FIRST EAGE CONFERENCE ON
DEEPWATER
EQUATORIAL MARGIN

The Potential of the Two Main Exploratory Plays for Oil and Gas in the Deep Waters of the Brazilian Equatorial Margin: Why does it Matter?

Ronan Ávila
Deputy Superintendent of Geological and Economic Assessment (SAG) - ANP
August 17, 2023

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DEEPWATER
EQUATORIAL MARGIN
15-17 AUGUST 2023
RIO DE JANEIRO | BRAZIL

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BRAZILIAN NUMBERS & PRE-SALT

WHY DOES IT MATTER?

1

BRAZILIAN EQUATORIAL MARGIN

GEOLOGICAL POTENTIAL

2

3

FINAL HIGHLIGHTS

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Percentage of Fossils in the Brazilian Energy Mix

% OF FOSSIL IN THE **ENERGY** MIX

EPE 2022; Resenha Energética Brasileira 2022, ano base 2021, pg. 24,
https://www.gov.br/mme/pt-br/assuntos/secretarias/spe/publicacoes/resenha-energetica-brasileira/resenhas/resenha-energetica-2022.pdf/view

"World Fossil fuels accounted for 82% of primary energy use last year, down from 83% in 2019 and 85% five years ago."

BP 2023; Statistical Review of World Energy, Energy developments 2021,
Statistical Review of World Energy | Energy economics | Home (bp.com)

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Percentage of Fossils in the Brazilian Eletric Mix

% OF FOSSIL IN THE **ELETRIC**[*1] MIX

[*1] The electrical is part of the energy mix

BRAZIL	OCDE	WORLD
19,7 %	52,7%	62,7%

EPE 2022; Resenha Energética Brasileira 2022, ano base 2021, pg. 25,
https://www.gov.br/mme/pt-br/assuntos/secretarias/spe/publicacoes/resenha-energetica-brasileira/resenhas/resenha-energetica-2022.pdf/view

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Percentage of Bioenergy's in Transport

% OF BIOENERGIES IN TRANSPORT

EPE 2022; Resenha Energética Brasileira 2022, ano base 2021, pg. 30,
https://www.gov.br/mme/pt-br/assuntos/secretarias/spe/publicacoes/resenha-energetica-brasileira/resenhas/resenha-energetica-2022.pdf/view

Brazilian Production Overview

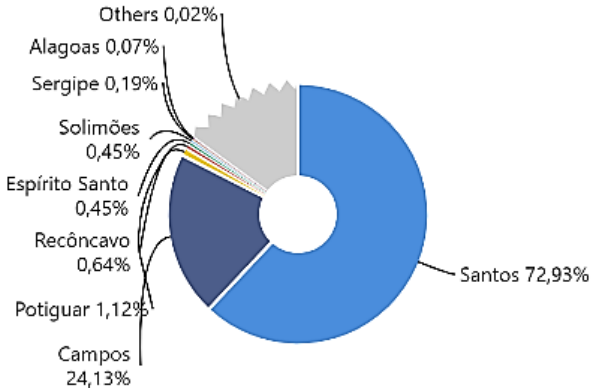
Petróleo Equivalente (boe/d)	Petróleo Equivalente Variação Mês (%)	Petróleo Equivalente Variação Ano (%)
4.324.244,07	5,22% ▲	18,00% ▲

Petróleo (bbl/d)	Petróleo Variação Mês (%)	Petróleo Variação Ano (%)	Gás Natural (mil m3/d)	Gás Natural Variação Mês (%)	Gás Natural Variação Ano (%)
3.366.570,90	5,16% ▲	19,02% ▲	152.257,89	5,43% ▲	14,56% ▲

Produção Pré-sal

Petróleo Equivalente (boe/d)	Petróleo Equivalente Variação Mês (%)	Petróleo Equivalente Variação Ano (%)
3.243.465,30	1,47% ▲	17,54% ▲

Petróleo (bbl/d)	Petróleo Variação Mês (%)	Petróleo Variação Ano (%)	Gás Natural (mil m3/d)	Gás Natural Variação Mês (%)	Gás Natural Variação Ano (%)
2.552.822,22	1,71% ▲	16,62% ▲	109.803,49	0,59% ▲	21,05% ▲



Equivalent Oil (bbl/d)

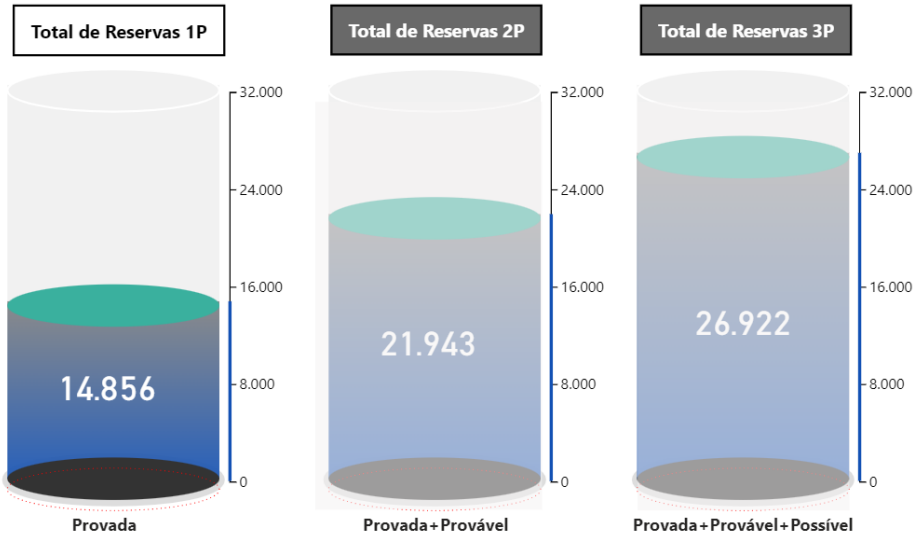
ANP 2023; Painéis Dinâmicos, Investimentos na Fase de Produção

https://app.powerbi.com/view?r=eyJrIjoiNzVmNzI1MzQtNTY1NC00ZGVhLTk5N2ItNzBkMDNhY2IxZTIxIiwidCI6IjQ0OTlmNGZmLTI0YTYtNGI0Mi1iN2VmLTEyNGFmY2FkYzkxMyJ9

Oil Reserves

Petróleo | Gás Natural

Volume Total de Reservas de Petróleo (milhões bbl)



PRÉ-SAL

11.478

MAR

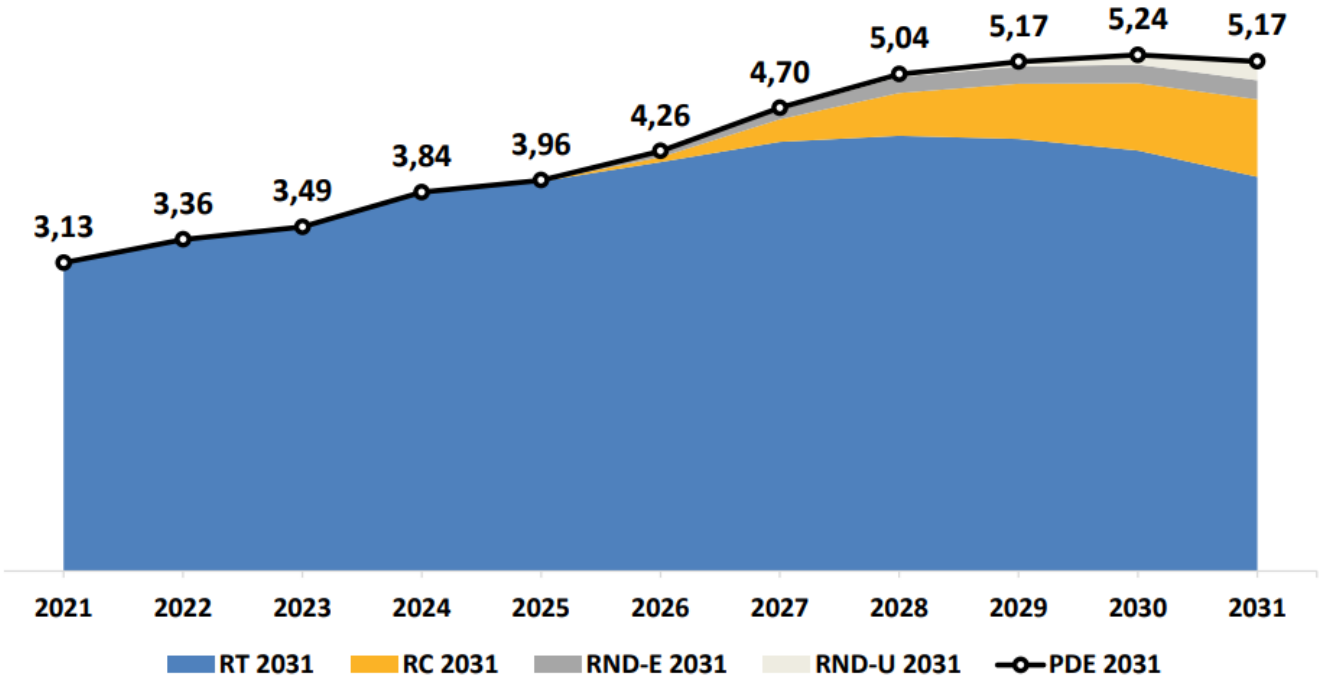
14.396

TERRA

460

ANP 2023; Painéis Dinâmicos,

Oil Production Forecast by Resource Category



Source: EPE PDE 2031

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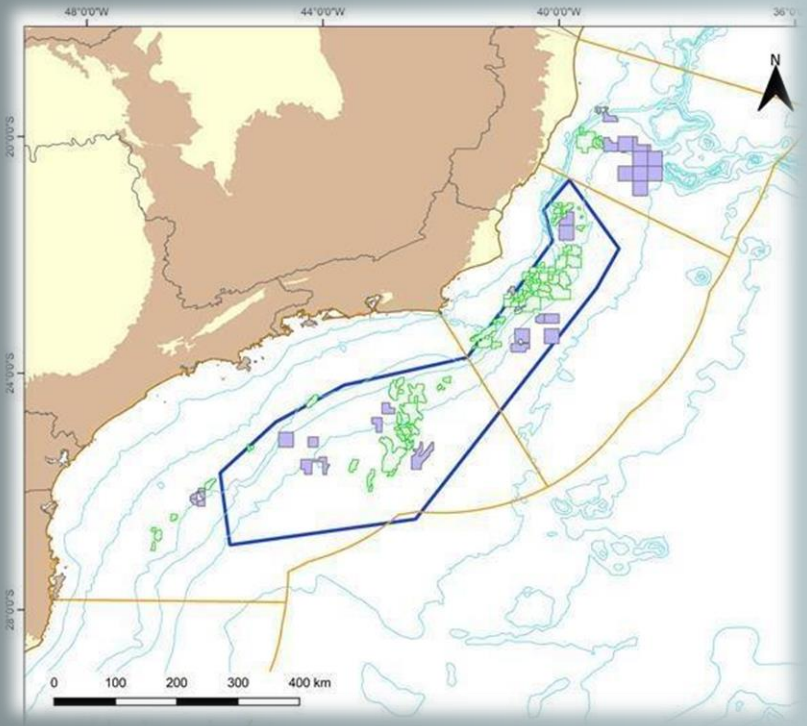
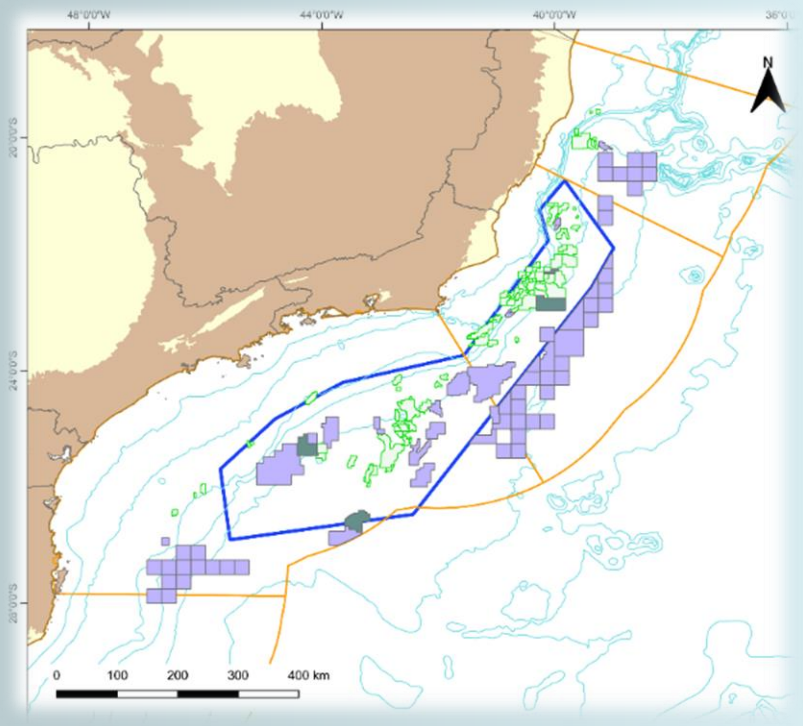
Contracts – Santos and Campos Basin

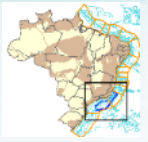


2016



2023

Block Block - OPP Field Pre-Salt Polygon



IN THE PRE-SALT PLAY, THE PROPER DELIMITATION AND AVAILABILITY OF EXPLORATORY BLOCKS MUST CONSIDER BOTH THE CREAMING CURVE AND GEOLOGICAL HETEROGENEITY. IN THIS SCENARIO, THE NOMINATION OF AREAS IS CONSOLIDATED AS A PRIMARY TOOL, ACCORDING TO ANP RES. 837/2021

MORE THAN 75% OF OUR OIL PRODUCTION CURRENTLY COMES FROM THE PRE-SALT REGION. HOWEVER, PROJECTIONS SUGGEST THAT AFTER 2031, BRAZILIAN PRODUCTION WILL START TO DECLINE. TO REPLENISH RESERVES ON A SUFFICIENT SCALE, WE MUST EXPLORE THE BRAZILIAN EQUATORIAL MARGIN, WHICH REMAINS LARGELY UNEXPLORED IN DEEP WATERS

THE PRESENCE OF HYDROCARBON CAN ONLY BE CONFIRMED BY A WELL

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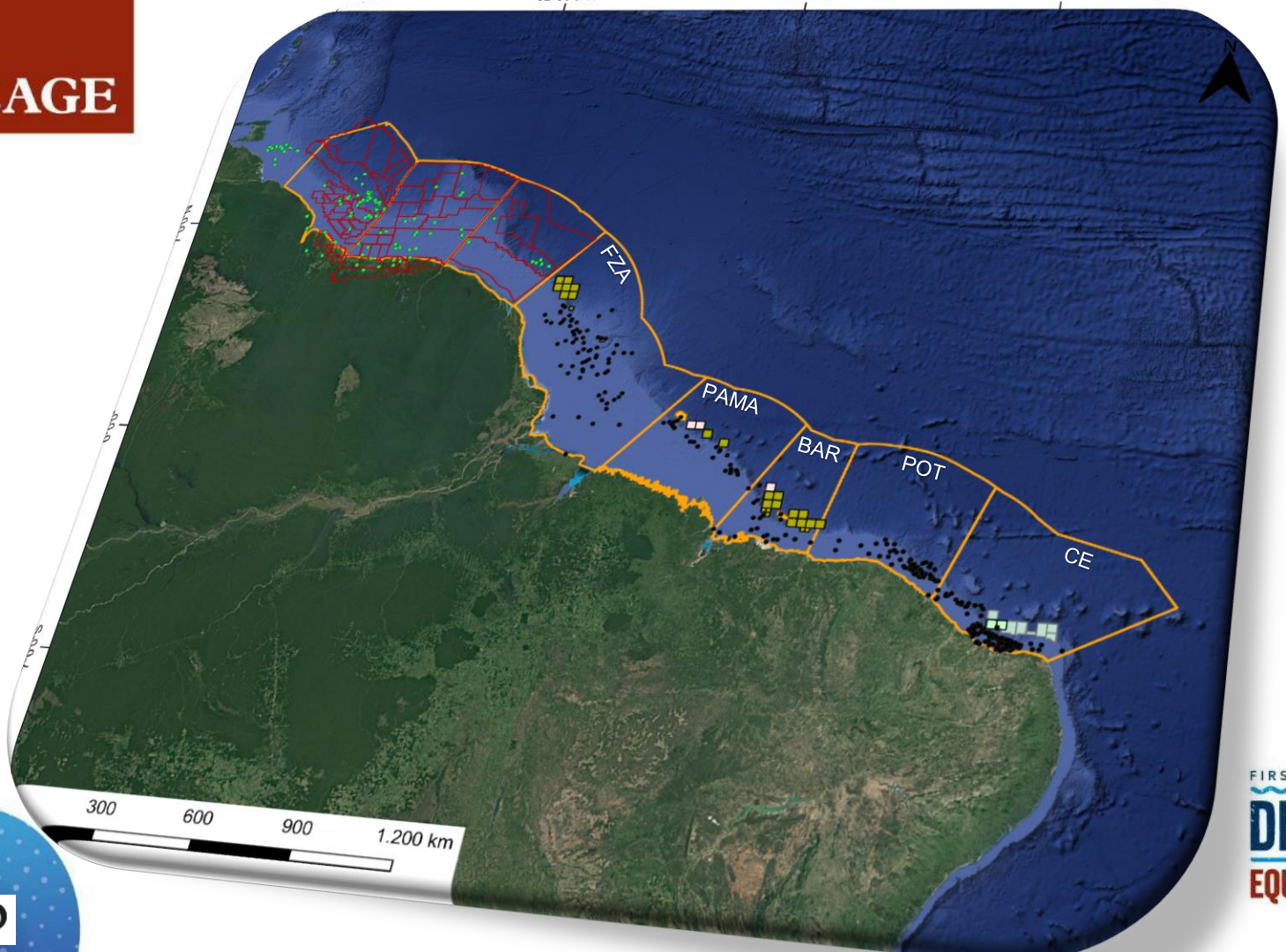

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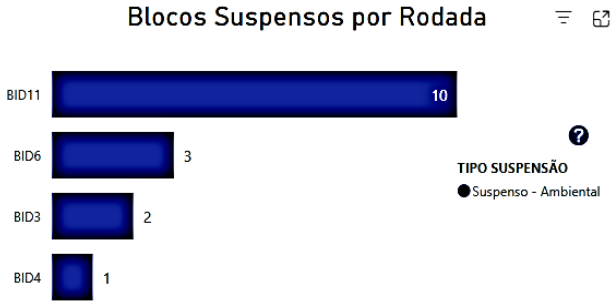
anp | Painel Dinâmico da Fase Exploração

Blocos sob Contrato - Contratos Suspensos

Atualização dos

Geral | Tabela | Ativos | Suspensos

BLOCO: Todos | BACIA: Todos | AMBIENTE: MAR | RODADA: Todos | TIPO SUSPENSÃO: Todos



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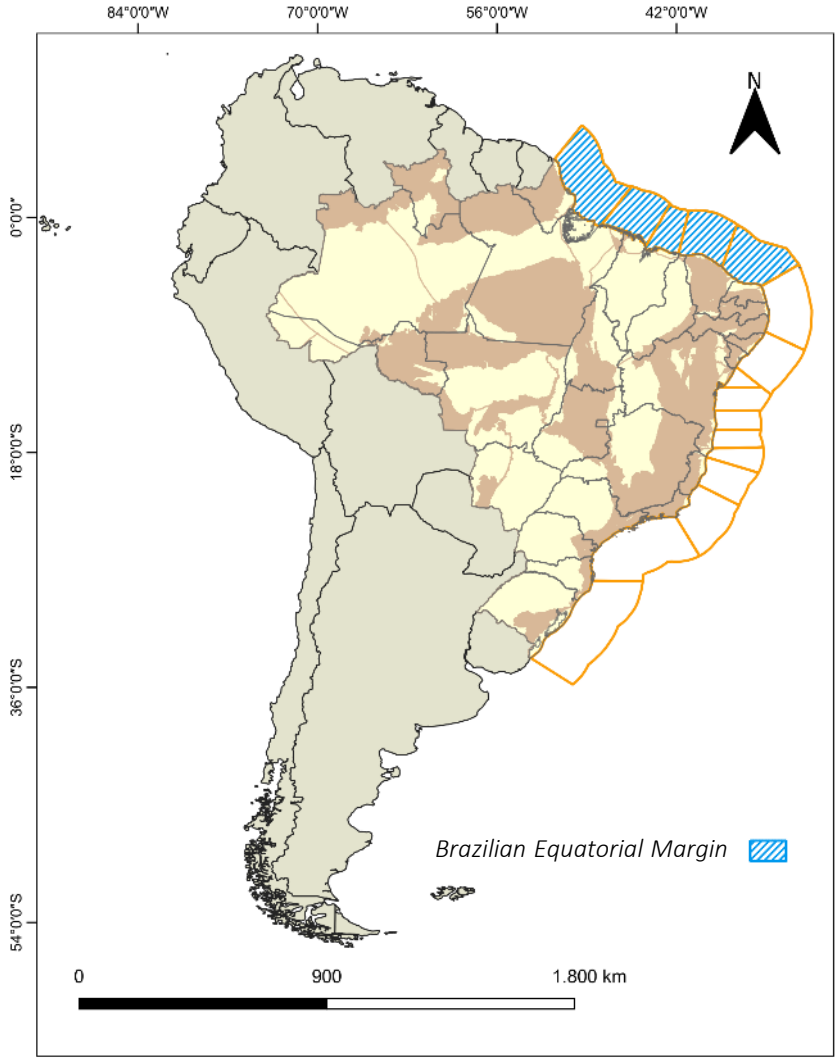

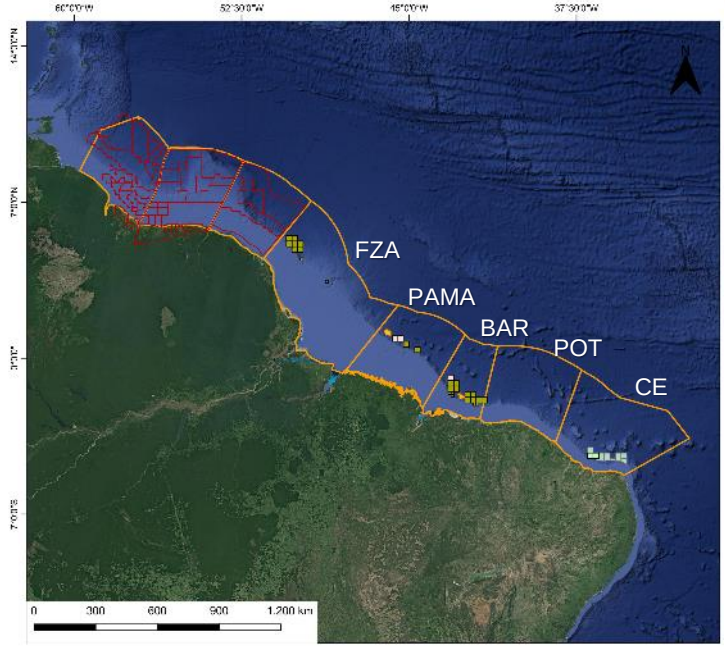

DEEPWATER
EQUATORIAL MARGIN

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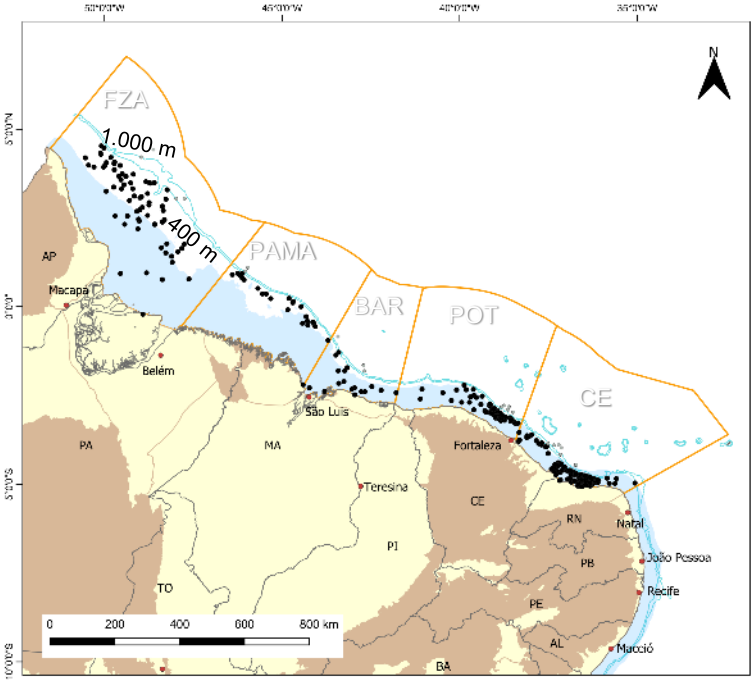
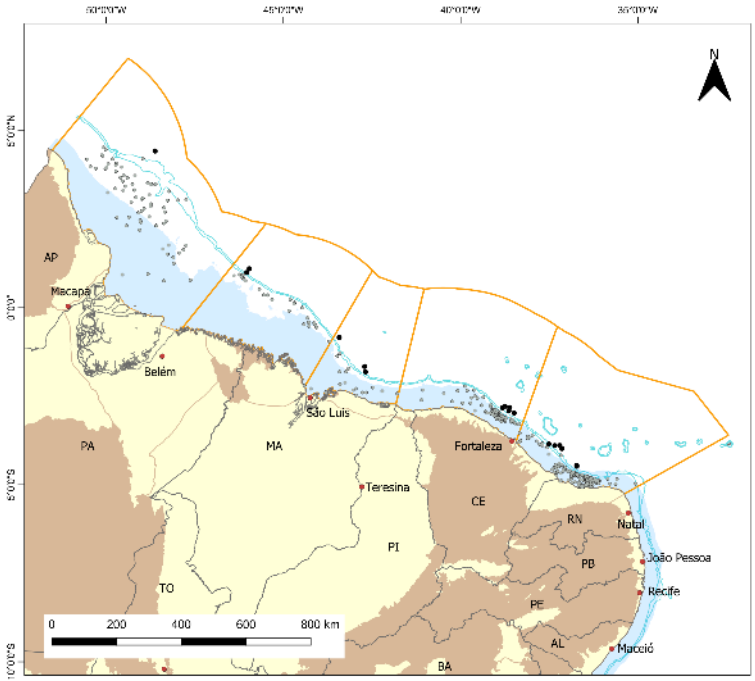
BRAZILIAN EQUATORIAL MARGIN - WELL





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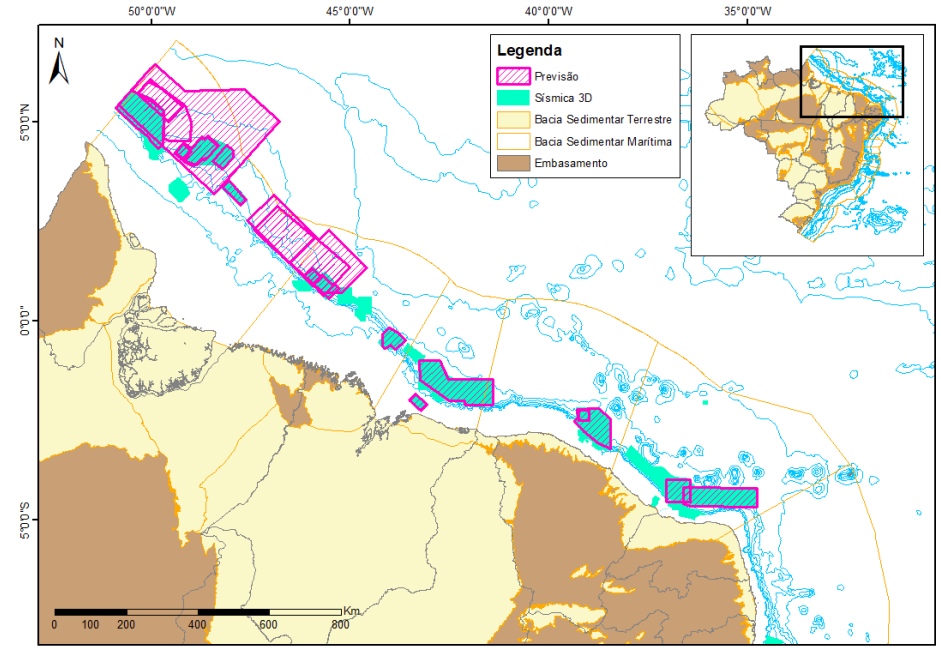
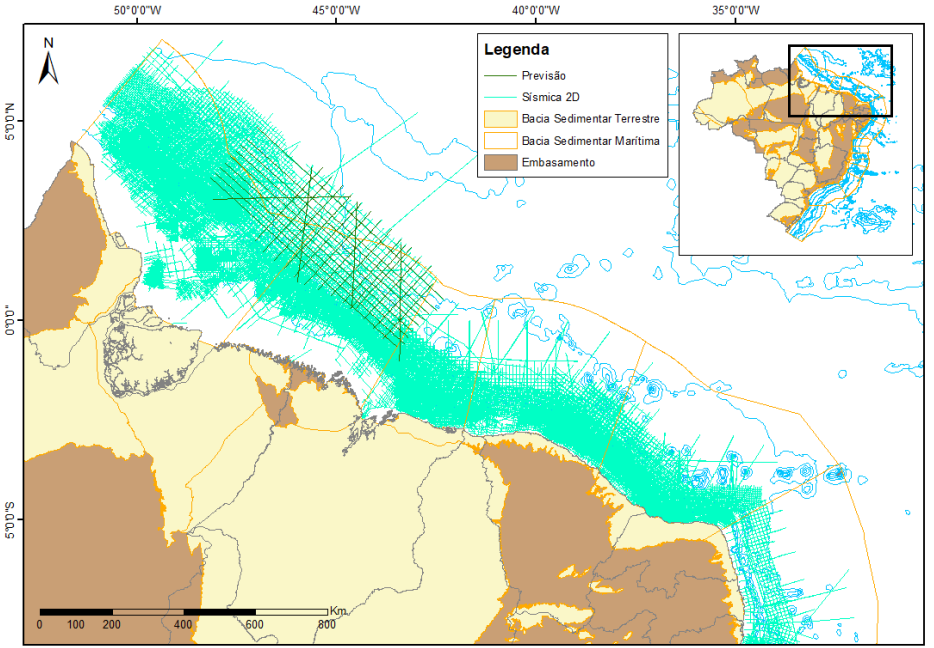
BRAZILIAN EQUATORIAL MARGIN - SEISMIC





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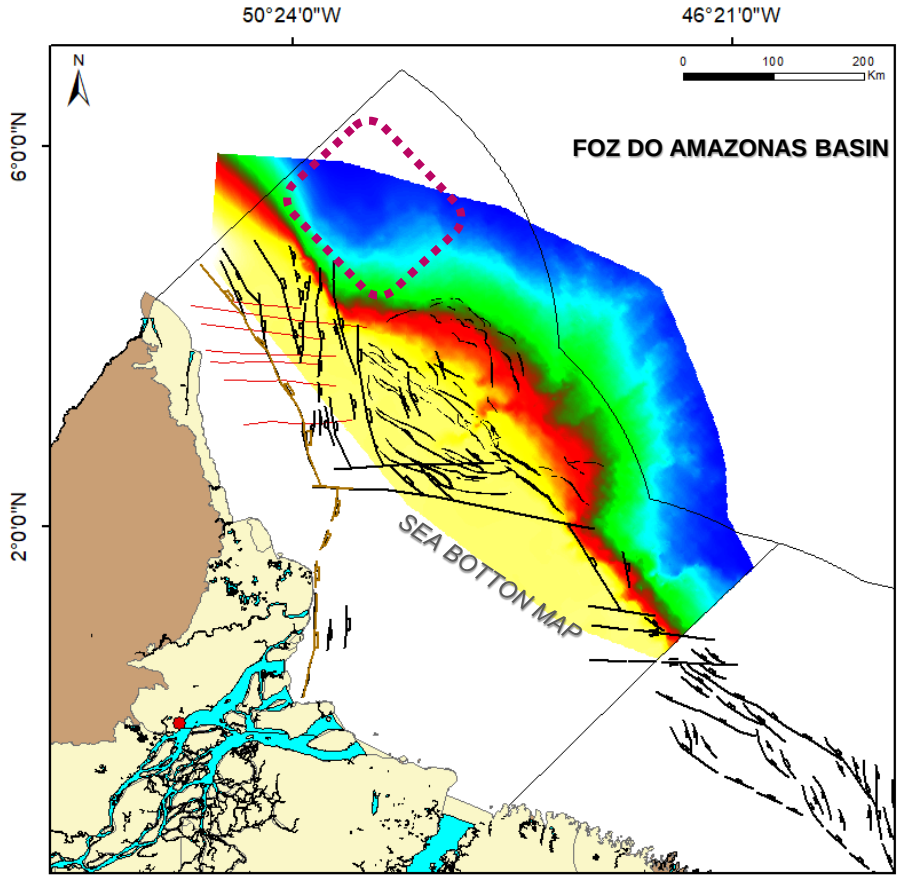
Target Area for Understanding the Potential (FZA)



TARGET AREA

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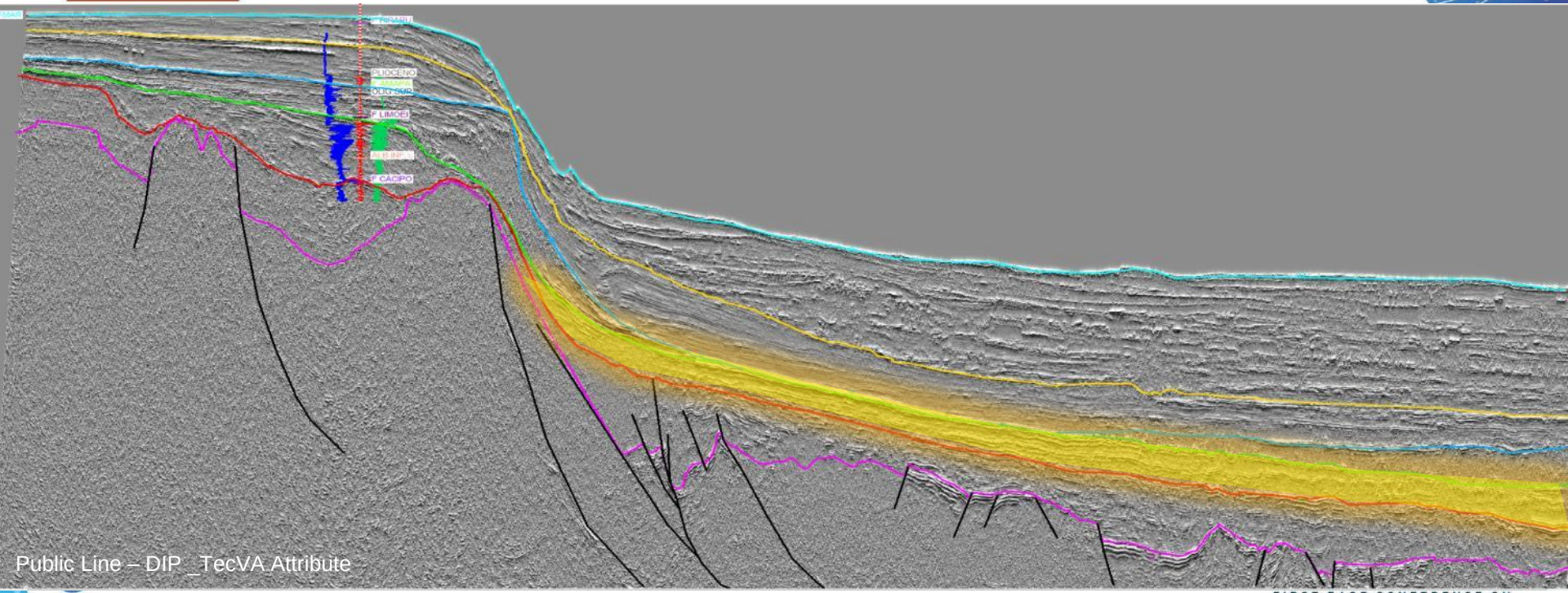
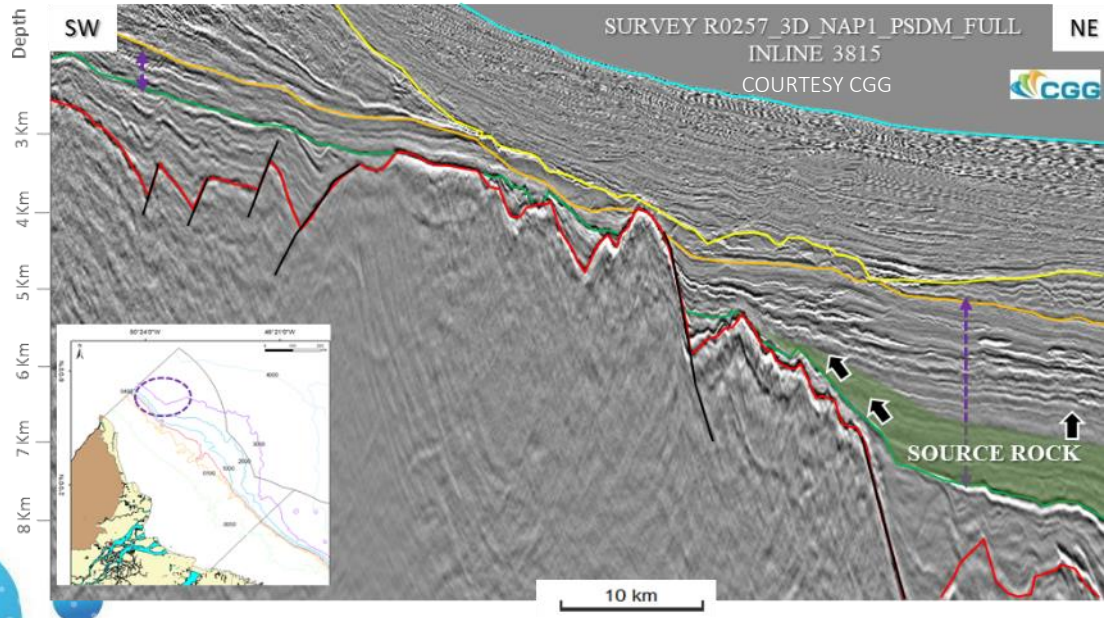
FZA – Regional View



Public Line – DIP _TecVA Attribute

FZA – Main Play

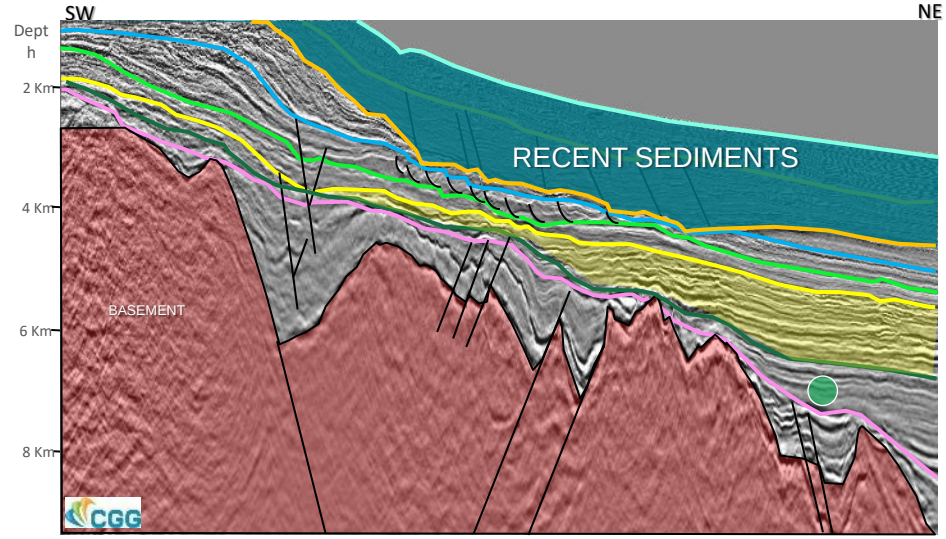


The green polygon represents the Cenomanian-Turonian source rock.

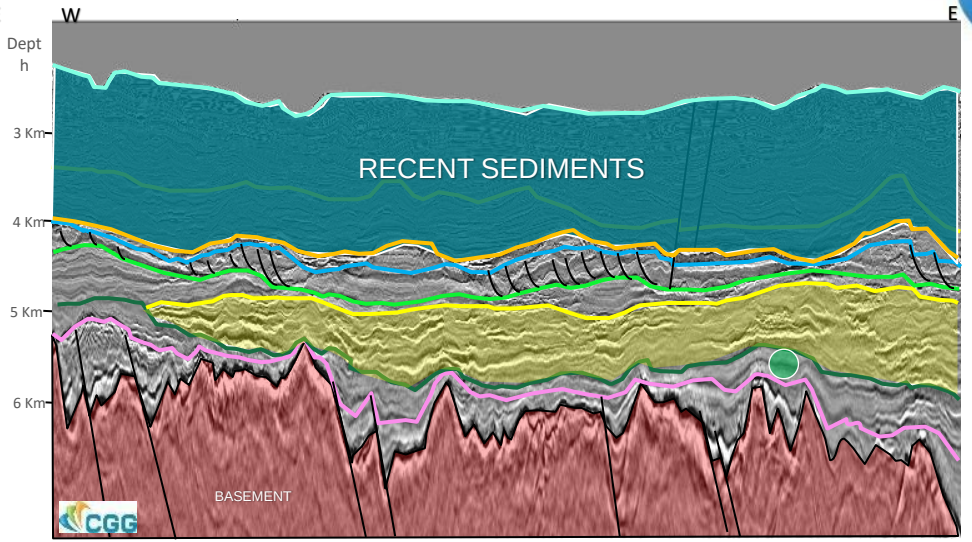
The black arrows indicate the hydrocarbon migration routes.

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

FZA – Main Play



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

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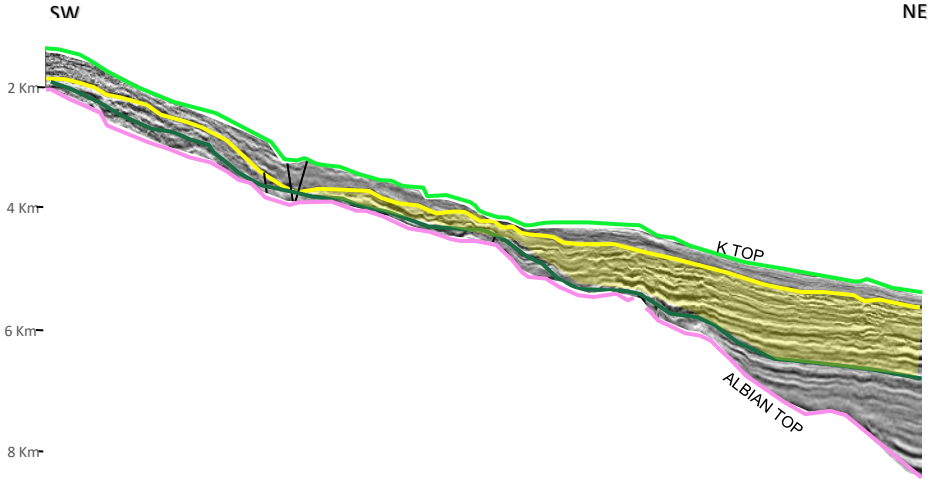
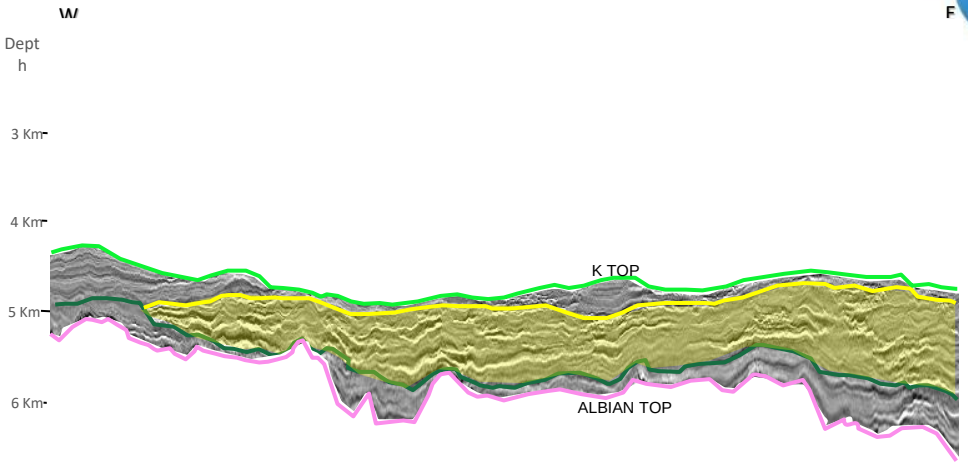
FZA – Main Play





MAIN RESERVOIR INTERVAL

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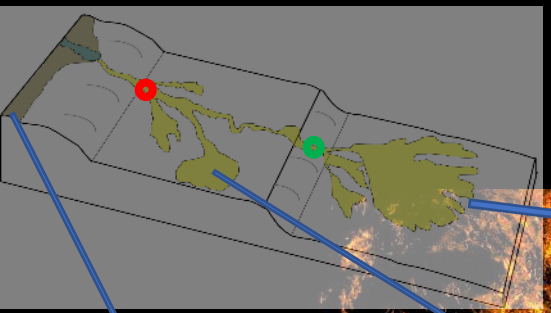
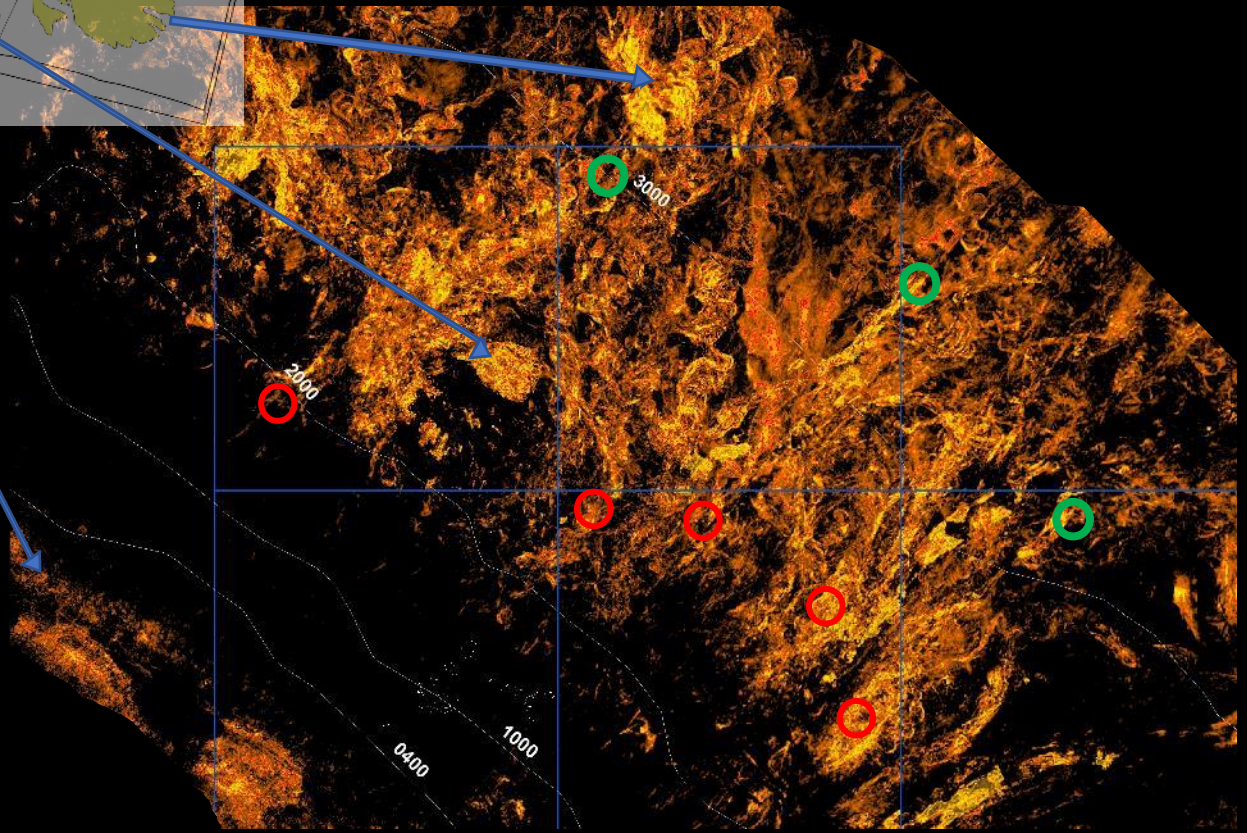
(ALBIAN ⇔ MAASTR. INTERVAL)
MARINE TURBIDITES (VAT MIN ATTRIBUTE)
MAIN RESERVOIR INTERVAL





SANDSTONES

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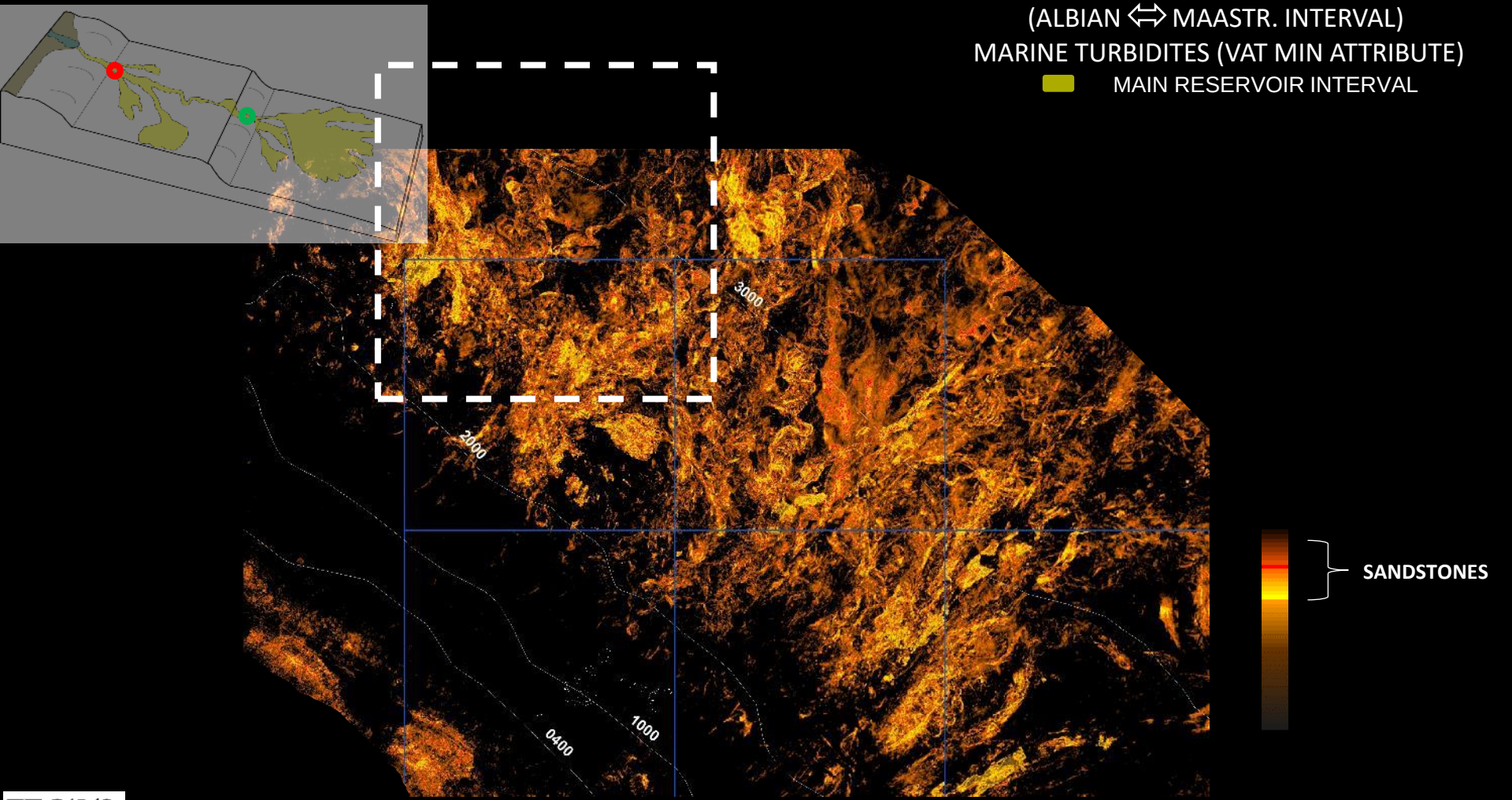
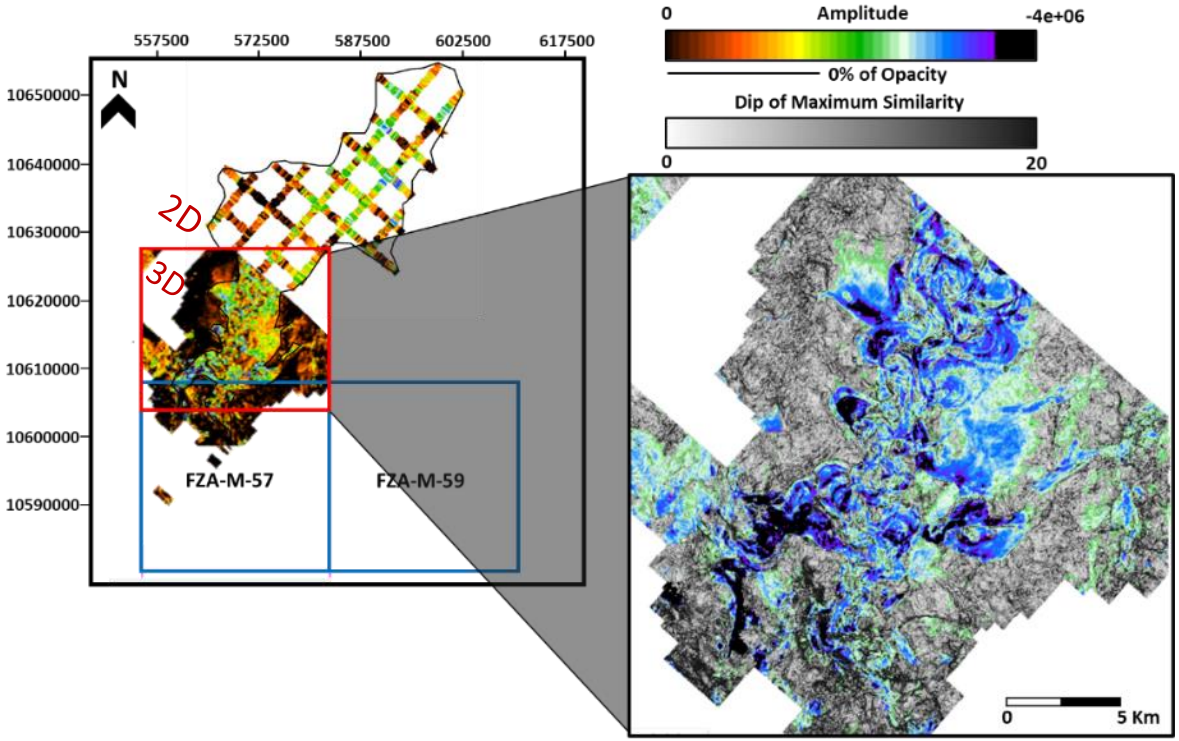
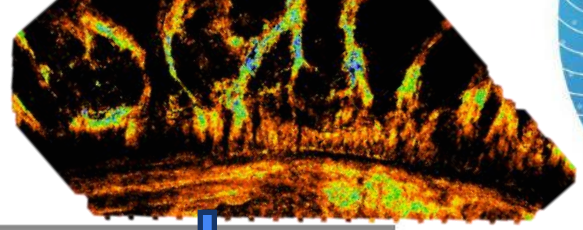
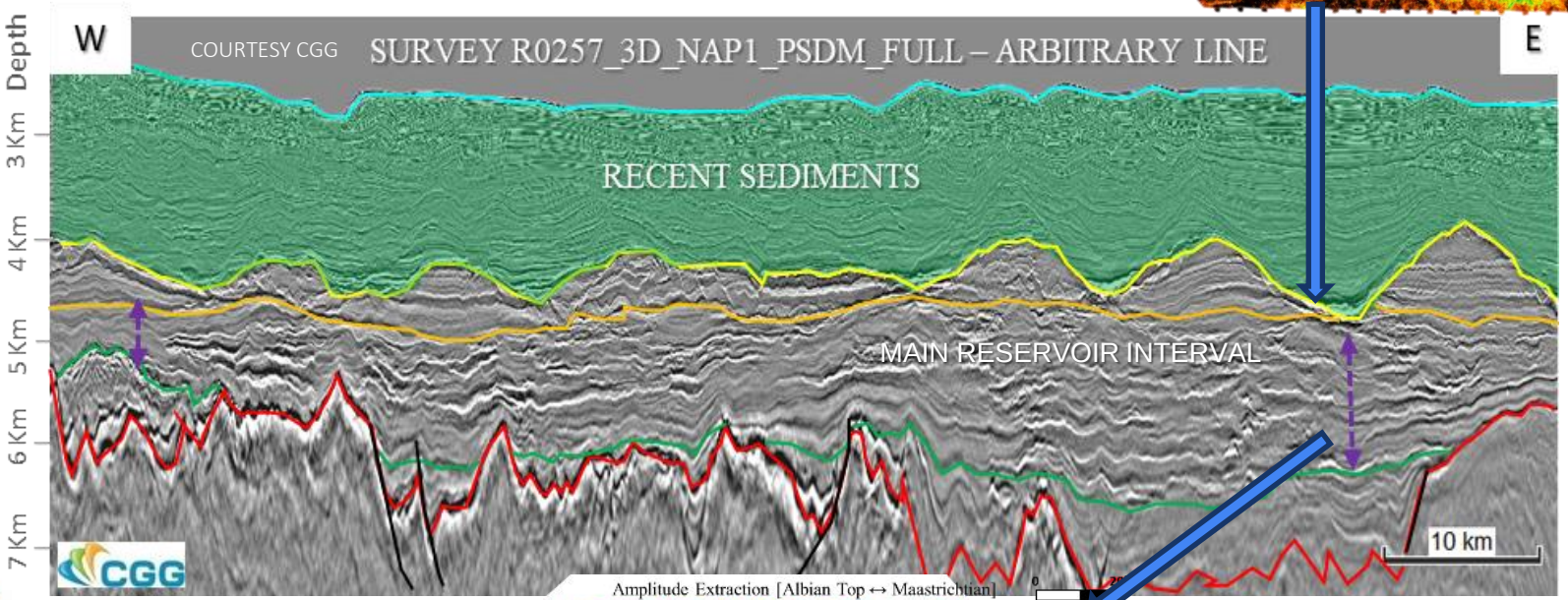

(ALBIAN ⇔ MAASTR. INTERVAL)
MARINE TURBIDITES (VAT MIN ATTRIBUTE)
MAIN RESERVOIR INTERVAL
3000
2000
1000
0400
SANDSTONES

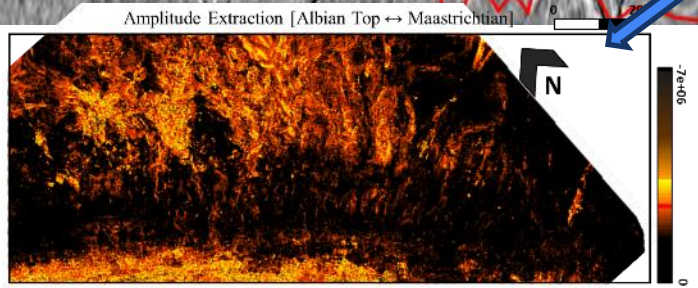
FZA – Main Play



FZA – Main Play







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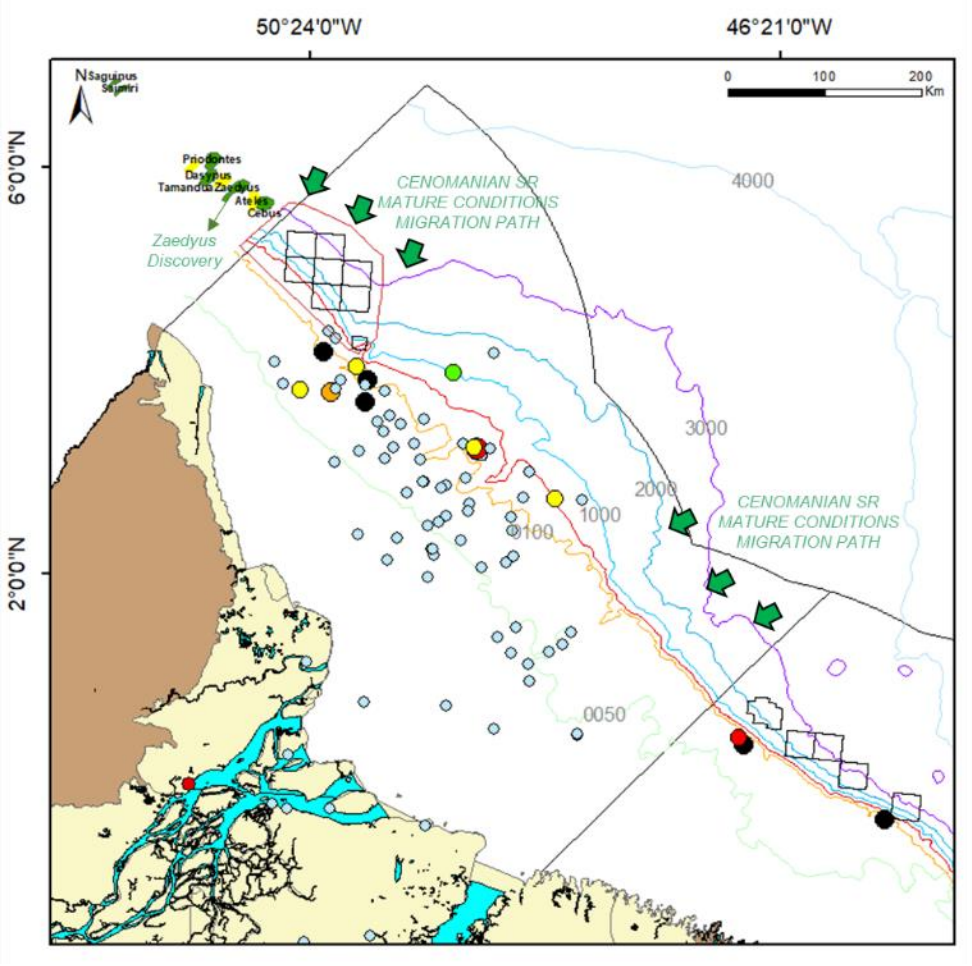
DEEPWATER
EQUATORIAL MARGIN

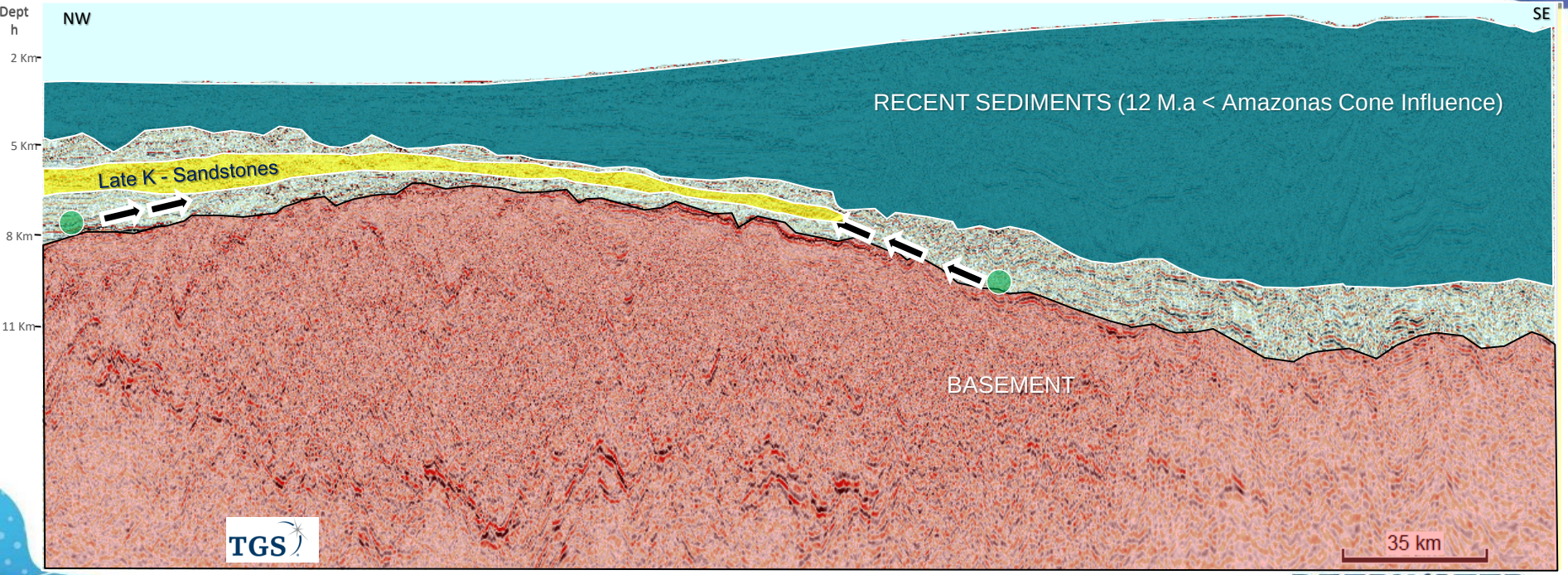
FZA – Main Play



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

FIRST EAGE CONFERENCE ON DEEPWATER EQUATORIAL MARGIN

FZA – Main Play

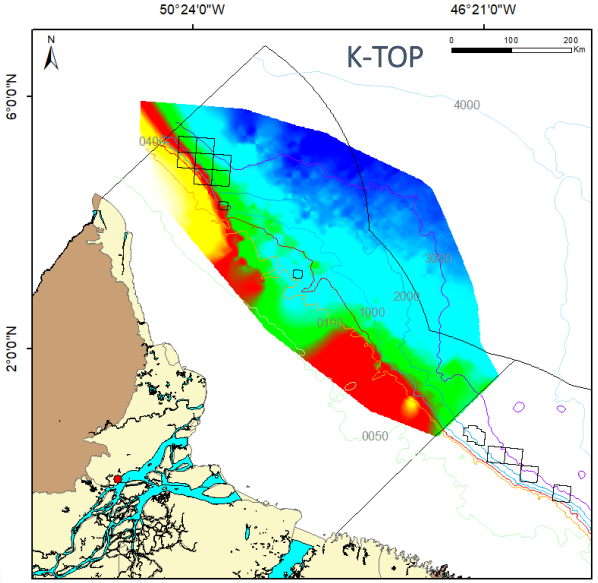


COURTESY TGS - R0257_2D_FOZ (LINE 2050)

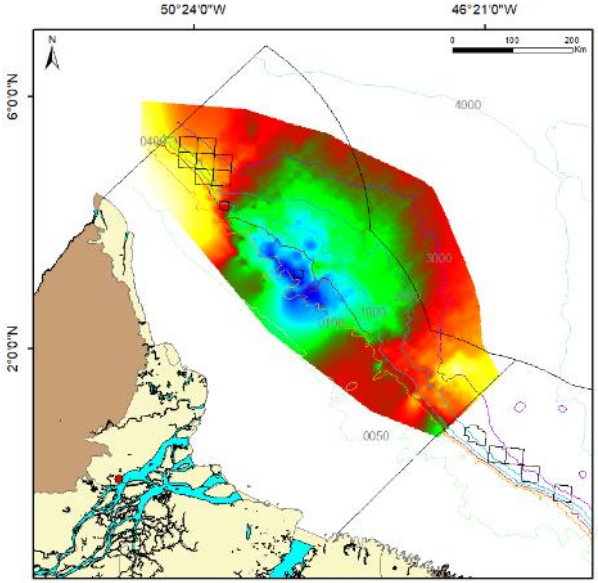
MAIN RESERVOIR INTERVAL

MAIN SOURCE ROCK

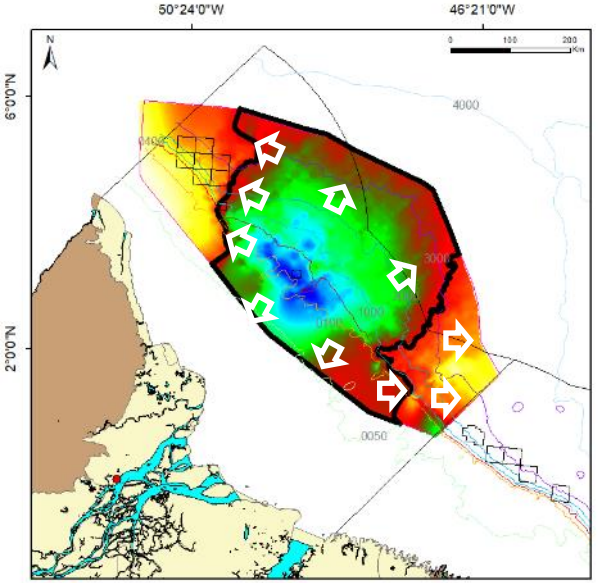
FZA – Main Play



K-TOP STRUCTURAL MAP

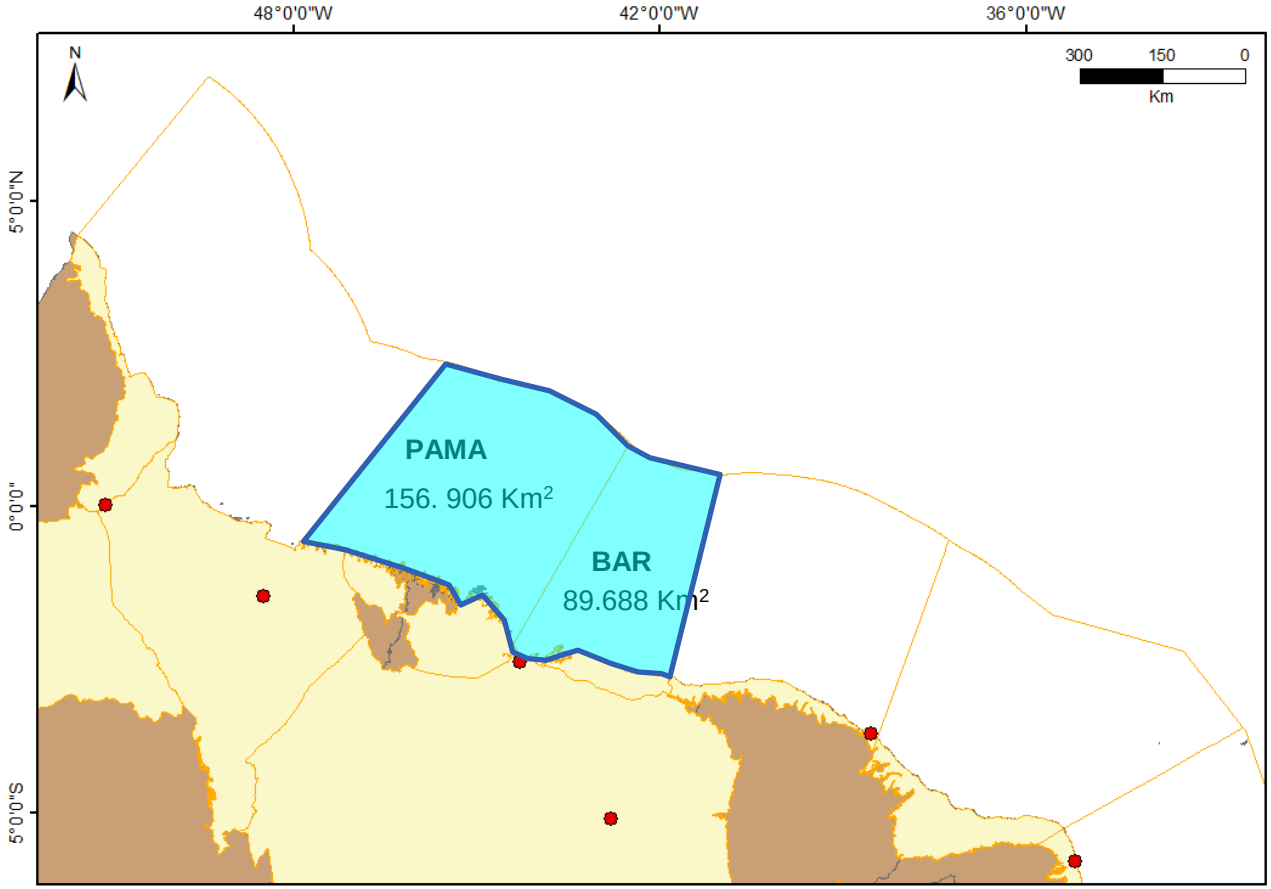


RECENT SEDIMENTS THICKNESS MAP



INT. KITCHEN and MIGRATION PATH

PAMA & BAR – Main Play



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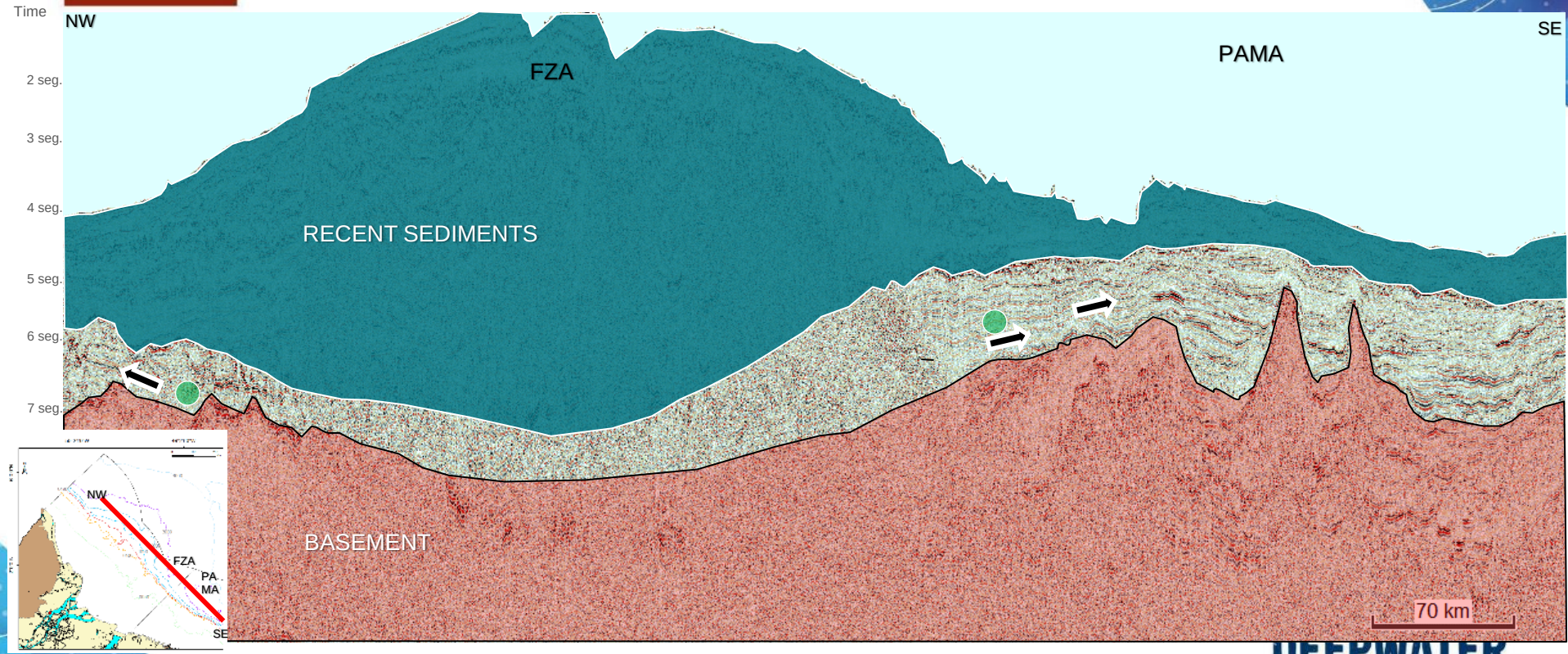
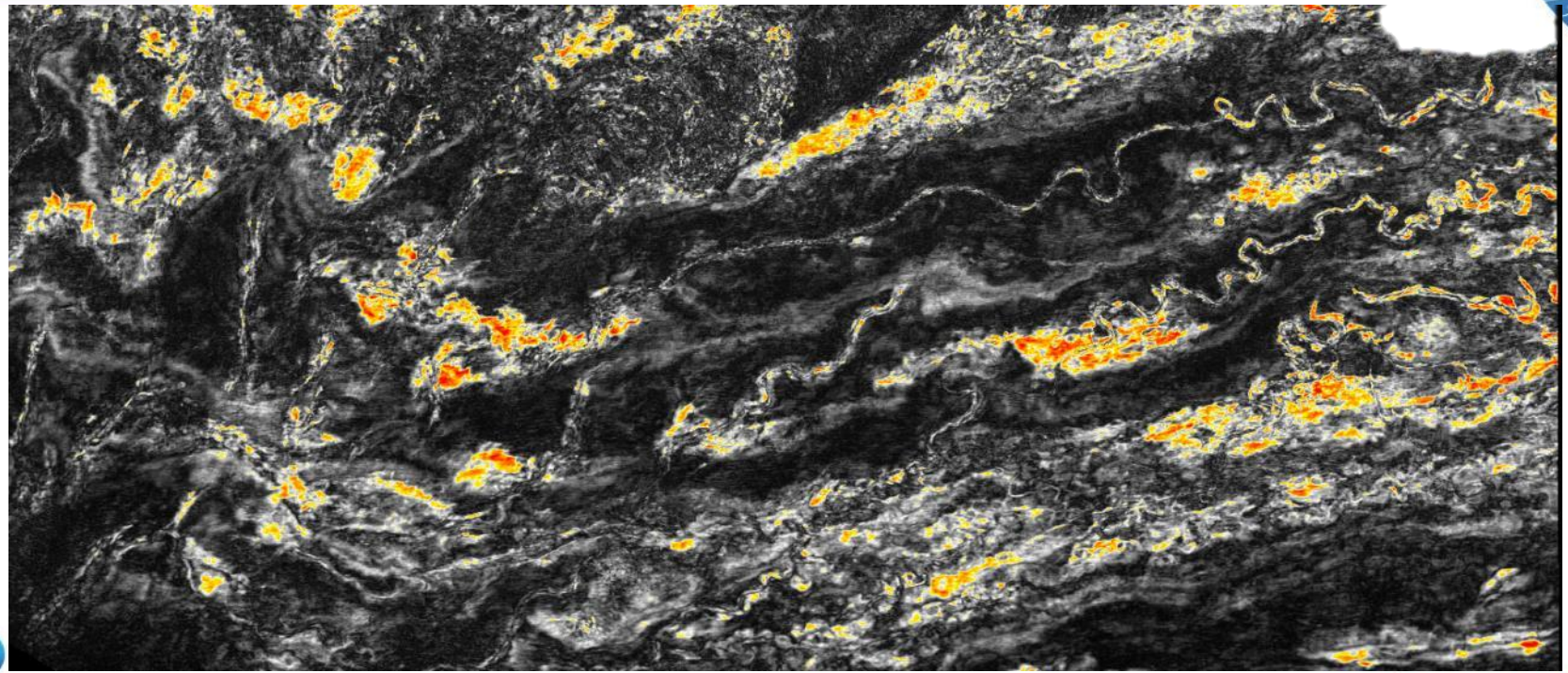
PAMA – Main Play



0270_2D_SPEC_BM_FZA_LINE 2006

DEEPWATER EQUATORIAL MARGIN

BAR – Main Play



SWETNESS

0 20.000

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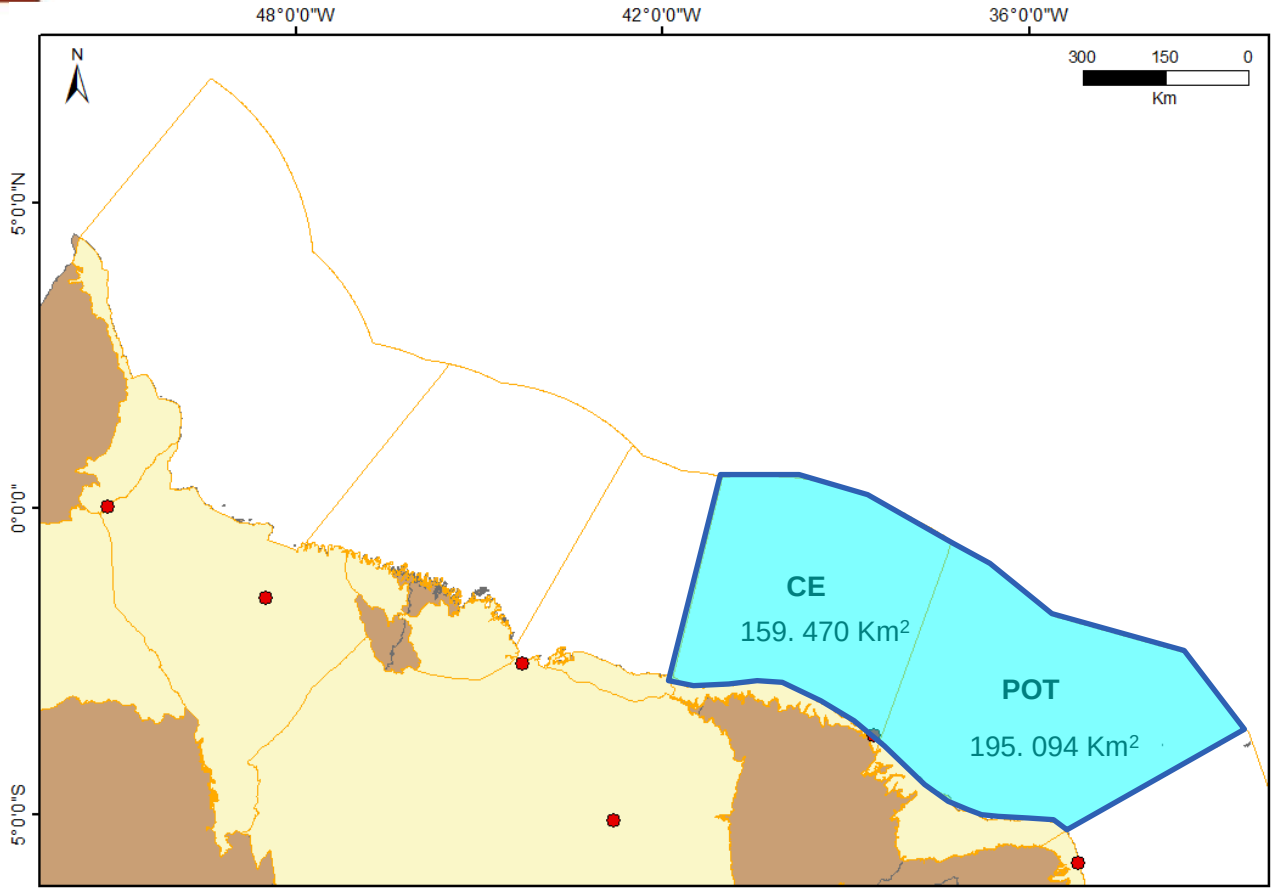
CE & POT – Main Play



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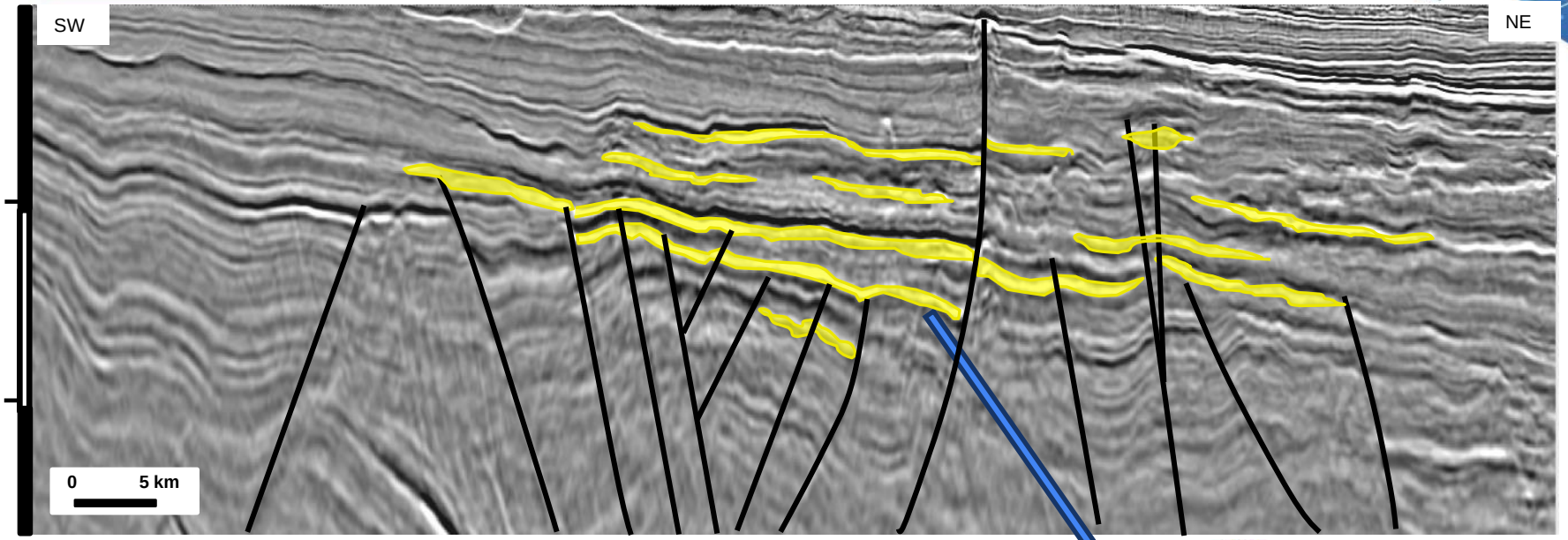
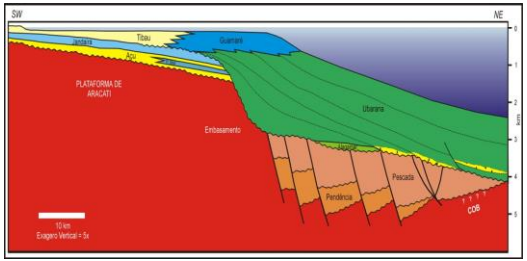
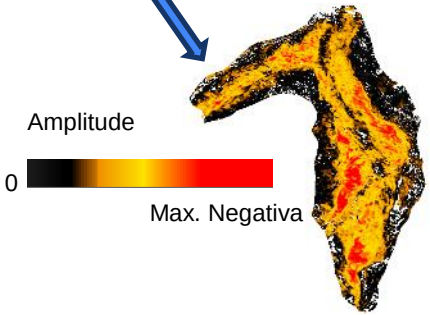
CE – Main Plays

Linha 0268-7589 [0268_CEARA_FORTALEZA]



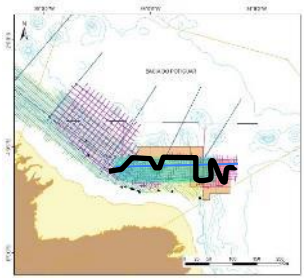


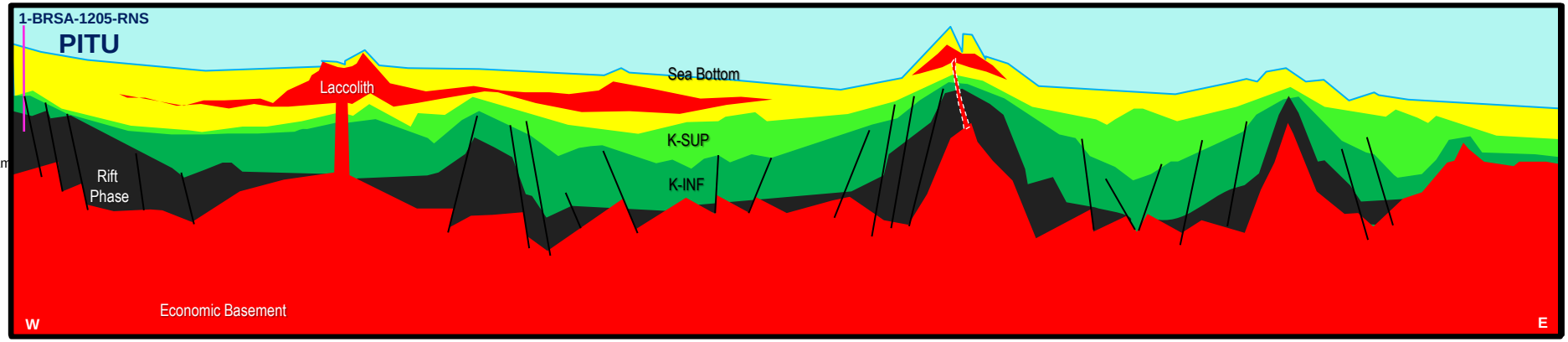
Bertani *et al*., 1989



FIRST EAGE CONFERENCE ON DEEPWATER EQUATORIAL MARGIN

POT – Main Plays

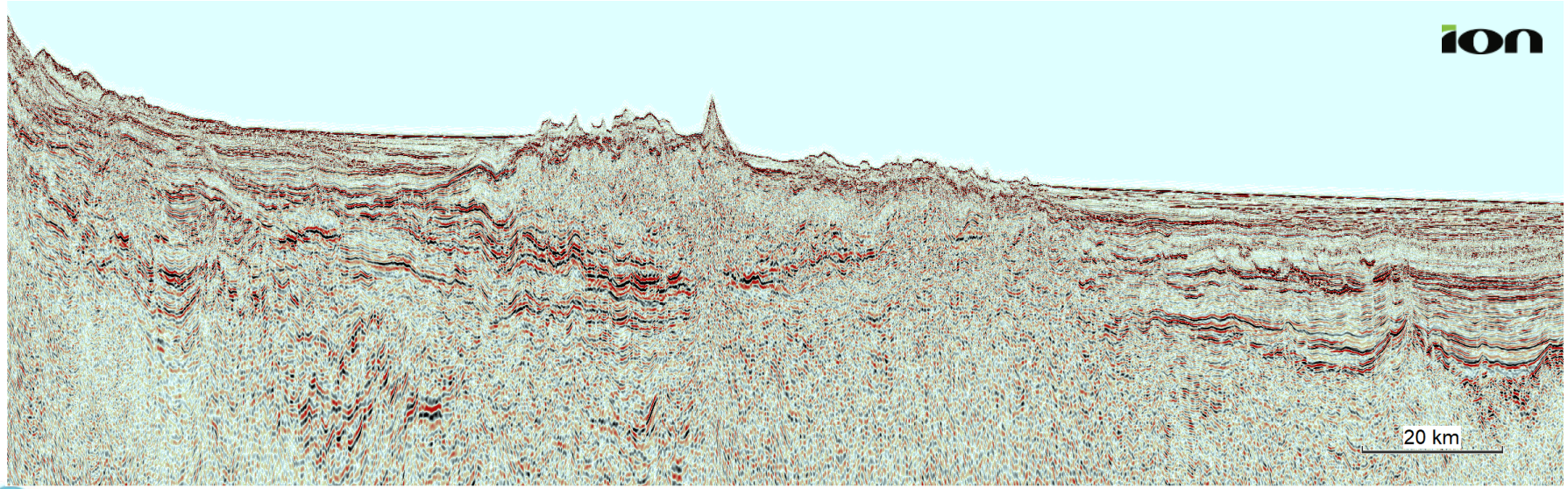




ANP, 2021

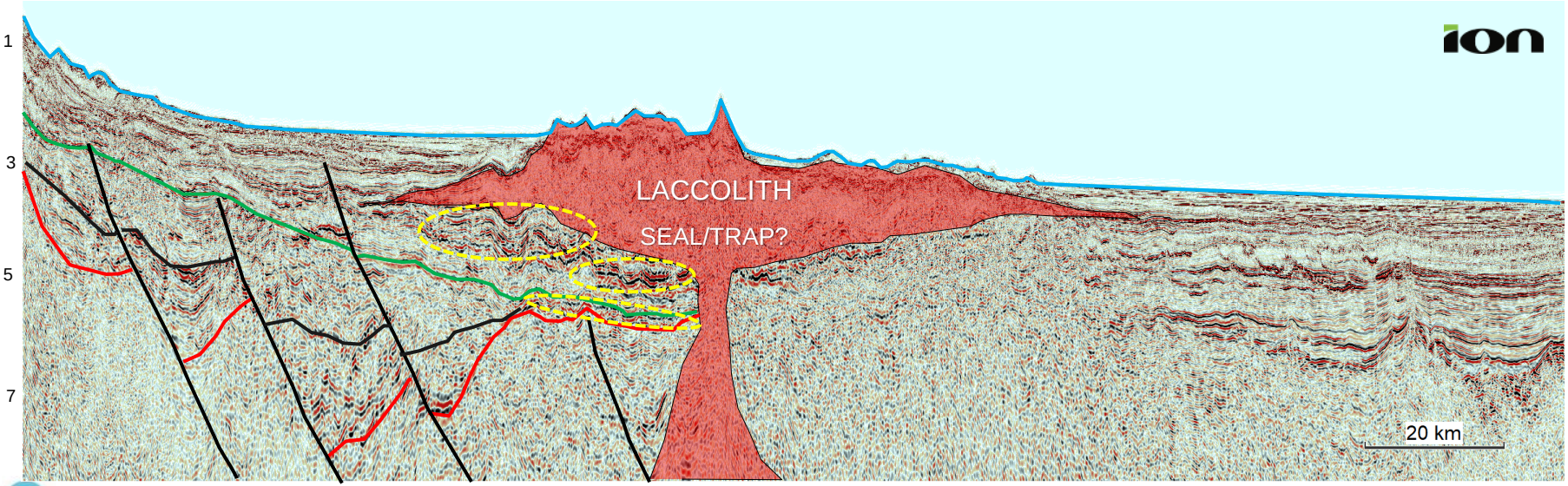
Marine source rock, as well as from the evaporitic phase, identified **in deep waters** of the Potiguar Basin, representing a new frontier.

POT – Main Plays



0022_GREATERBRASILSPAN – Courtesy of ION

POT – Main Plays



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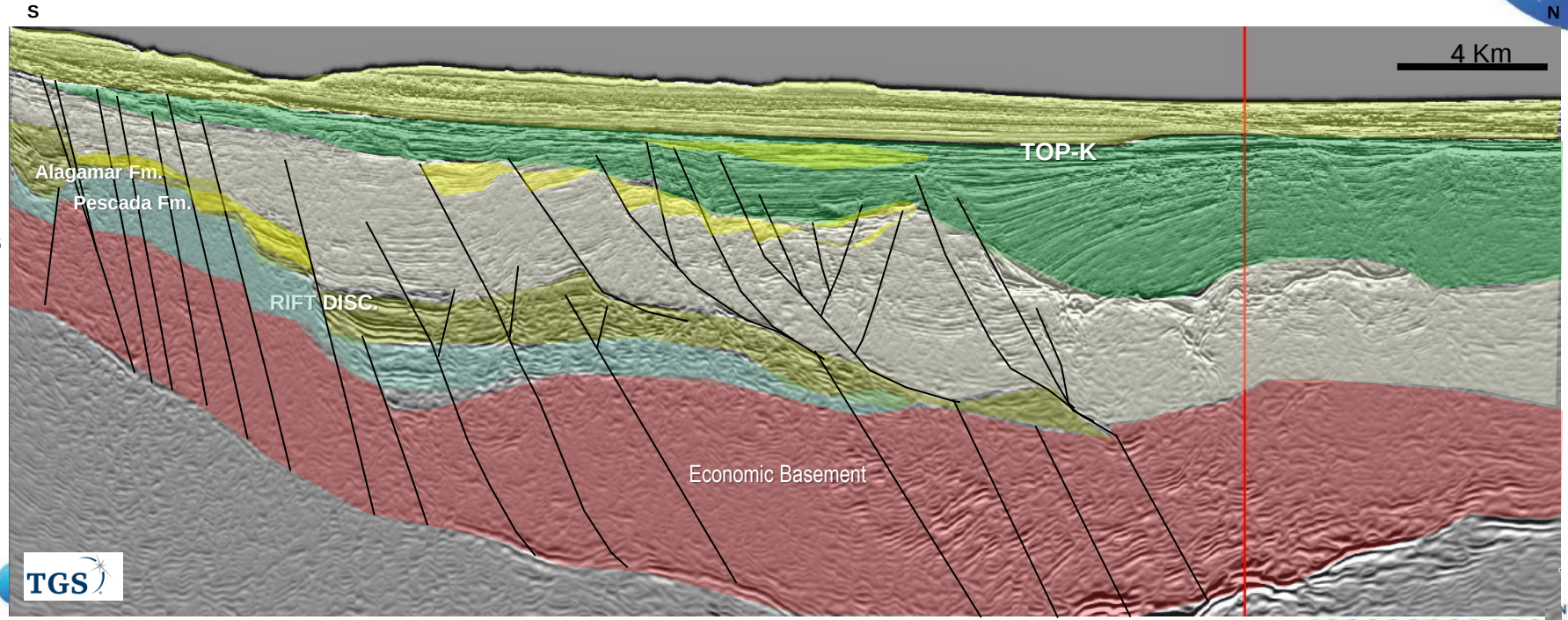
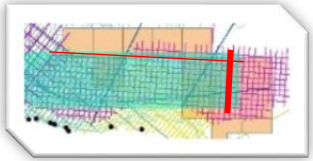


0257 3D PBP1 PSDM – Courtesy of TGS



DEEPWATER EQUATORIAL MARGIN

EAGE

GUYANA AND SURINAME HAVE BEEN REPORTING WORLD-CLASS HYDROCARBONS DISCOVERIES

AFRICAN CORRELATED SEDIMENTARY BASINS HAVE ALSO BEEN ACHIEVING EXPLORATORY SUCCESS

THE BEST RESULTS WERE PRESENTED IN CRETACEOUS SANSTONE TURBIDITES (RESERVOIR) AND MARINE SOURCE

IN BRAZIL ONLY 21 WELLS WERE DRILLED ON THE EQUATORIAL MARGIN DEEP WATERS (THE LAST IN 2015)

IT IS AN UNEXPLORED REGION WHERE SEISMIC DATA HIGHLIGHTS HUGE GEOLOGICAL POTENTIAL

THERE ARE GEOLOGICAL ANALOGUES WITH RECENT DISCOVERIES ON CORRELATE BASINS

THE EQUATORIAL MARGIN IS THE EXPLORATORY FRONTIER REGION OF BRAZIL WITH THE GREATEST POTENTIAL TO INCORPORATE RELEVANT VOLUMES OF HYDROCARBONS OVER THE NEXT DECADE

THE PRESENCE OF HYDROCARBON CAN ONLY BE CONFIRMED BY A WELL

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BRAZILIAN NUMBERS & PRE-SALT

WHY DOES IT MATTER?

1

BRAZILIAN EQUATORIAL MARGIN

GEOLOGICAL POTENTIAL

2

3

FINAL HIGHLIGHTS

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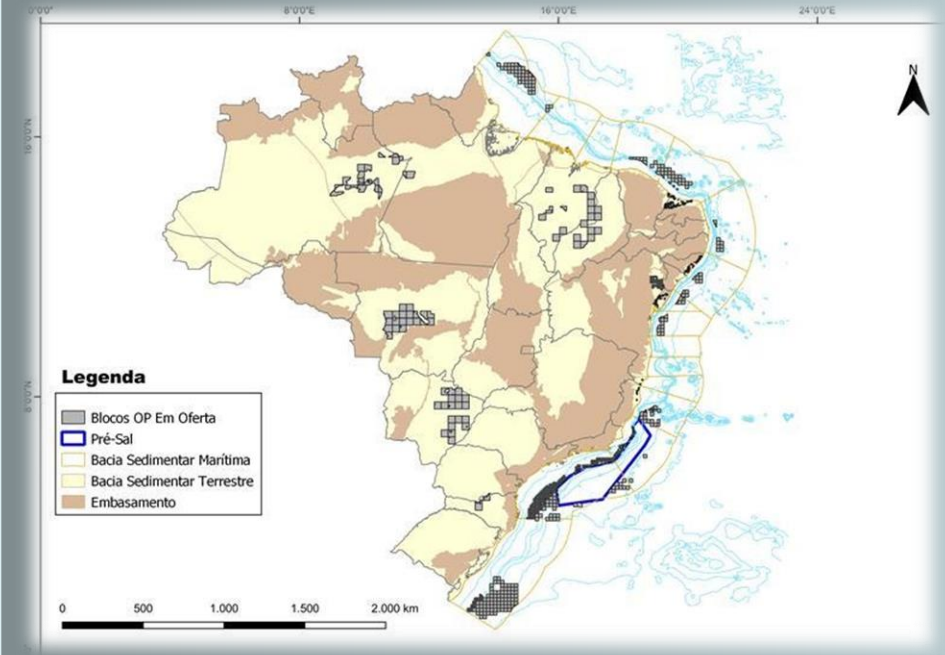
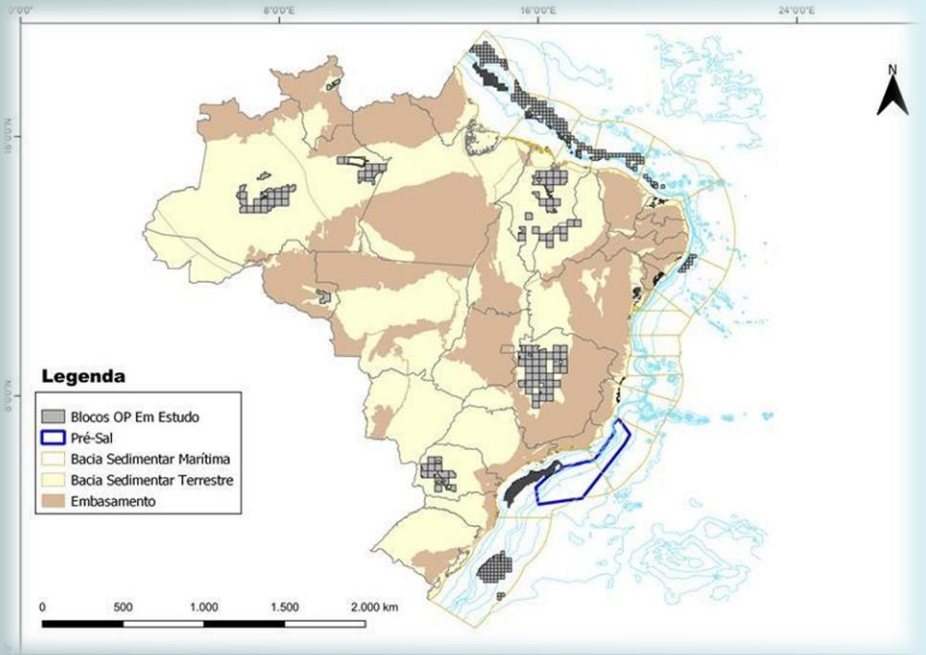
Open Acreage – Permanent Offer (OPC)

Less than 7% of Sedimentary Area





On Offer 2023 On Study

ANP RESOLUTION Nº 837/2021

ESTABLISHES THE PROCEDURE FOR NOMINATING AREAS TO BE STUDIED BY THE ANP

EAGE

GUYANA NOW HAS PROVEN RESERVES OF OVER 11 BILLION OIL-EQUIVALENT BARRELS, MAKING IT AN IMPRESSIVE OIL AND GAS DESTINATION. WITH THE MAJORITY OF THE RESERVES LOCATED IN THE STABROEK BLOCK, THE COUNTRY IS SET TO BECOME ONE OF THE WORLD'S LARGEST PER CAPITA OIL PRODUCERS IN THE COMING YEARS. THE FIRST SIGNIFICANT OIL DISCOVERY OFFSHORE GUYANA WAS MADE IN **MAY 2015** AT THE LIZA-1 WELL

THE **LAST DEEPWATER WELL DRILLED** IN THE BRAZILIAN EQUATORIAL MARGIN WAS **IN 2015**. SINCE THEN, WE HAVE ACQUIRED NEW SEISMIC DATA AND UPDATED THE GEOLOGICAL MODEL. WE BELIEVE THERE IS HUGE POTENTIAL FOR RELEVANT DISCOVERIES, AT LEAST TWO MAIN PLAYS, ONE IN THE CRETACEOUS SANDSTONES TURBIDITES WITH MARINE SOURCE ROCK AND ANOTHER IN THE RIFT/TRANSITIONAL PHASE

THE PRESENCE OF HYDROCARBON CAN ONLY BE CONFIRMED BY A WELL

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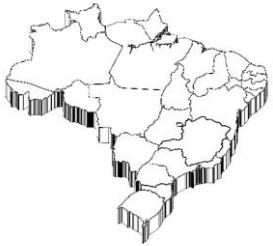
Vanderlei Sartori - Economic Modeling

Yasminne Marie Lobo Alves Sodre - Environment and Geoprocessing



Secretaries

Roselane Bejamim Xavier

Valeria de Andrade Ornelas

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Deputy – Ronan Magalhães Ávila – Geologist

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Legar Advisor - Amanda Wermelinger Pinto Lima

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Director – Claudio Jorge

Advisor – Cesar Issa

Advisor – Guilherme Papaterra

Advisor – Heloisa Helena da Costa

Advisor – Rosangela Moreira de Araújo

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