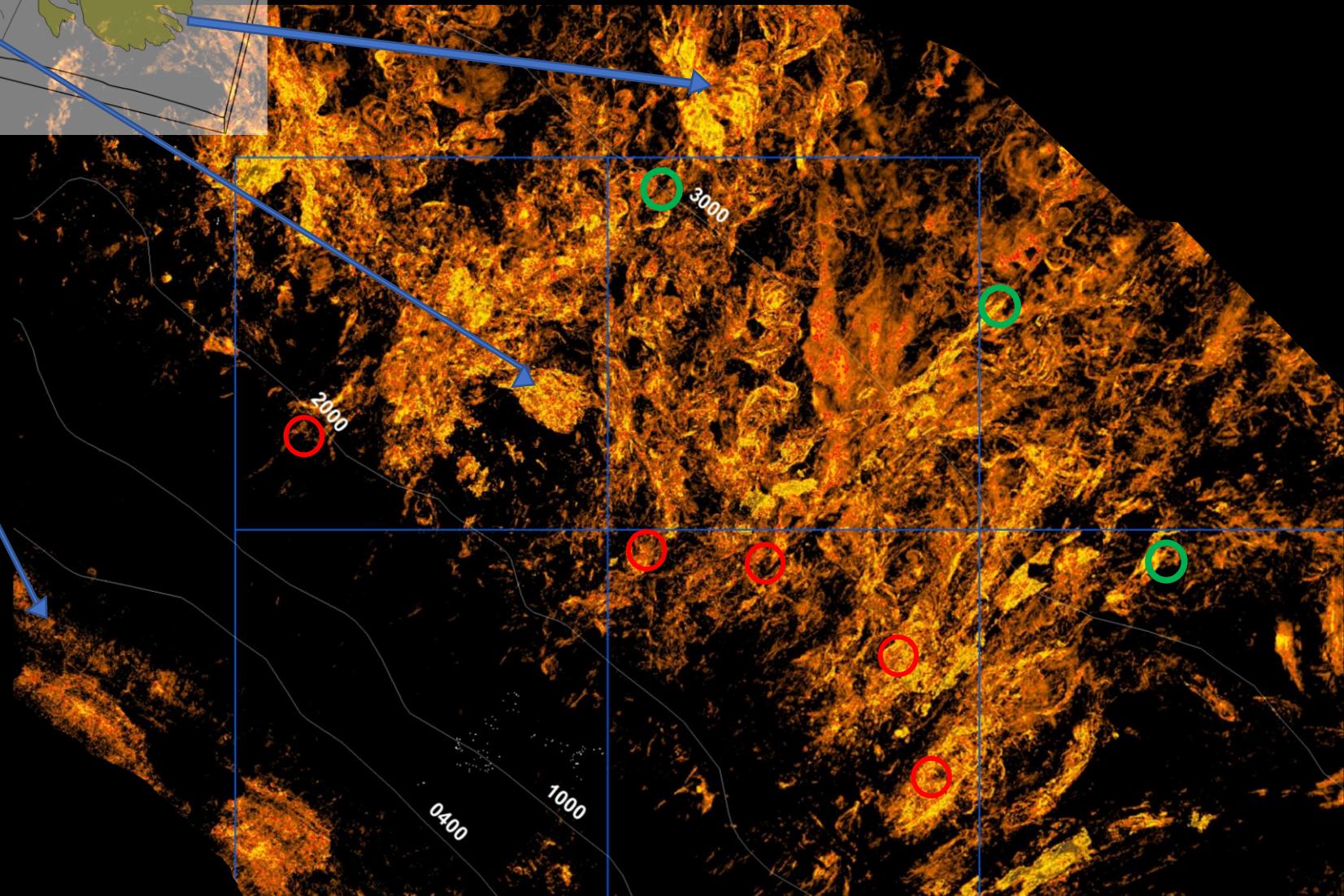
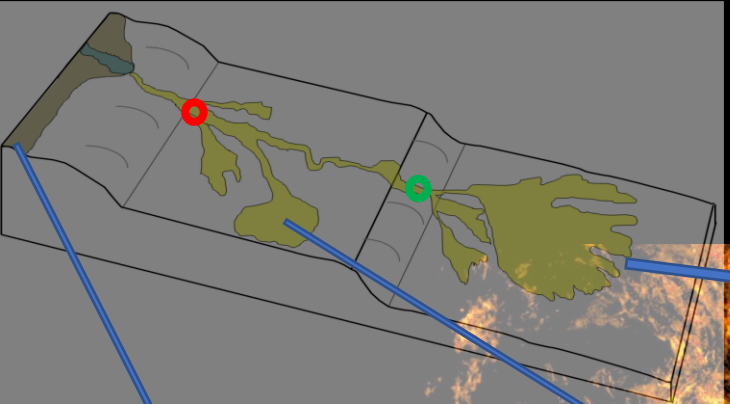
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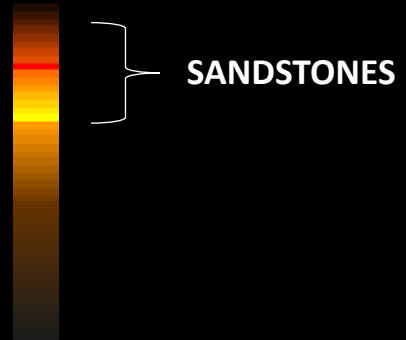
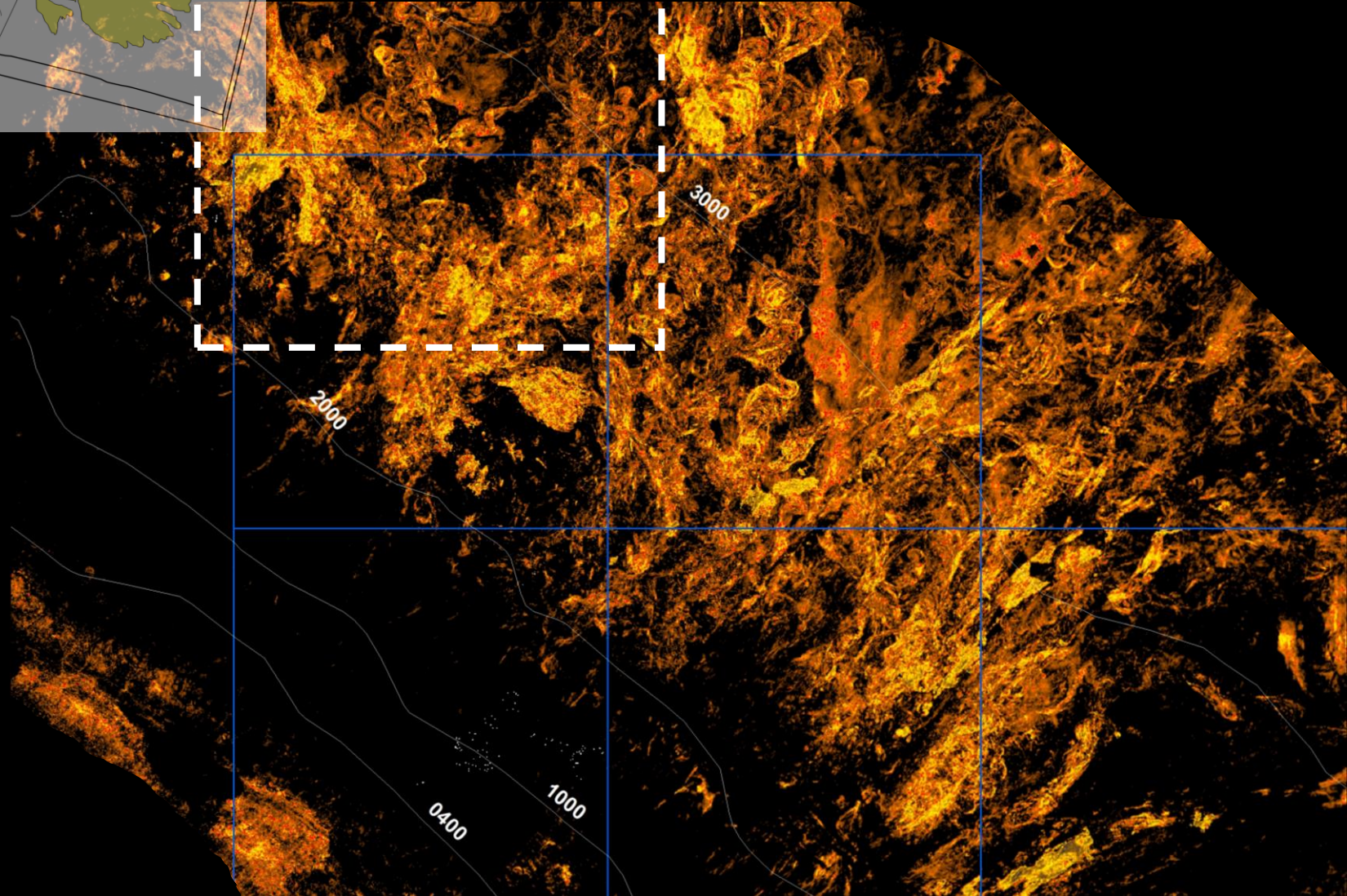
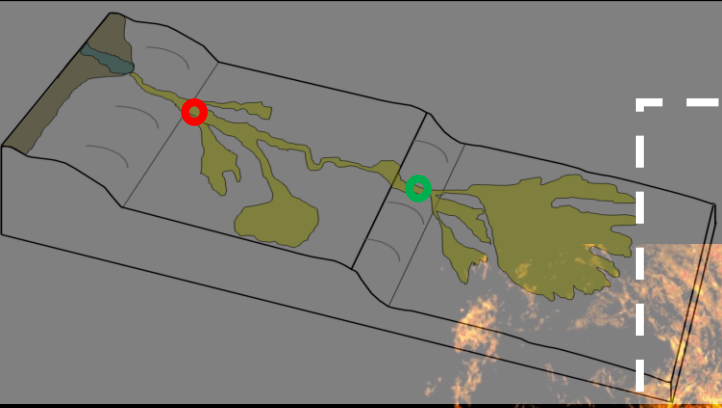
 MAIN RESERVOIR INTERVAL

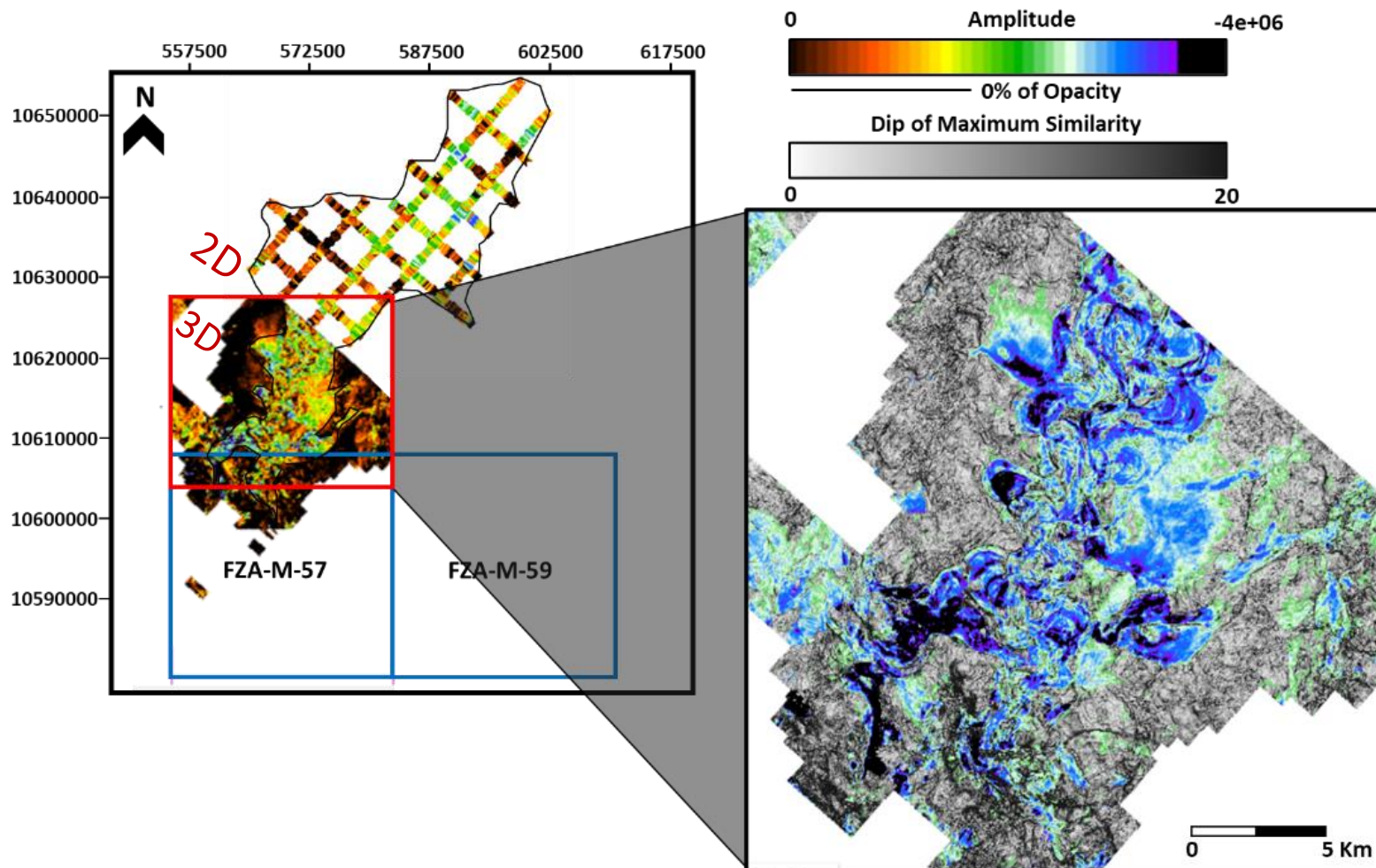


(ALBIAN ↔ MAASTR. INTERVAL)
MARINE TURBIDITES (VAT MIN ATTRIBUTE)
MAIN RESERVOIR INTERVAL

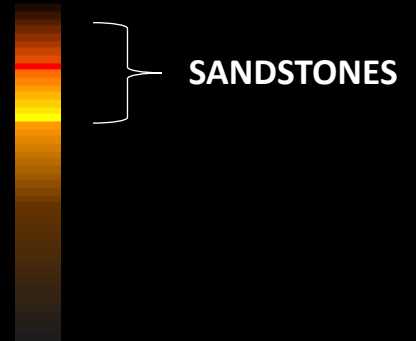
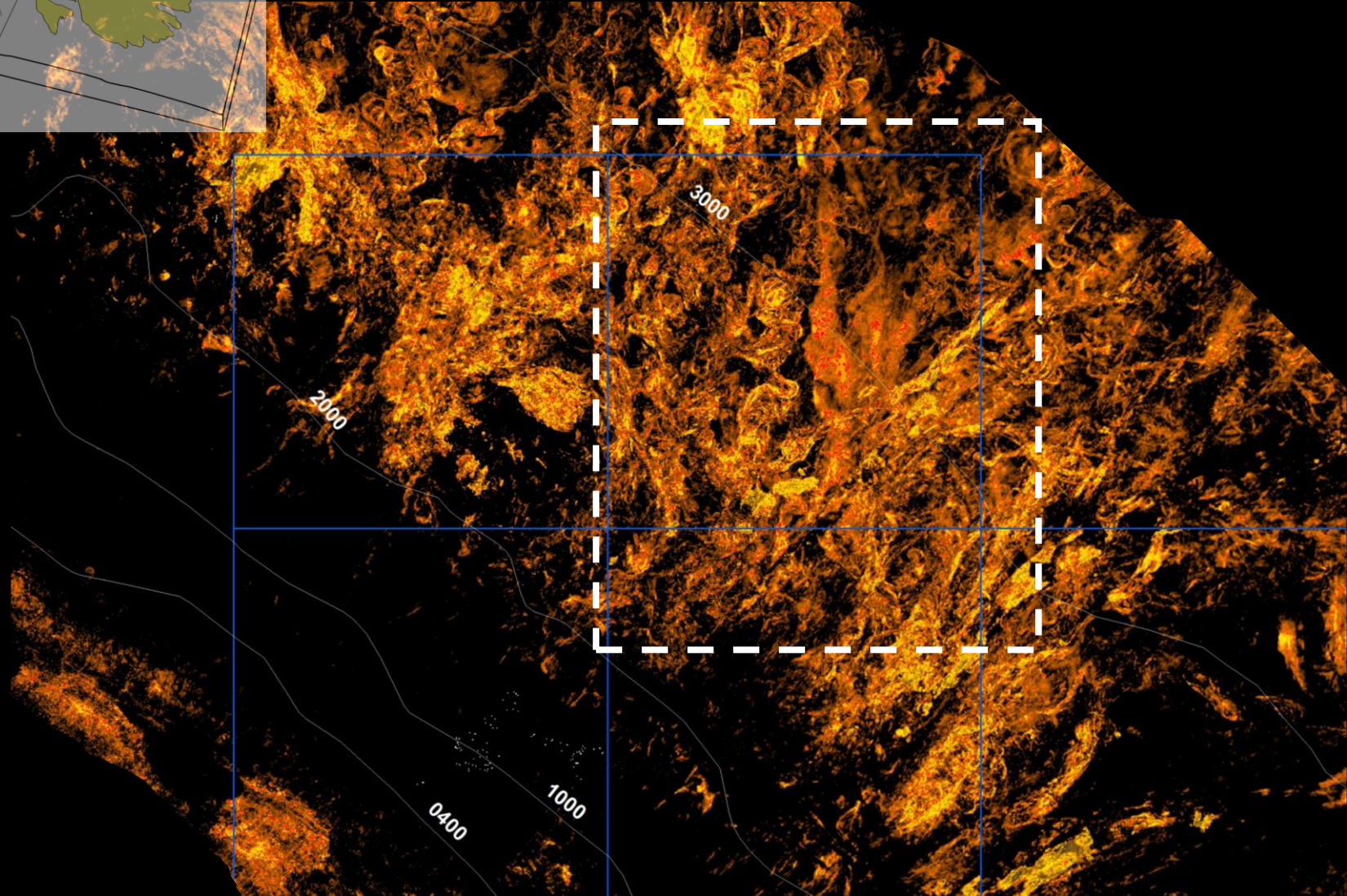
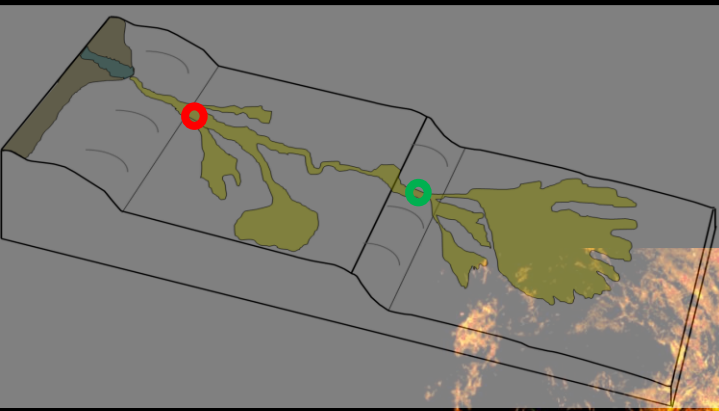


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MARINE TURBIDITES (VAT MIN ATTRIBUTE)
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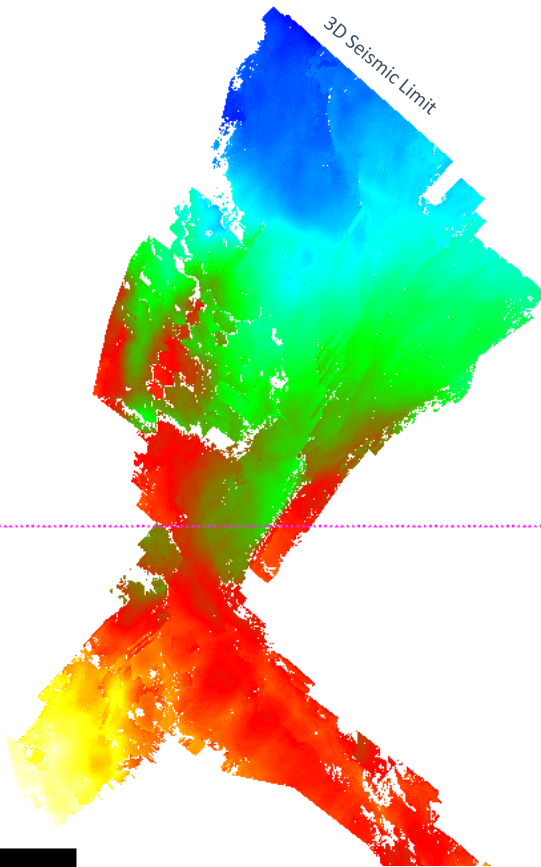
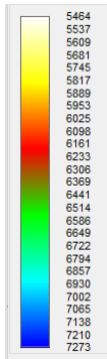




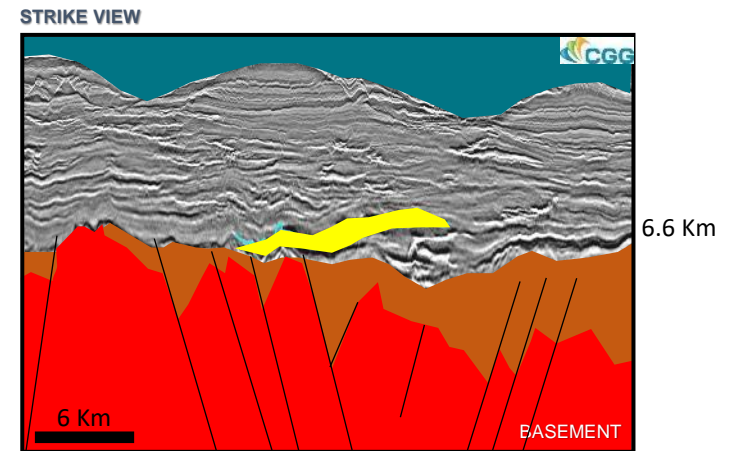
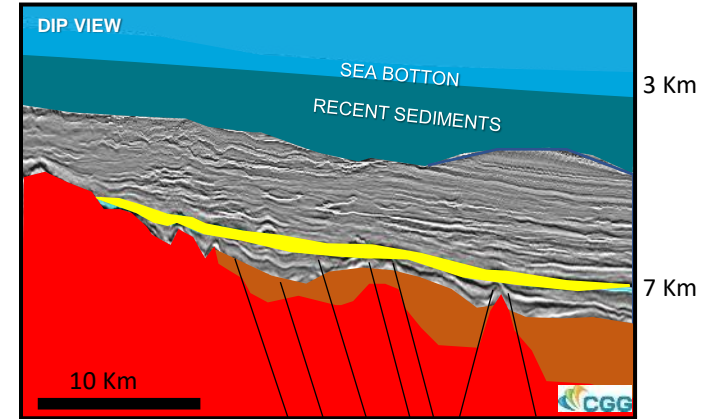
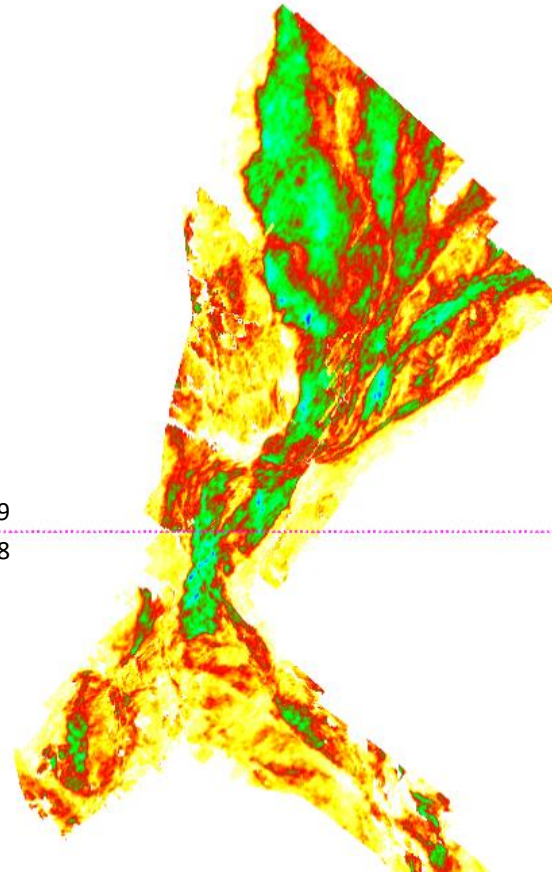
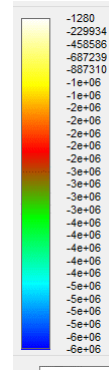
(ALBIAN ↔ MAASTR. INTERVAL)
MARINE TURBIDITES (VAT MIN ATTRIBUTE)
MAIN RESERVOIR INTERVAL

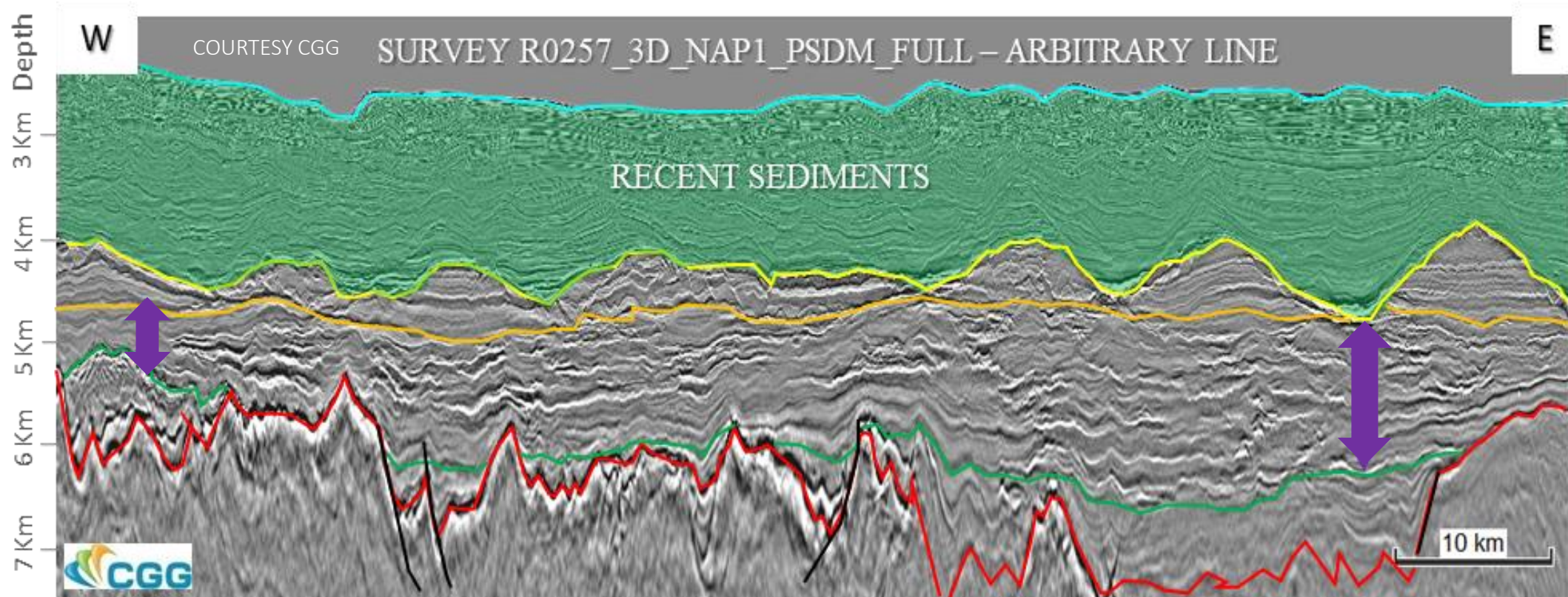


Depth (m)

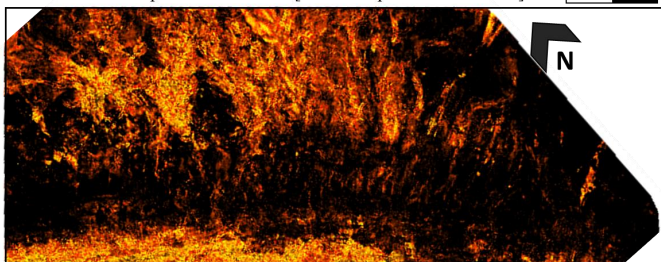


Amplitude Map





Amplitude Extraction [Albian Top ↔ Maastrichtian]

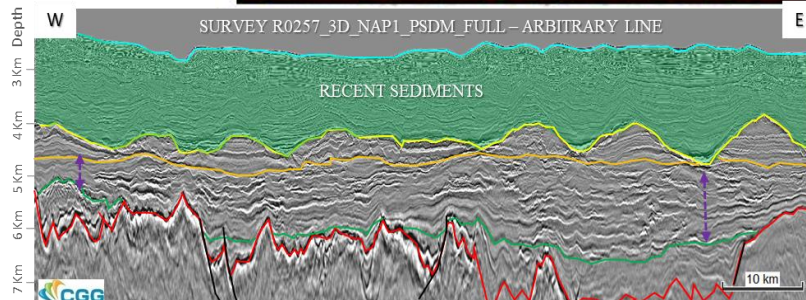
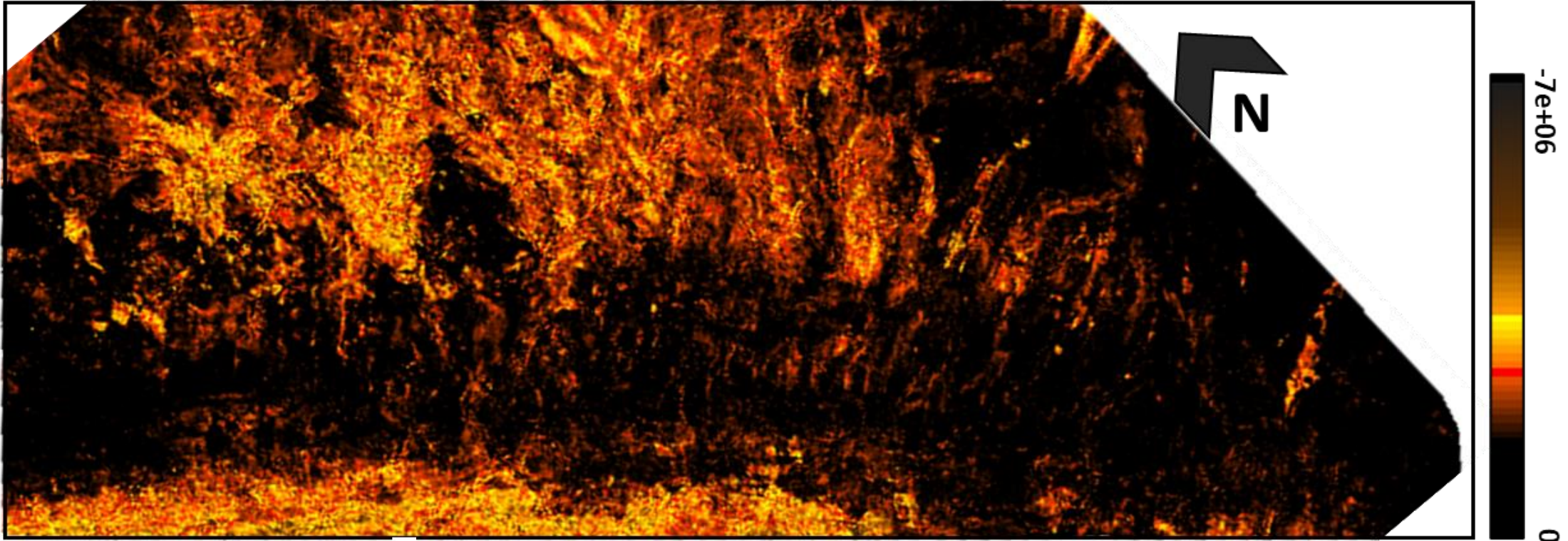


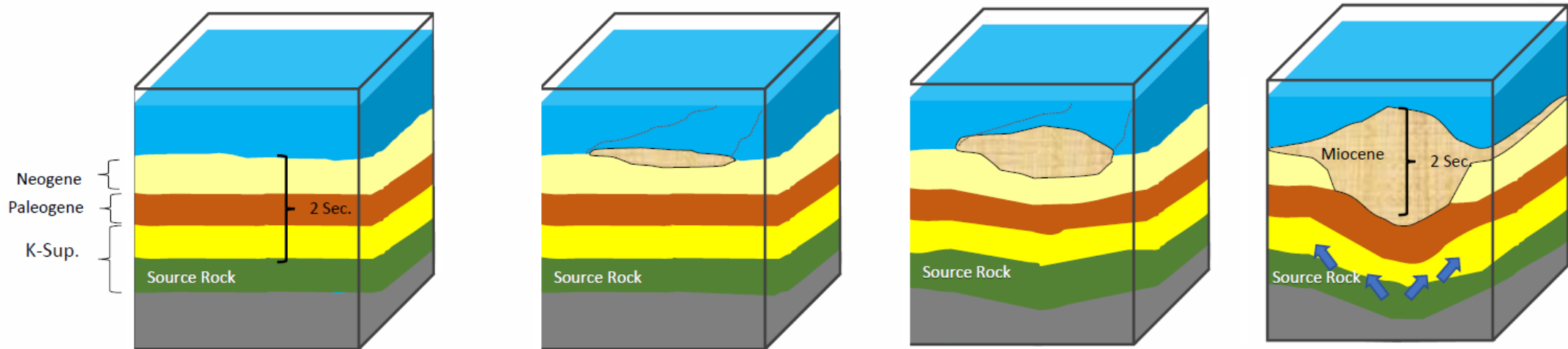
↕ MAIN RESERVOIR INTERVAL ↕

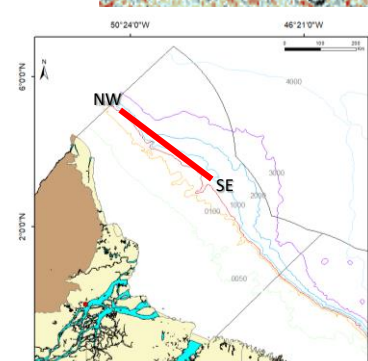
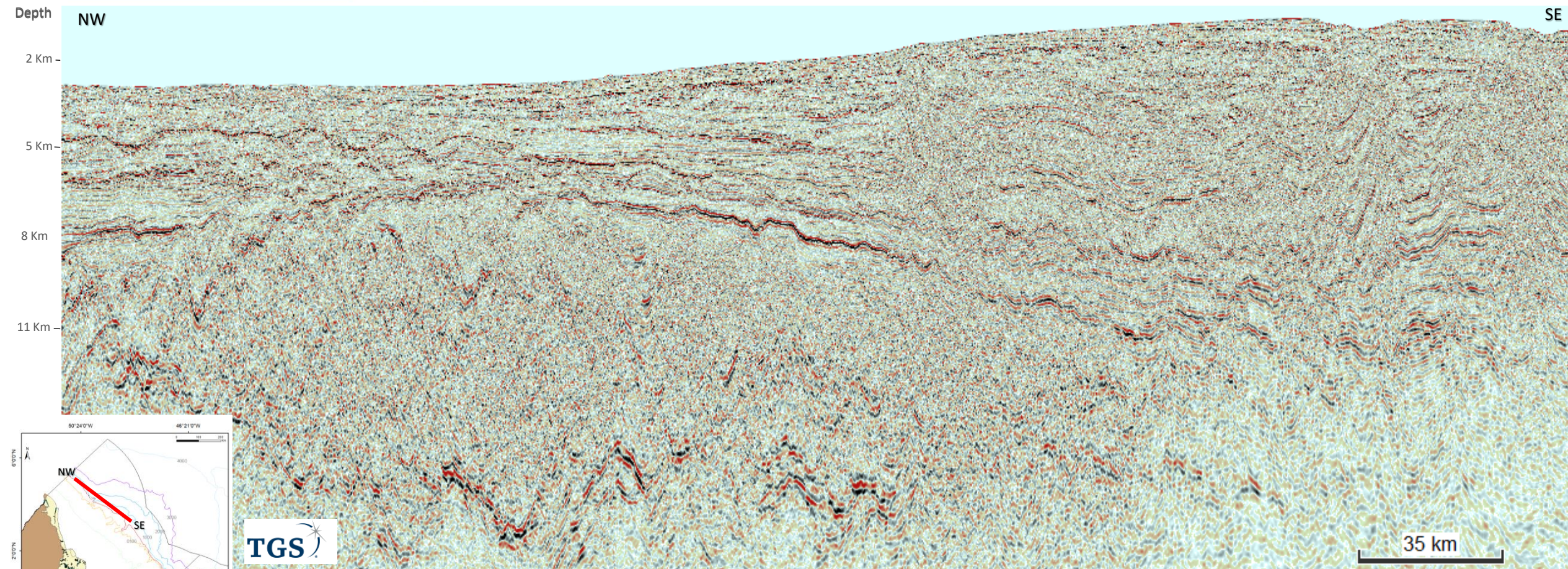
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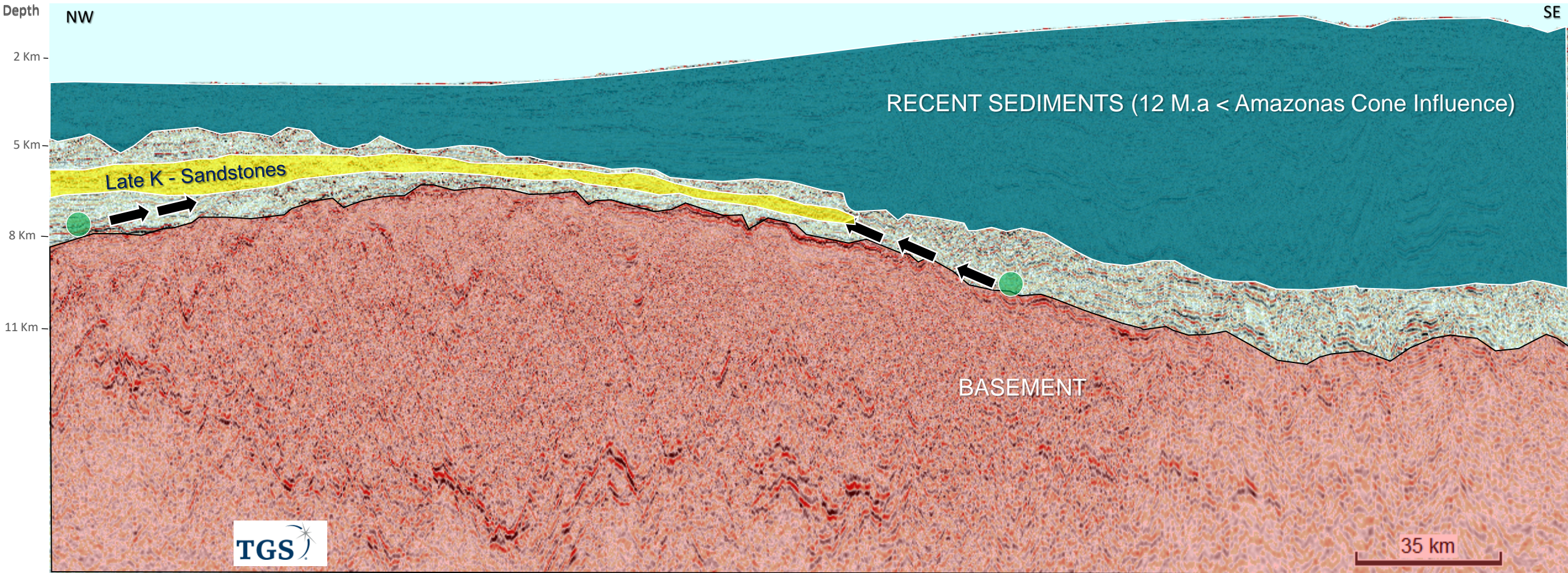
FZA – Study Area

Amplitude Extraction [Albian Top ↔ Maastrichtian]









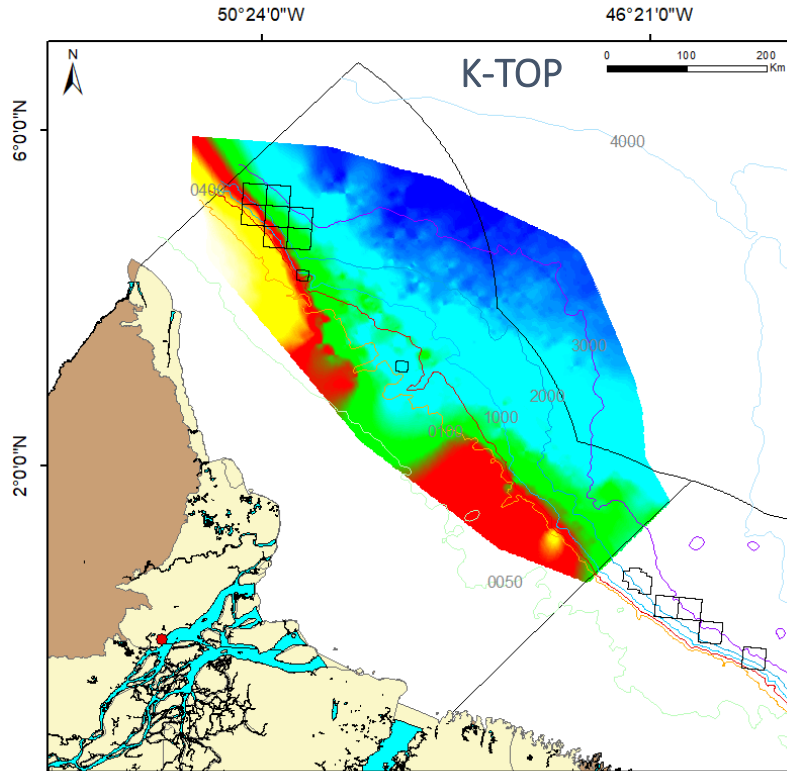
COURTESY TGS - R0257_2D_FOZ (LINE 2050)



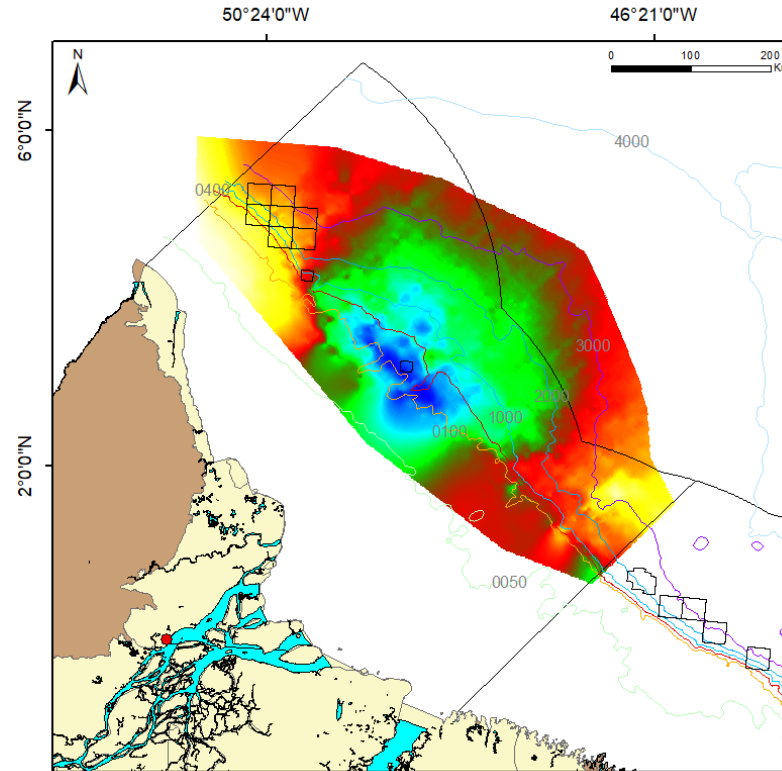
MAIN RESERVOIR INTERVAL



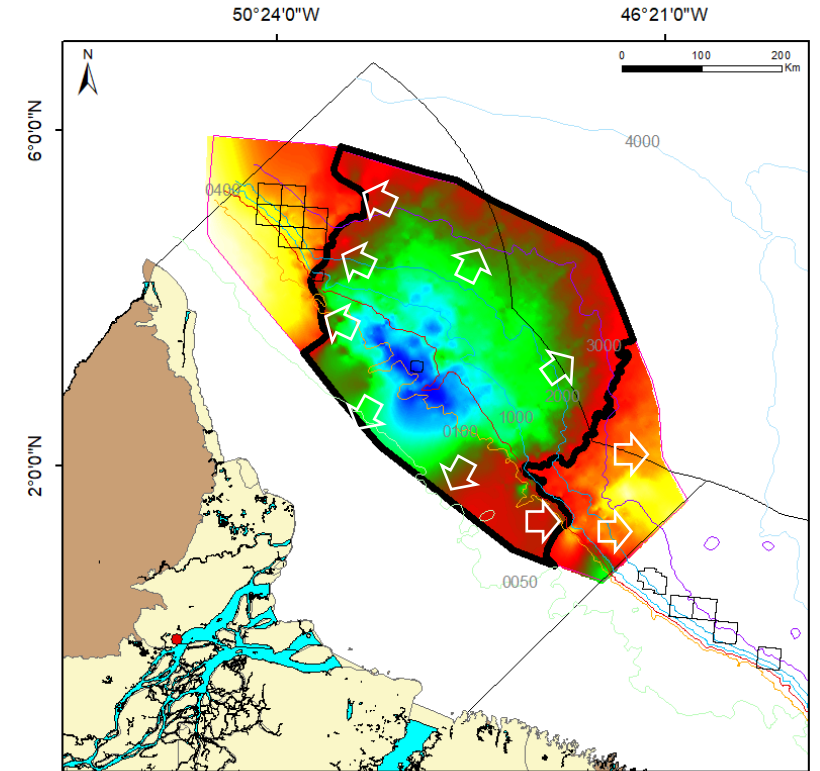
MAIN SOURCE ROCK



K-TOP STRUCTURAL MAP



RECENT SEDIMENTS THICKNESS MAP

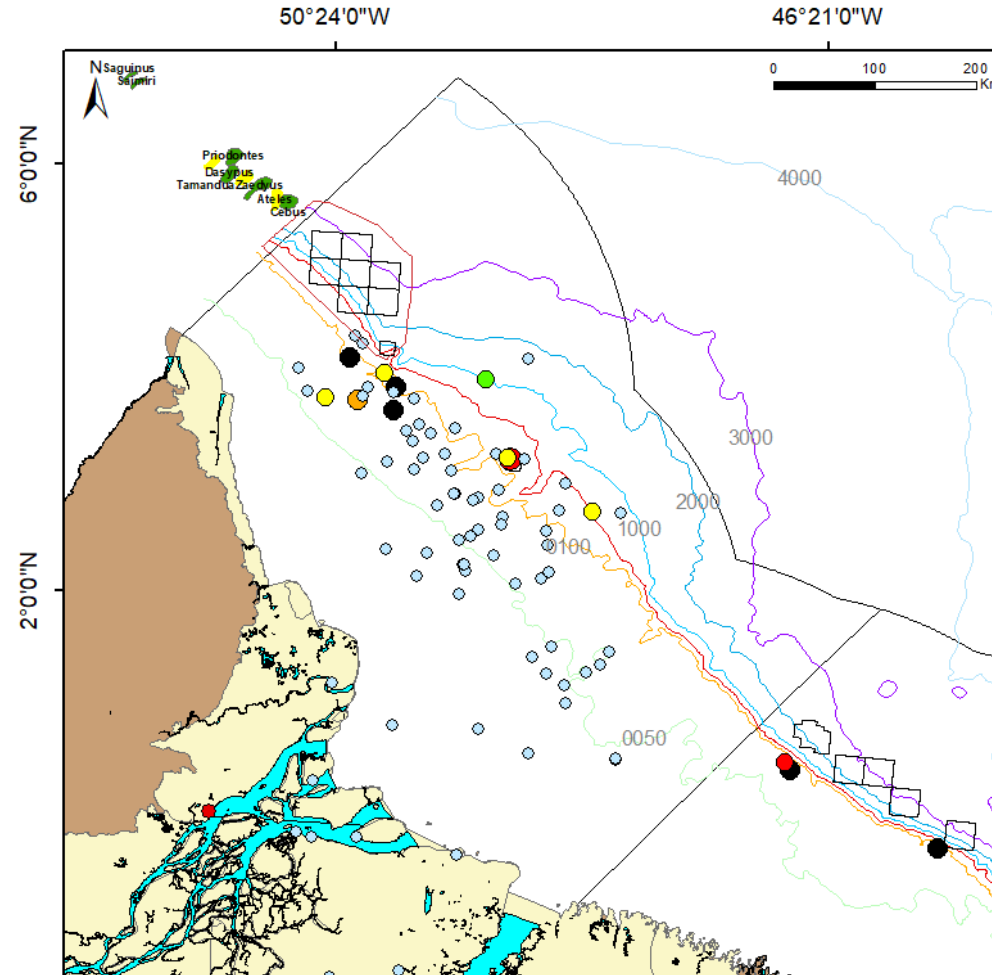


INT. KITCHEN and MIGRATION PATH

STUDY AREA

MAIN EXPLORATORY PLAY

*Deep/Ultra-Deep Water Late Cretaceous
Sandstone Turbidites*



OLD WELLS DRILLED IN SHALLOW WATER
AND/OR RECENT SEDIMENTS

- "DISCOVERY"
- NON COMERCIAL PRODUCER (GAS)
- NON COMERCIAL PRODUCER (OIL)
- NON COMERCIAL PRODUCER (OIL & GAS)
- DRY WITH SIGNS OF OIL & GAS



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Exploration for Late Cretaceous sandstone turbidites in the South American Equatorial and African Northwestern margins was responsible for the most important discoveries of hydrocarbons in the last decade, mainly in Guyana. However, the analog play was never drilled in deep waters in Brazil's northwestern portion of the Foz do Amazonas basin.

In the study area, 3D seismic attribute extraction shows clastic system variations, probably with sandstone turbidites distributed in several stratigraphic levels of the Late Cretaceous with different channel and fan geometries. These potential reservoirs are very similar to those observed in recent analog discoveries. The 2D data indicate that these reservoirs follow the dip and are preserved in ultra-deep waters. Traps and seals are probably maintained, as the erosive unconformity associated with the base of the Amazon Fan does not reach the reservoirs in this region.

The source rock of all these basins is characterized by world-class Cenomanian-Turonian source rock. It is present in the study area with an adequate depth and thickness, therefore interpreted as a low exploratory risk but never drilled. In addition, we did not observe relevant geological hazards in synchronism.

BRAZILIAN PERMANENT OFFER OF BLOCKS – TOTAL NUMBERS (Oct./22)

- ◆ There are 1,068 blocks on offer in Concession Contracts (522 onshore and 546 offshore => **83 on the Equatorial Margin**)
- ◆ There are 11 blocks on offer in Production Share Regime (4 in Campos Basin and 7 in Santos Basin)
- ◆ There are 1,018 blocks on study => **289 on the Equatorial Margin**

<https://www.gov.br/anp/pt-br/rodadas-anp/oferta-permanente/opc/blocos-exploratorios>

RESOLUTION ANP N° 837/2021 – NOMINATION OF AREAS

<https://www.gov.br/anp/pt-br/rodadas-anp/mais-sobre-rodadas/nominacao-areas>

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Obrigado!

Thank you!