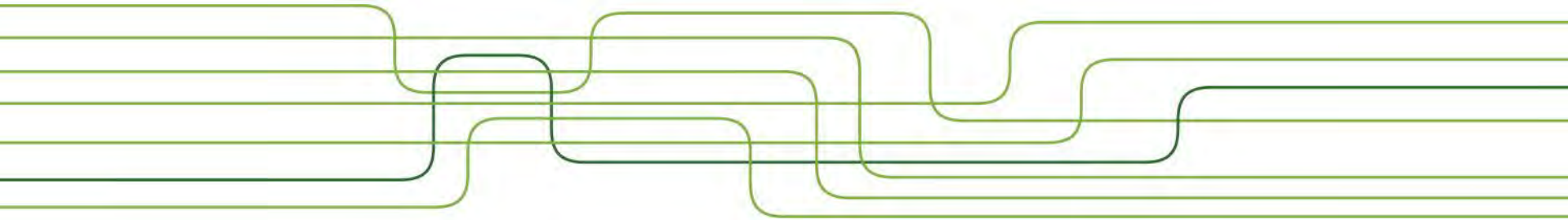


Brasil12thRound

Oil & Gas Bidding Rounds

Sergipe Alagoas Basin

Geologists Marcos André Rodrigues Alves and Gustavo Santana Barbosa



Location and Characterization

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

Petroleum Systems

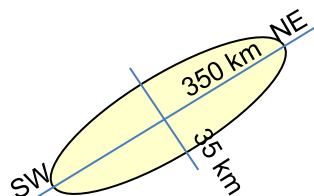
Plays

Area on Offer

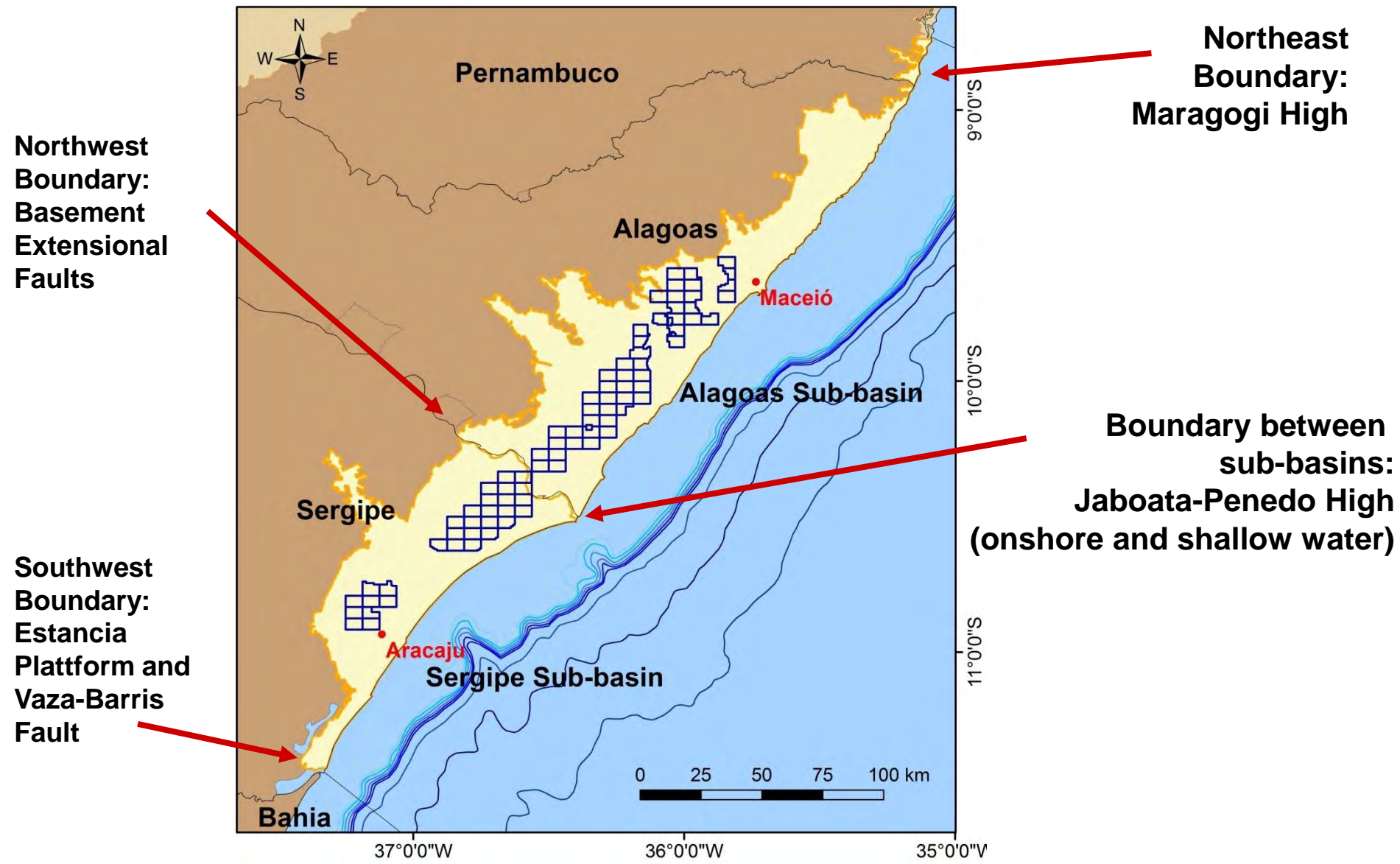
Final Remarks

Location and Characterization

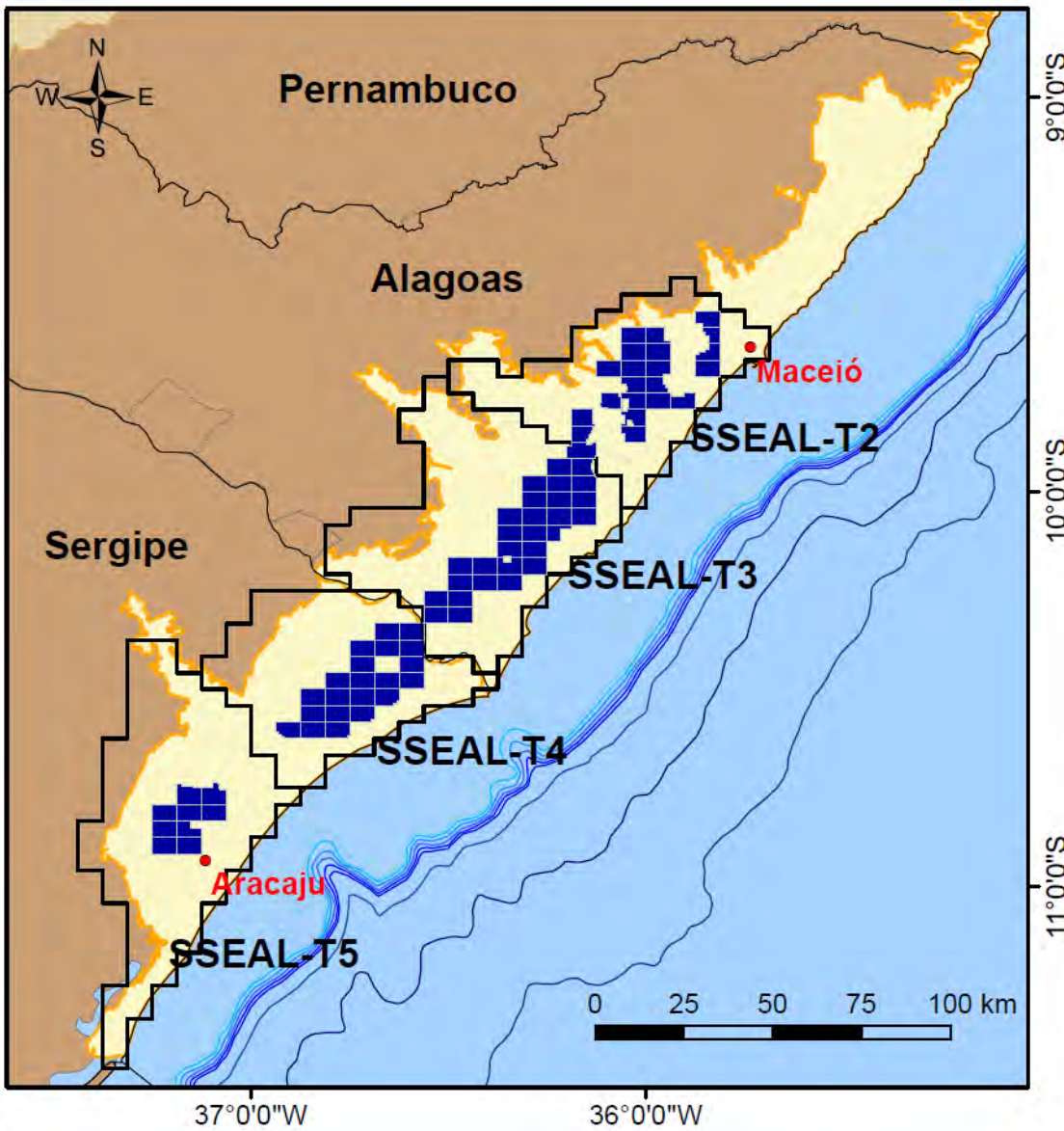
- Northeast of Brazil – Sergipe and Alagoas States
- Total Area: 44,370 km²
Onshore area: 12,620 km²
- Mesozoic Basin
- The onshore portion is classified as mature



Location and Characterization



Location and Characterization



80 Blocks
Sergipe-Alagoas Basin
Total Area: 2,418.77 km²

Legend:

- Capital
- Sectors Round 12
- Blocks on Offer - Round 12
- Sedimentary basins

Location and Characterization

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

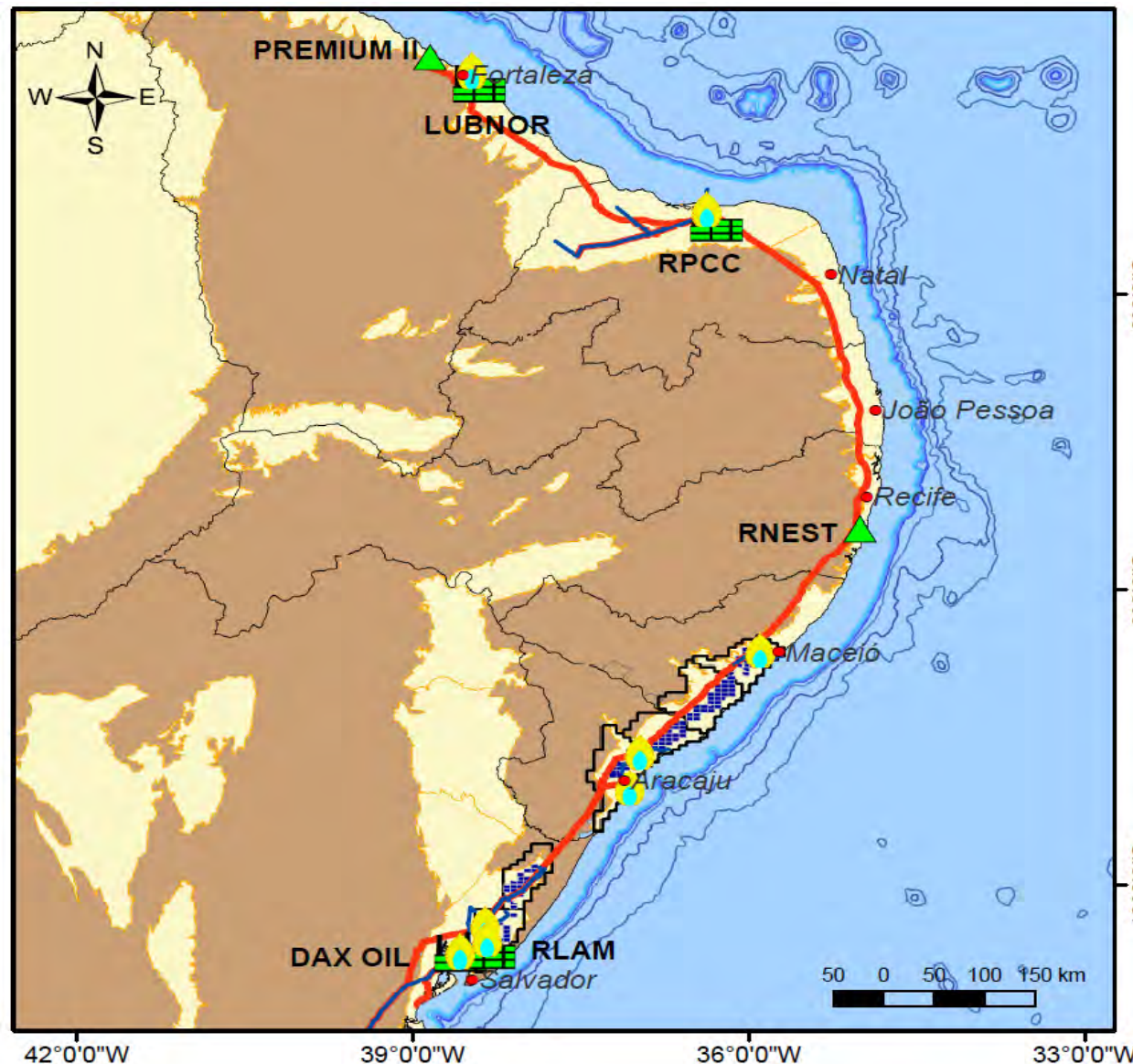
Petroleum Systems

Plays

Area on Offer

Final Remarks

Infrastructure and Operational Conditions

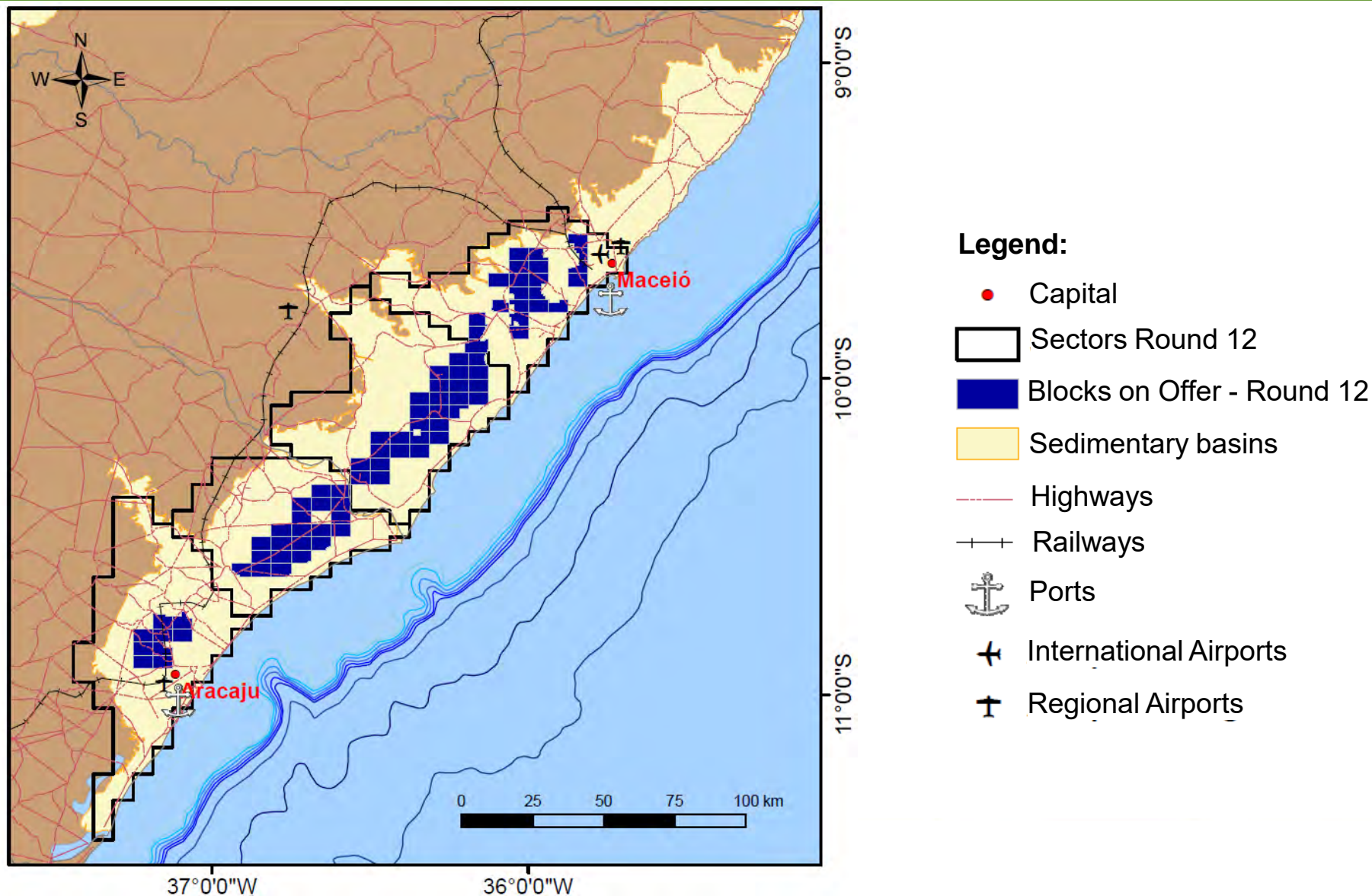


- **4 Refineries**
- **3,821 km of pipelines**
- **7 Natural Gas Processing Poles**
- **Natural Gas processing capacity in the region: 24 million m³/day**

Legend:

- Capital
- ▭ Sectors Round 12
- ▭ Blocks on Offer - Round 12
- ▭ Sedimentary basins
- 🔥 NGPP
- Oil Pipelines
- Gas Pipelines
- 🏭 Refineries
- ▲ Refineries under Construction

Infrastructure and Operational Conditions



Location and Characterization

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

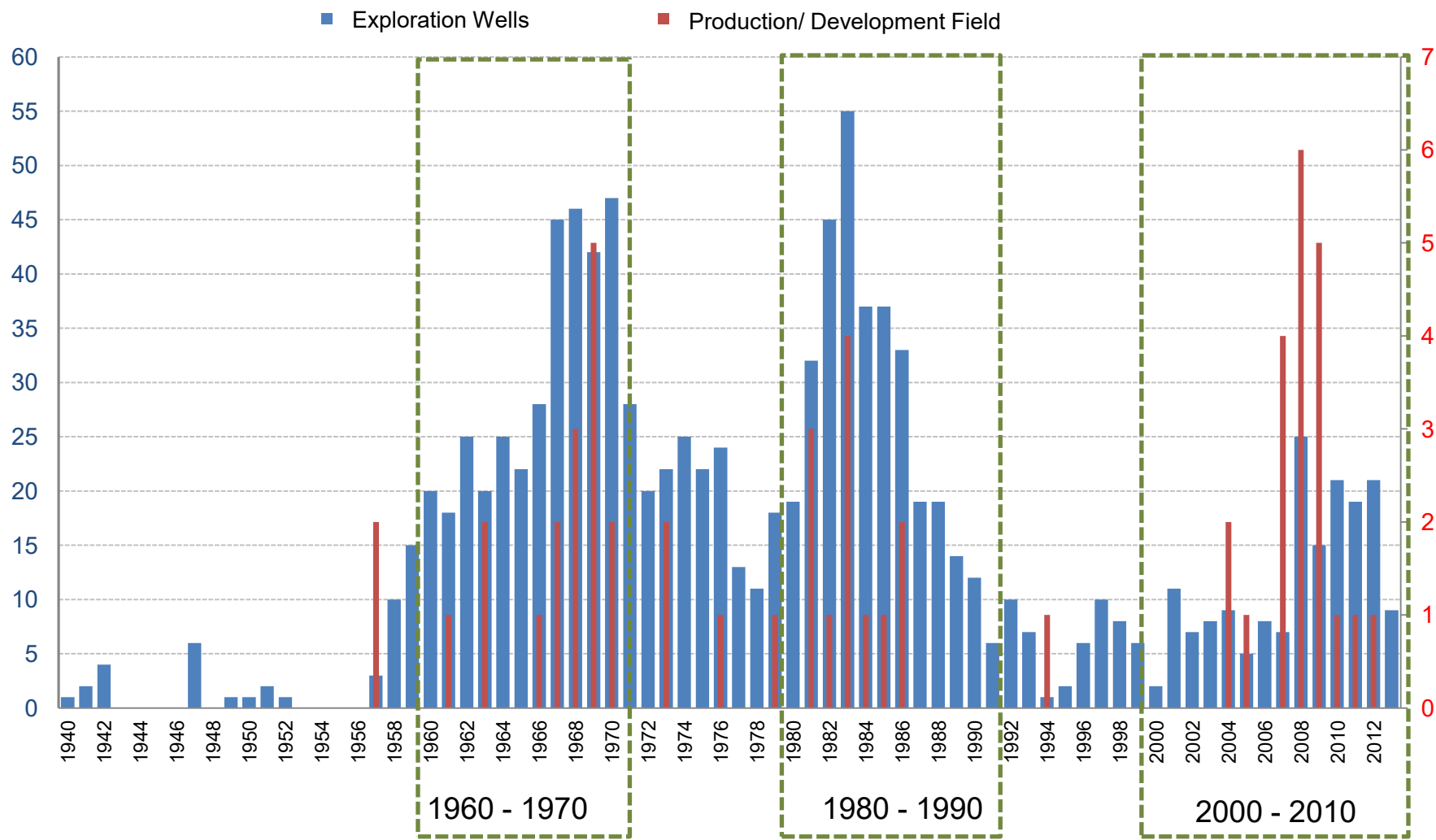
Petroleum Systems

Plays

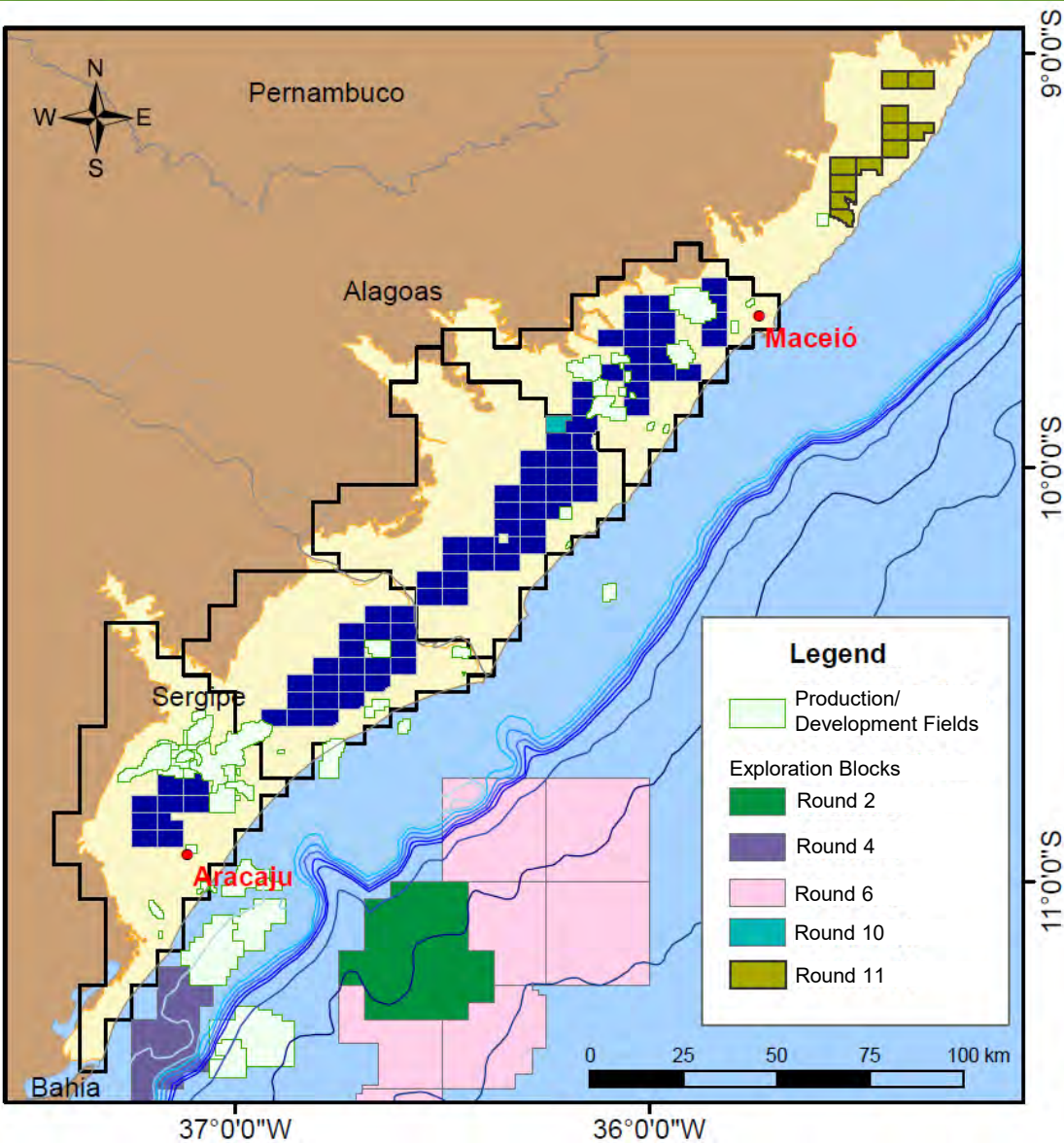
Area on Offer

Final Remarks

- Beginning: Geophysical Surveys by CNP – Petroleum National Council (1935)***



Blocks under Concession and National Bid Rounds



National Bid Rounds:
R2, R4, R6, R7, R10 and R11

Under concession: 10 blocks

- Onshore: 01 block under concession + 11 auctioned blocks at R11
- Offshore: 09 blocks

Onshore operator:

Integral de Petróleo e Gás do Brasil

Production/Development Fields

Alagoas Sub-basin

18 Production/Development
Fields

17 Onshore
1 Offshore

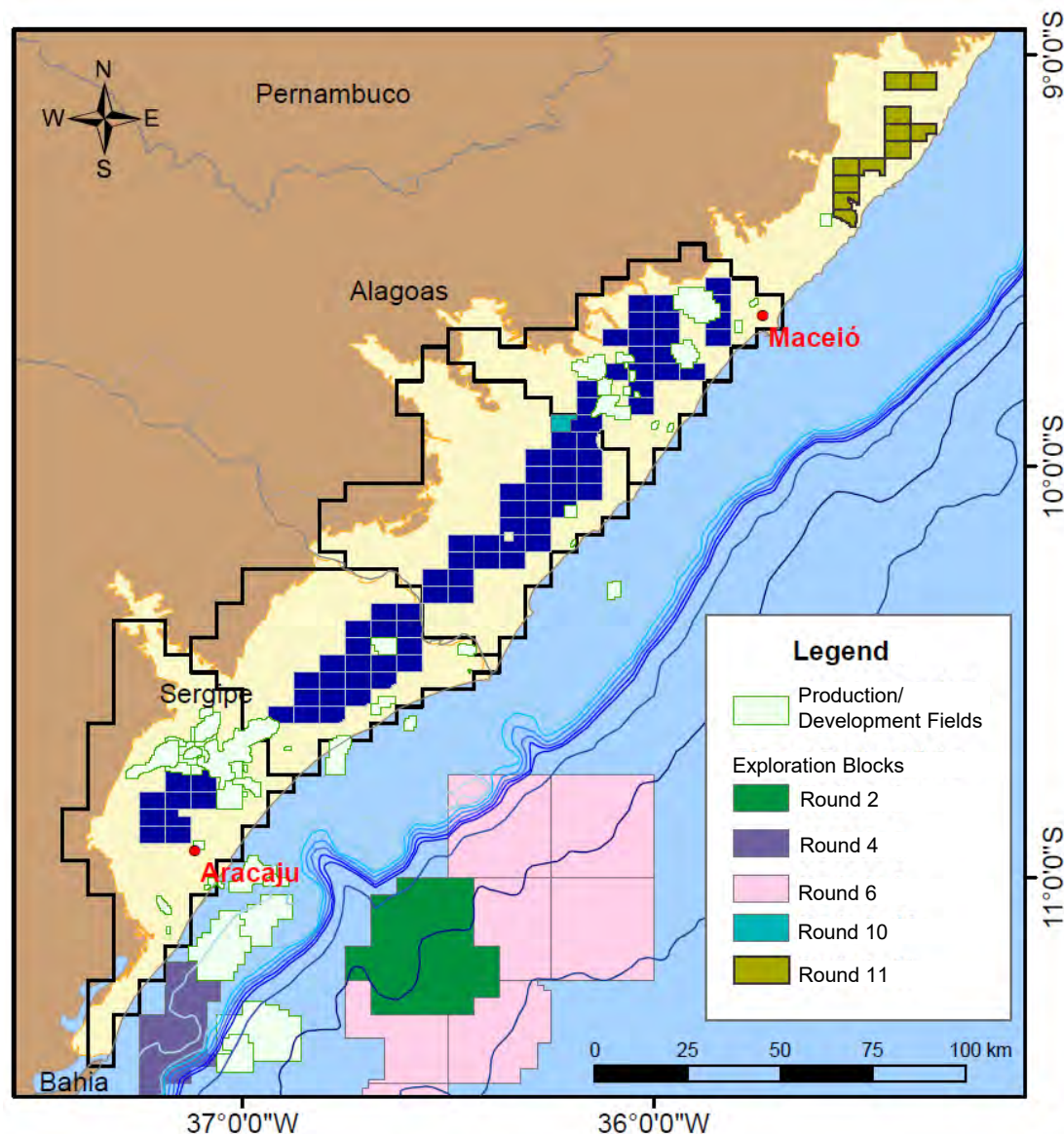
10 oil fields
7 gas fields
1 oil and gas field

Sergipe Sub-basin

38 Production/Development
Fields

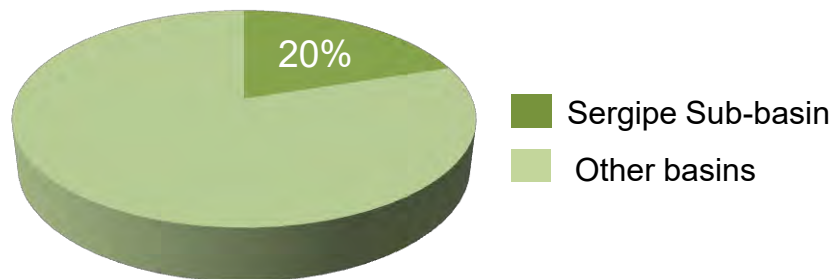
29 Onshore
9 Offshore

37 oil fields
1 oil and gas field



Evolution of Total Reserve (Onshore)

Total Reserve of Oil (Onshore)

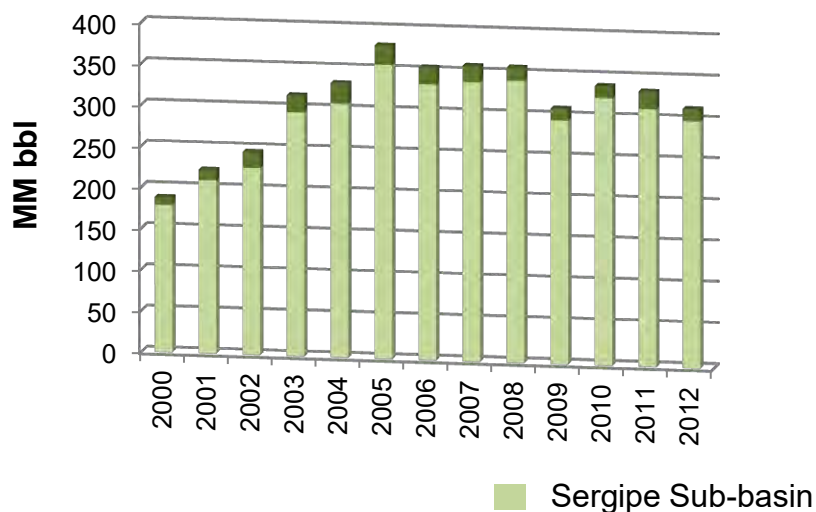


Average Production (dec/2012):

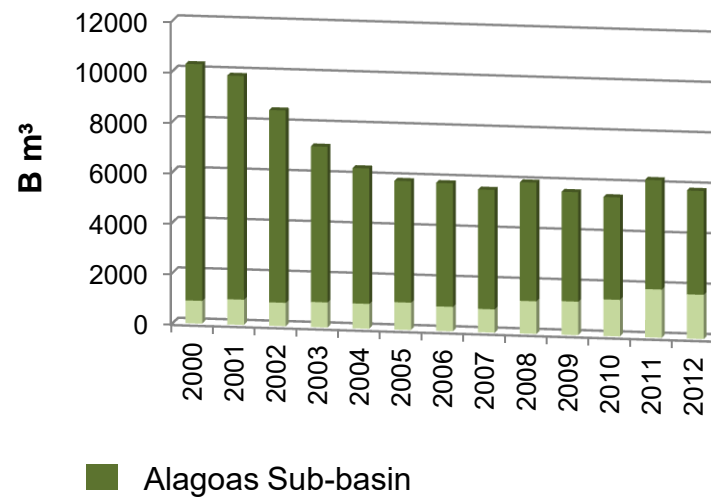
Oil: 5,000 bbl/day

Gas: 1.8 Million m³/day

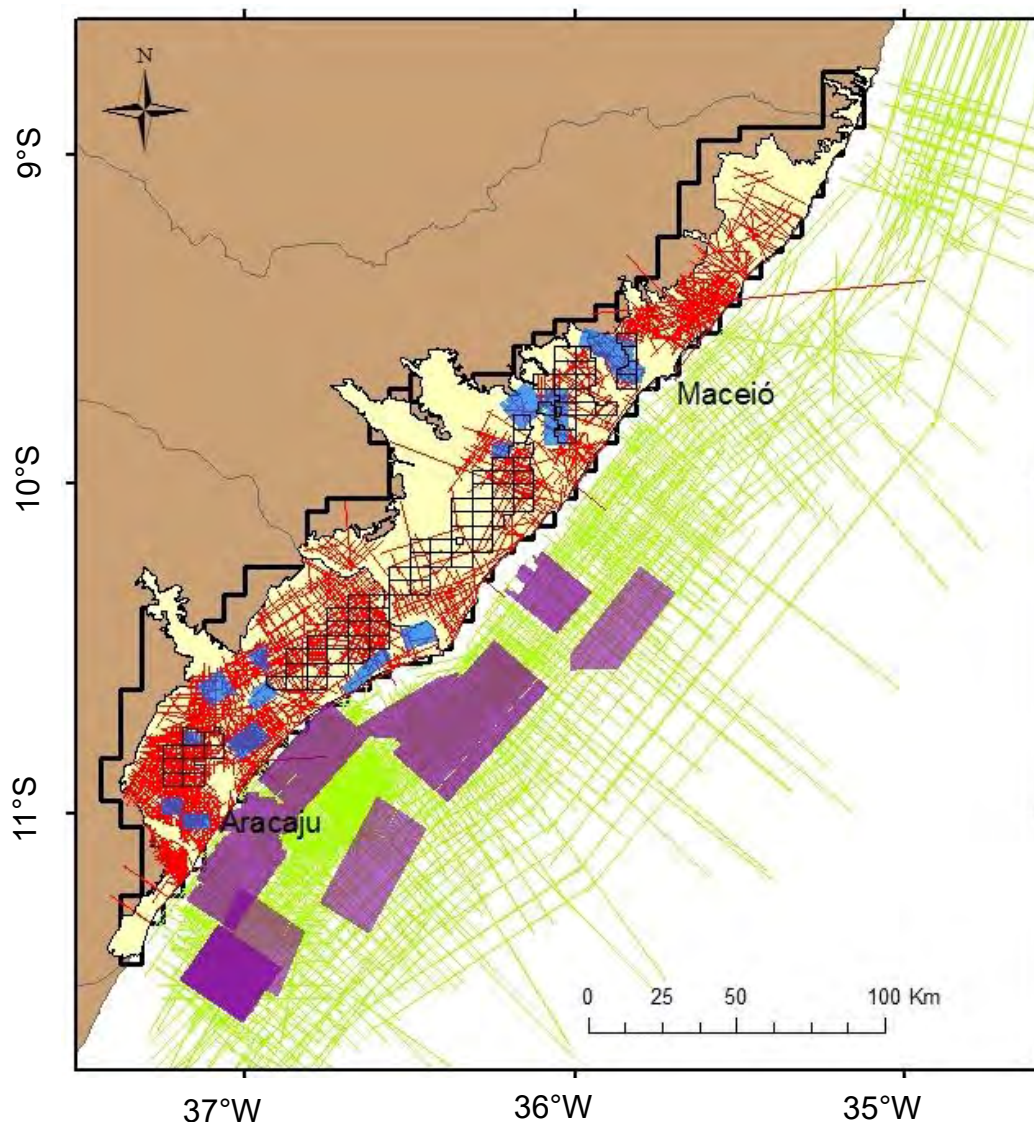
Total Reserve of Oil








Total Reserve of Gas



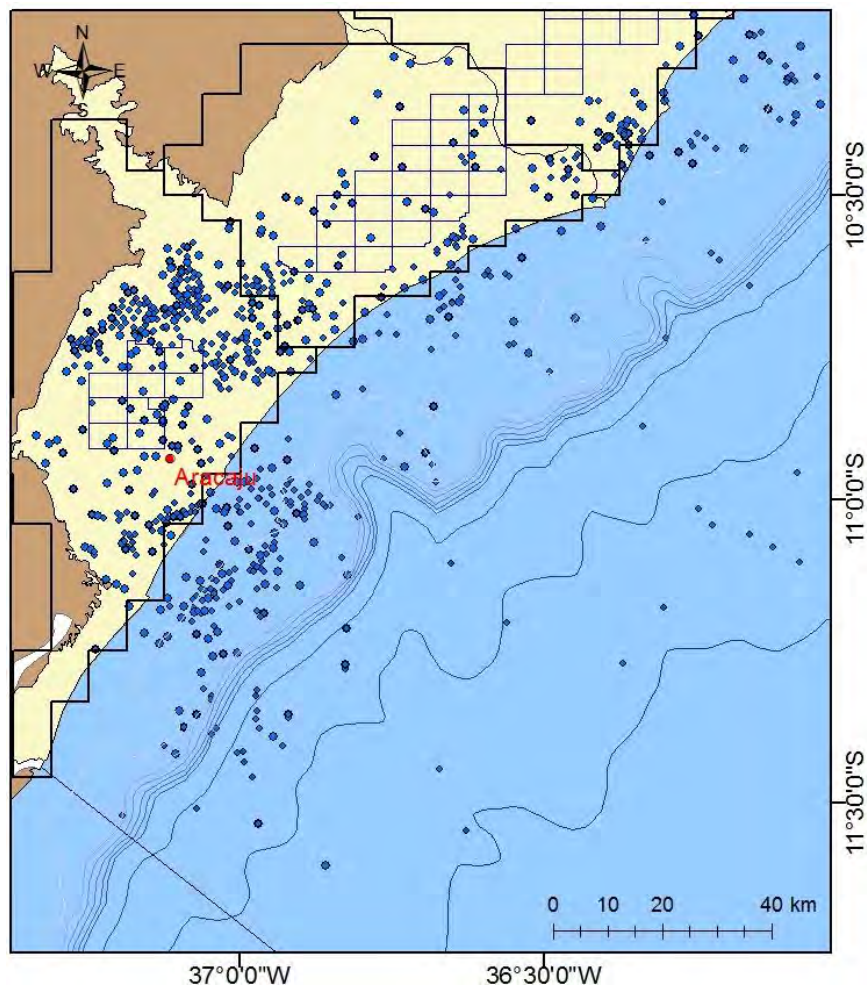
Available Data



- 38,715 km onshore 2D lines
- 1,155 km² onshore 3D lines
- 57,910 km offshore 2D lines
- 8,278 km² offshore 3D lines

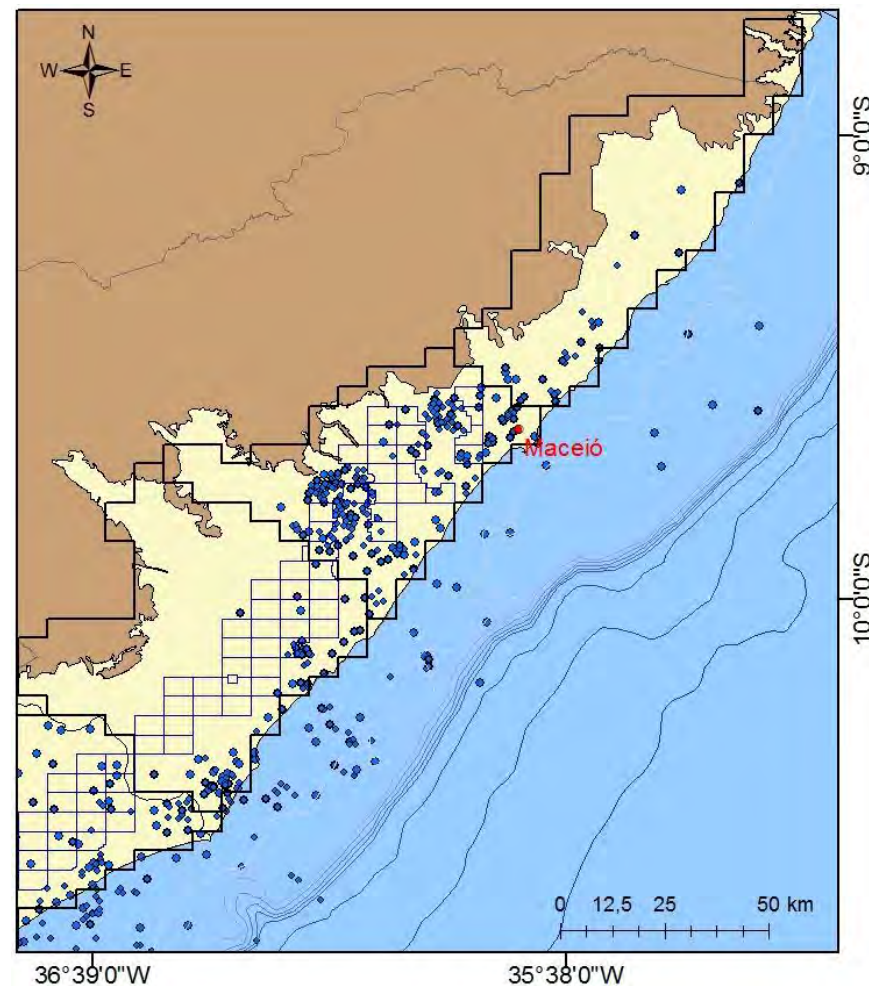
-  Onshore 2D Lines
-  Offshore 2D Lines
-  Offshore 3D Lines
-  Onshore 3D Lines
-  Offered Blocks in Round12

Available Data



**Sergipe Sub-basin: 770 Exploration Wells
(511 onshore and 259 offshore)**

● Exploration Wells



**Alagoas Sub-basin: 362 Exploration Wells
(316 onshore and 46 offshore)**

■ Round 12 Blocks on offer

Location and Characterization

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

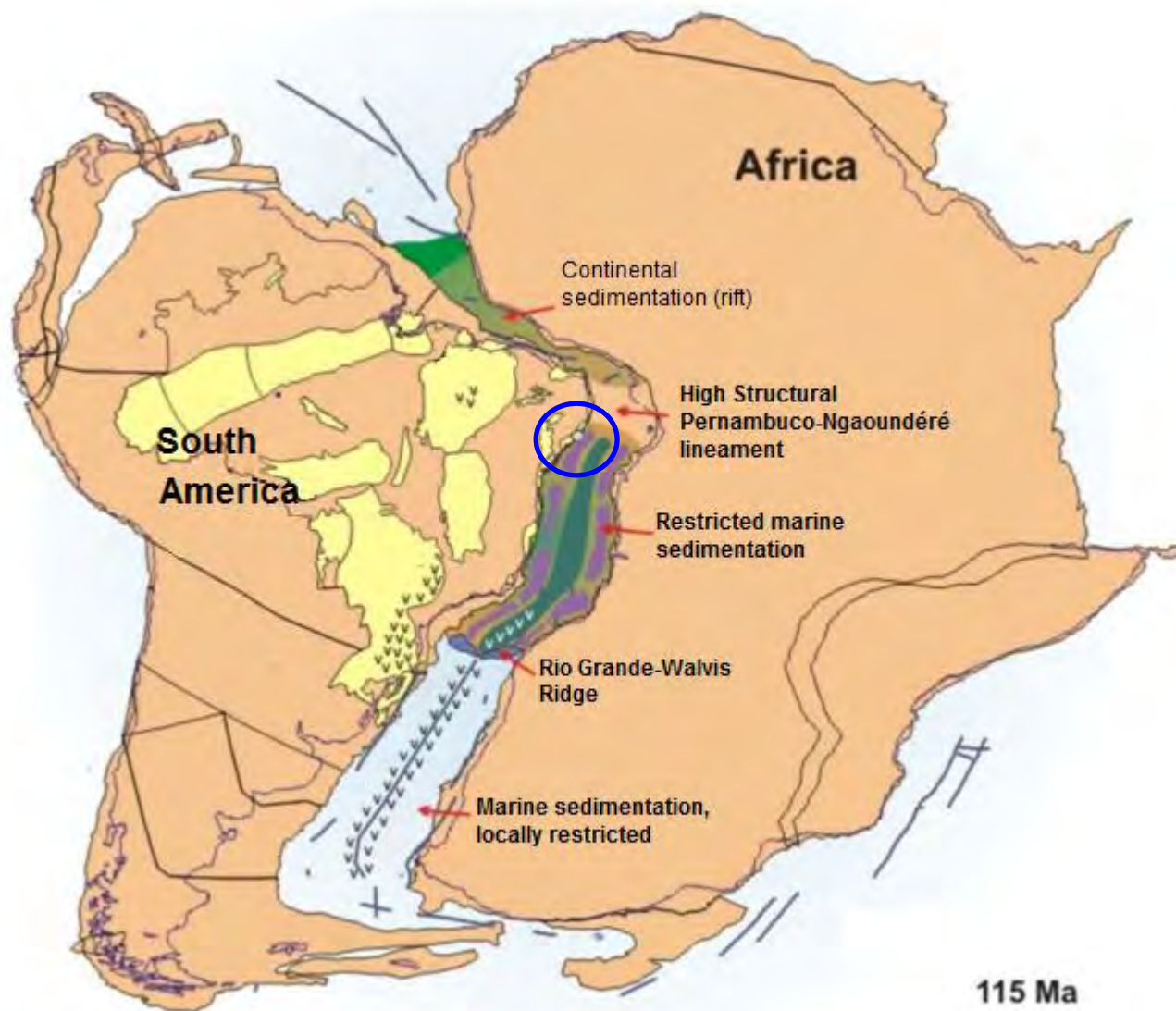
Petroleum Systems

Plays

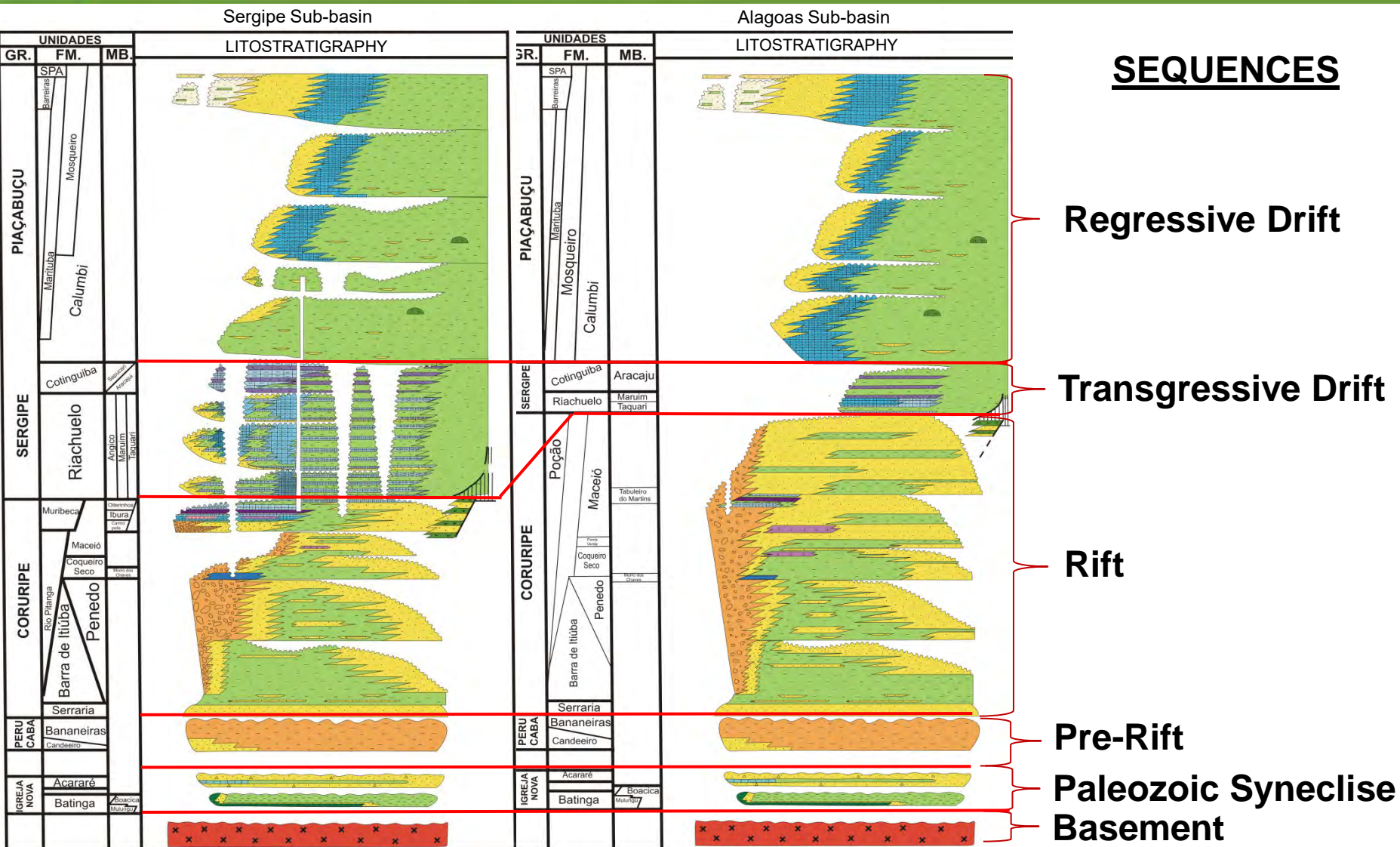
Area on Offer

Final Remarks

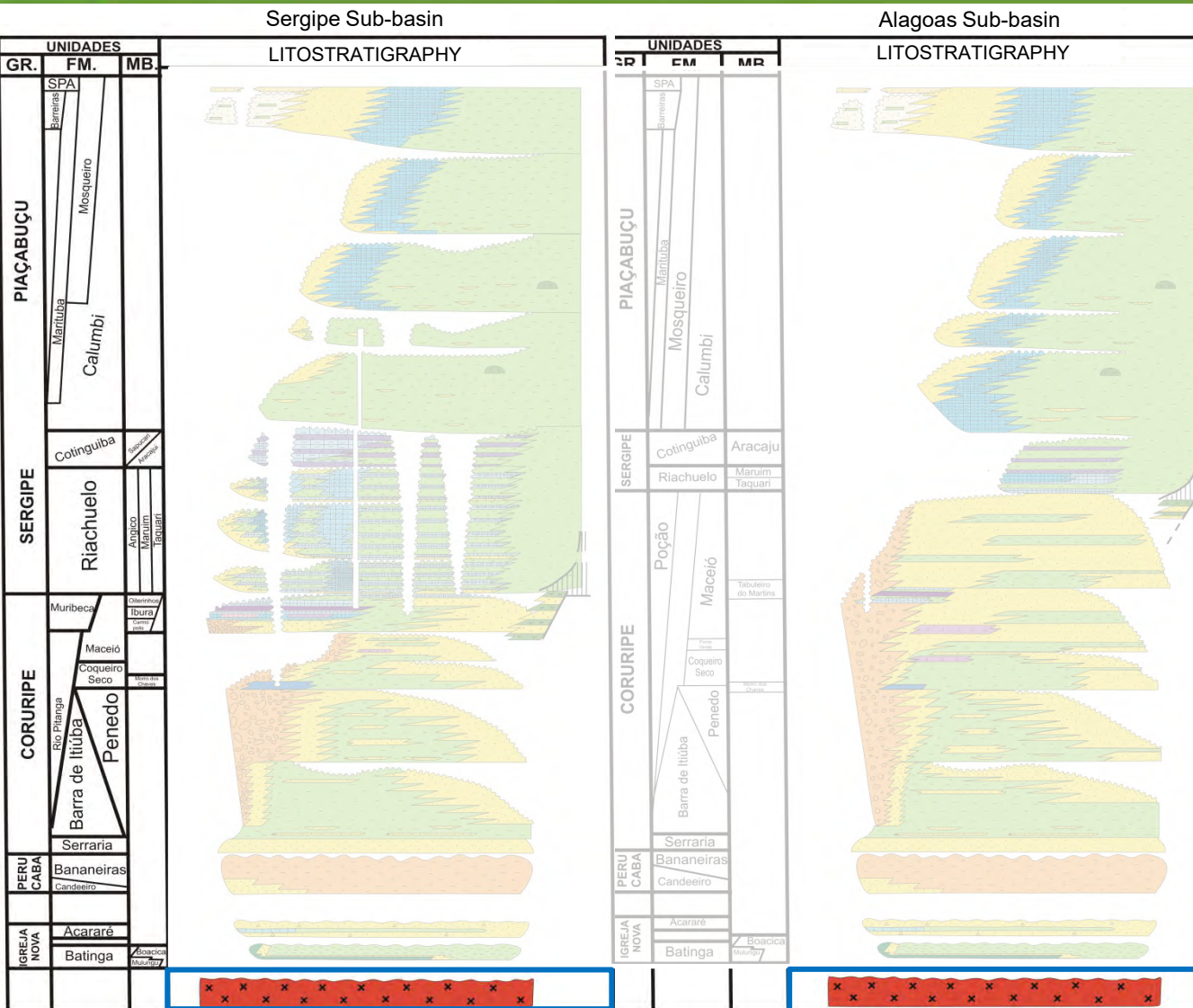
Tectonostratigraphic Evolution



Tectonostratigraphic Evolution



Tectonostratigraphic Evolution



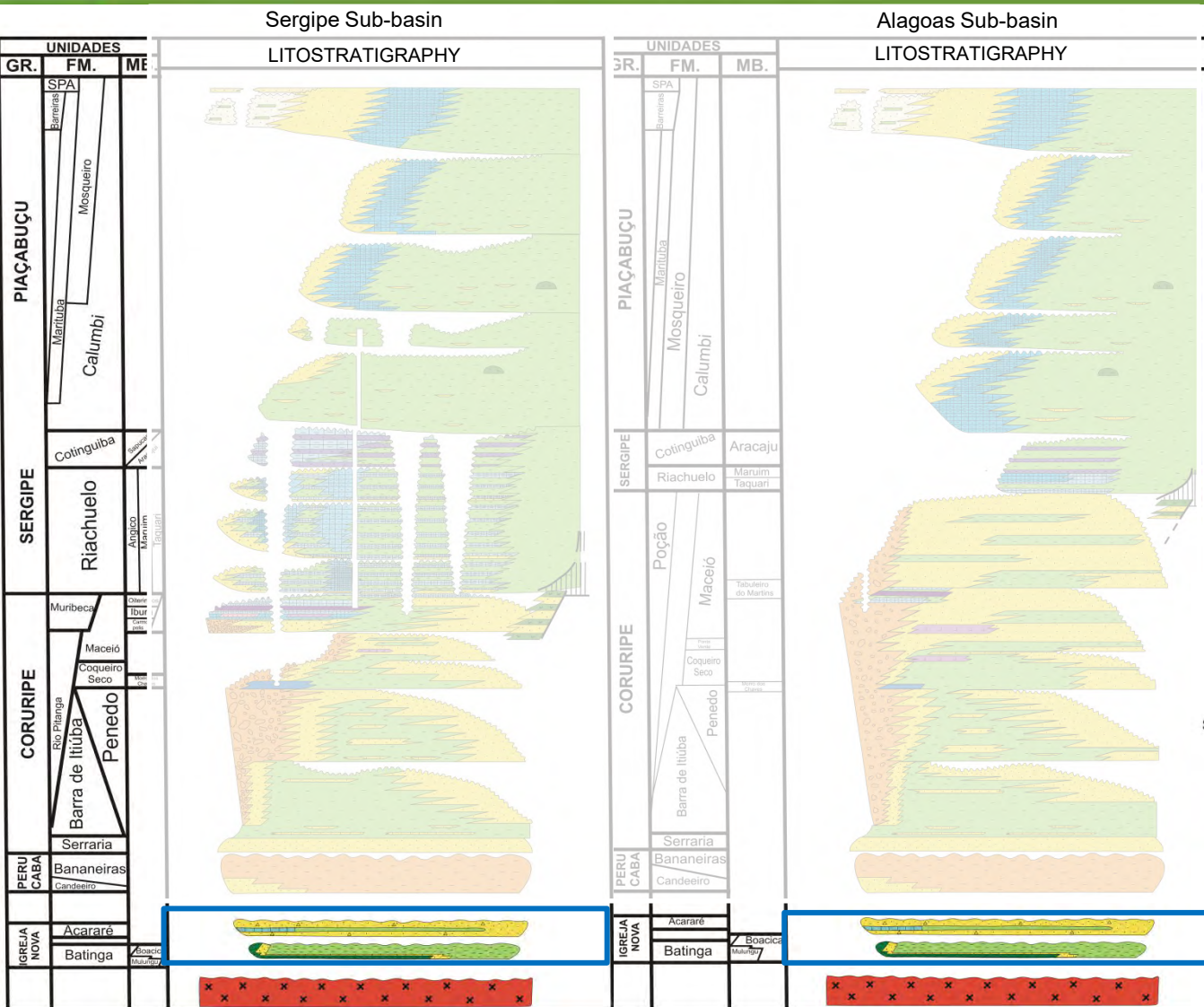
Basement
Proterozoic

Sergipe Sub-basin
Sergipana Belt
Metamorphic

Alagoas Sub-basin
Pernambuco-Alagoas
Massif
Granitic

Basement

Tectonostratigraphic Evolution



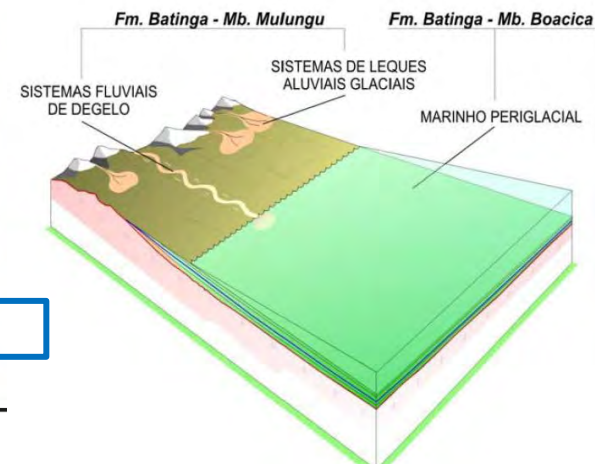
Paleozoic Syncline

Early Permian (Aracare Fm.)

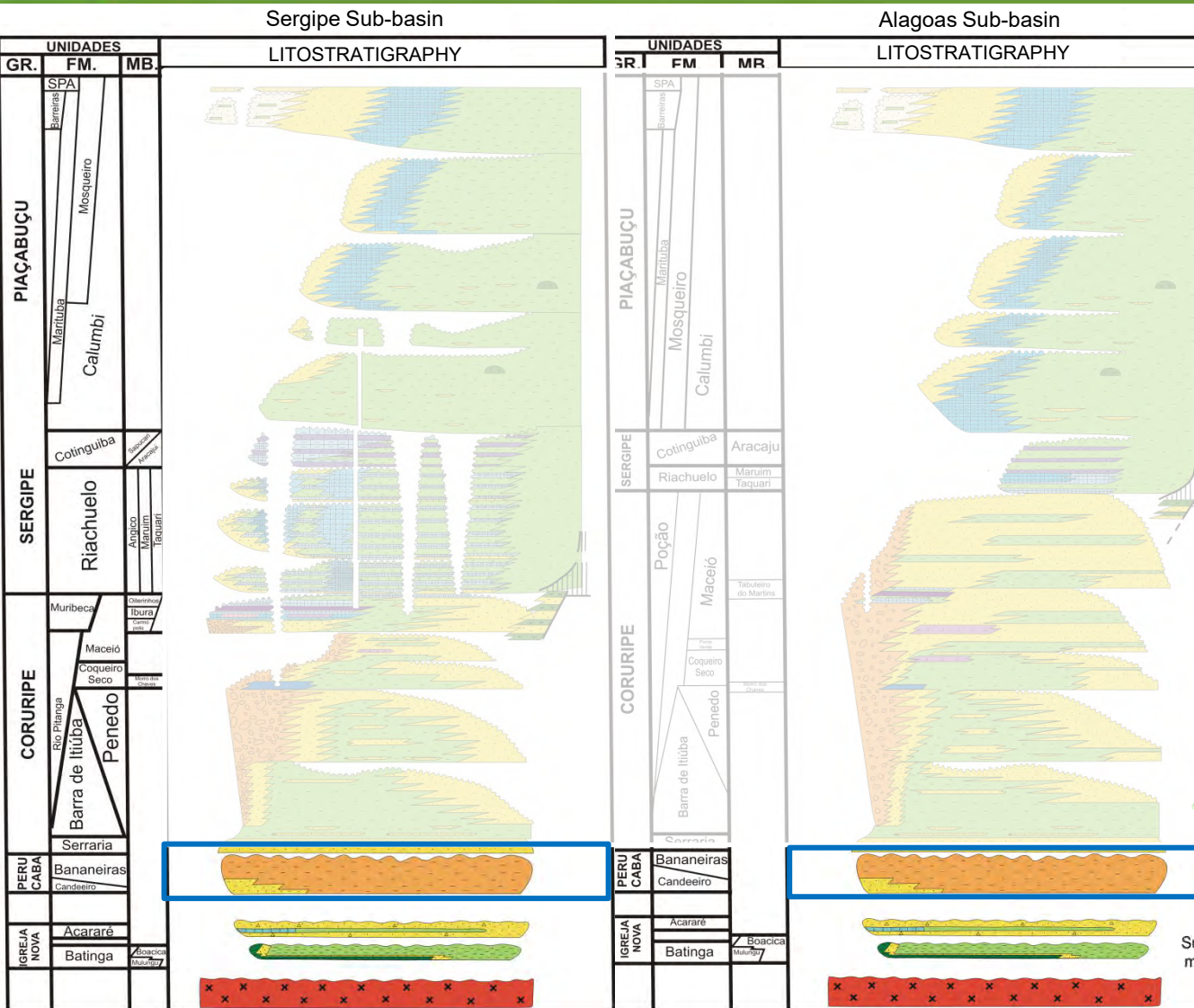
Desertic and coastal

Late Carboniferous (Batinga Fm.)

Subaqueous Glacial diamictites associated with fluvial sediments

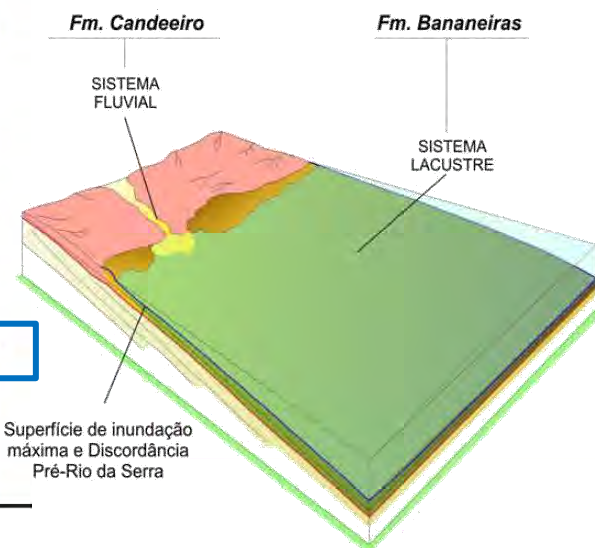


Tectonostratigraphic Evolution

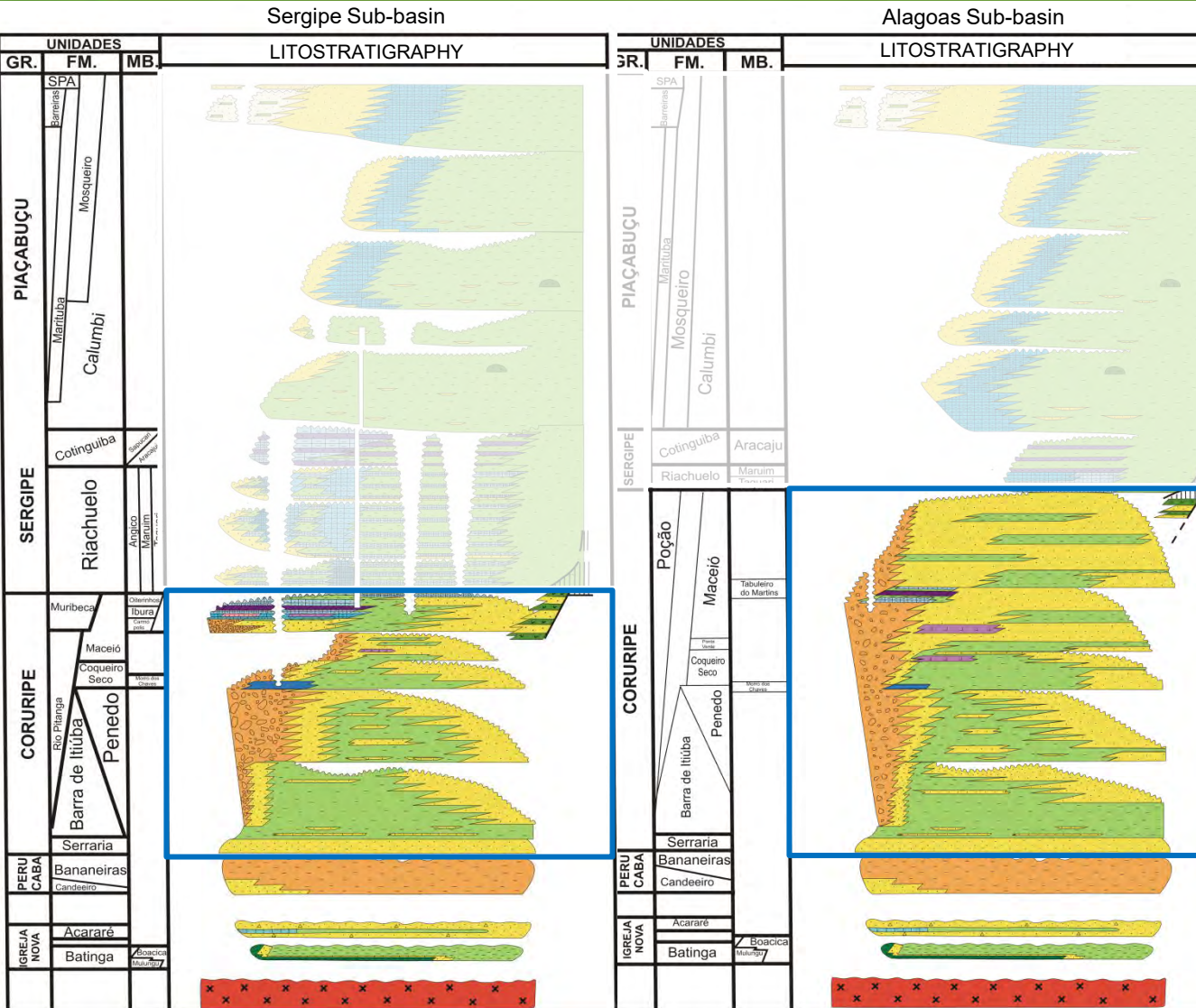


**Pre-Rift
Jurassic**

**Bananeiras and
Candeeiro Fm.**
Fluvial-deltaic/ Lacustrine



Tectonostratigraphic Evolution



Rift
Early Cretaceous
Coruripe Group

Muribeca Fm.

Pocao Fm.

Coqueiro Seco Fm.

Maceio Fm.

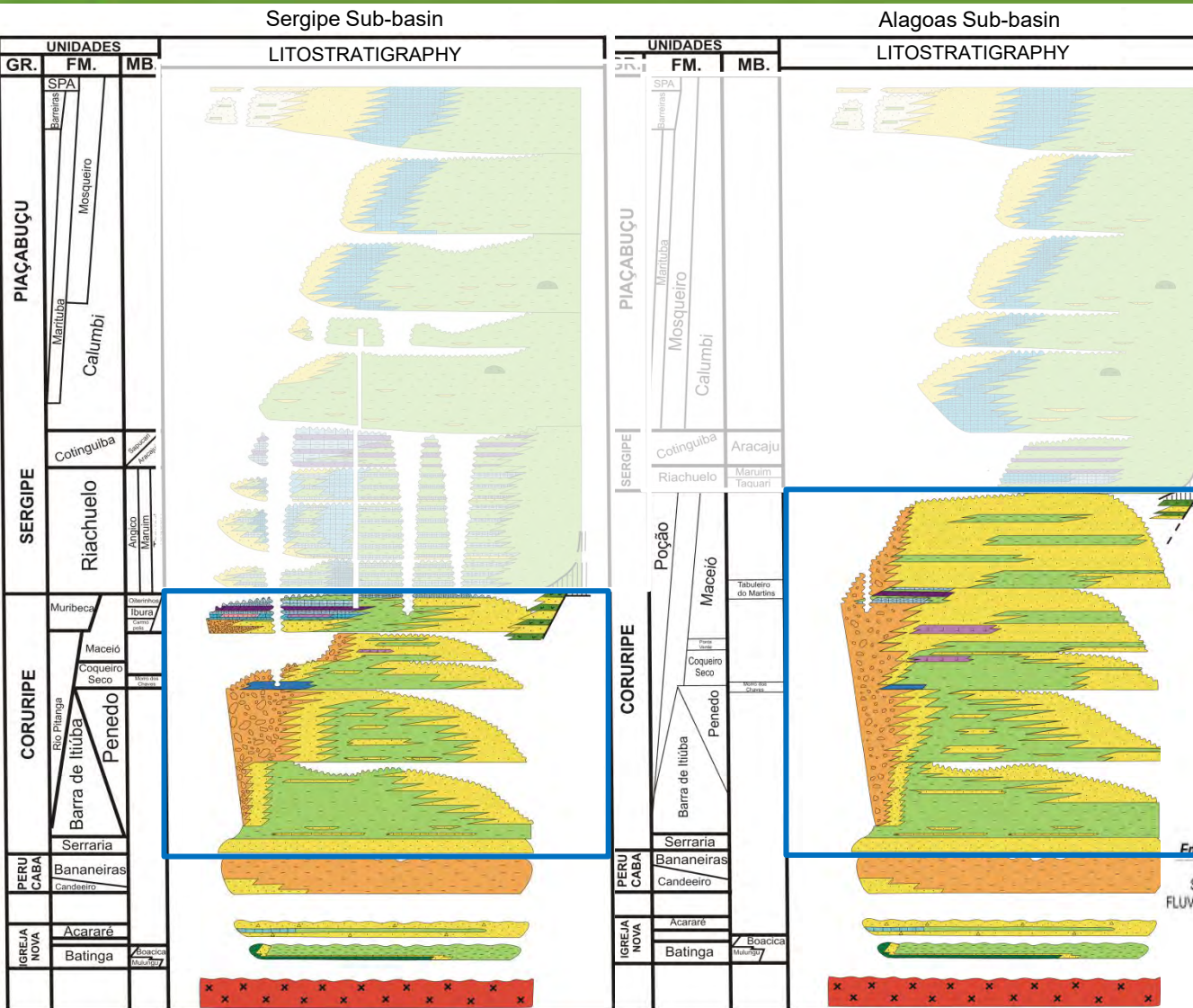
Rio Pitanga Fm.

Penedo Fm.

Barra do Itiuba Fm.

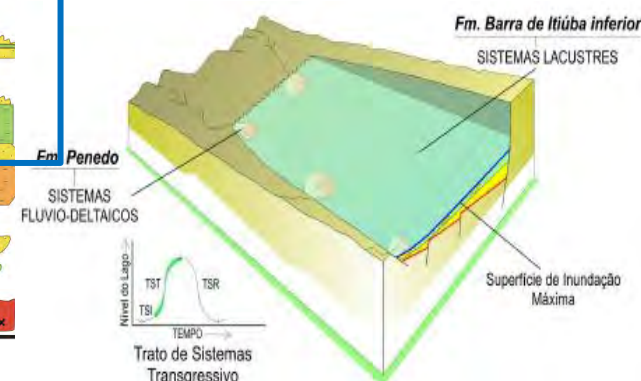
Serraria Fm.

Tectonostratigraphic Evolution

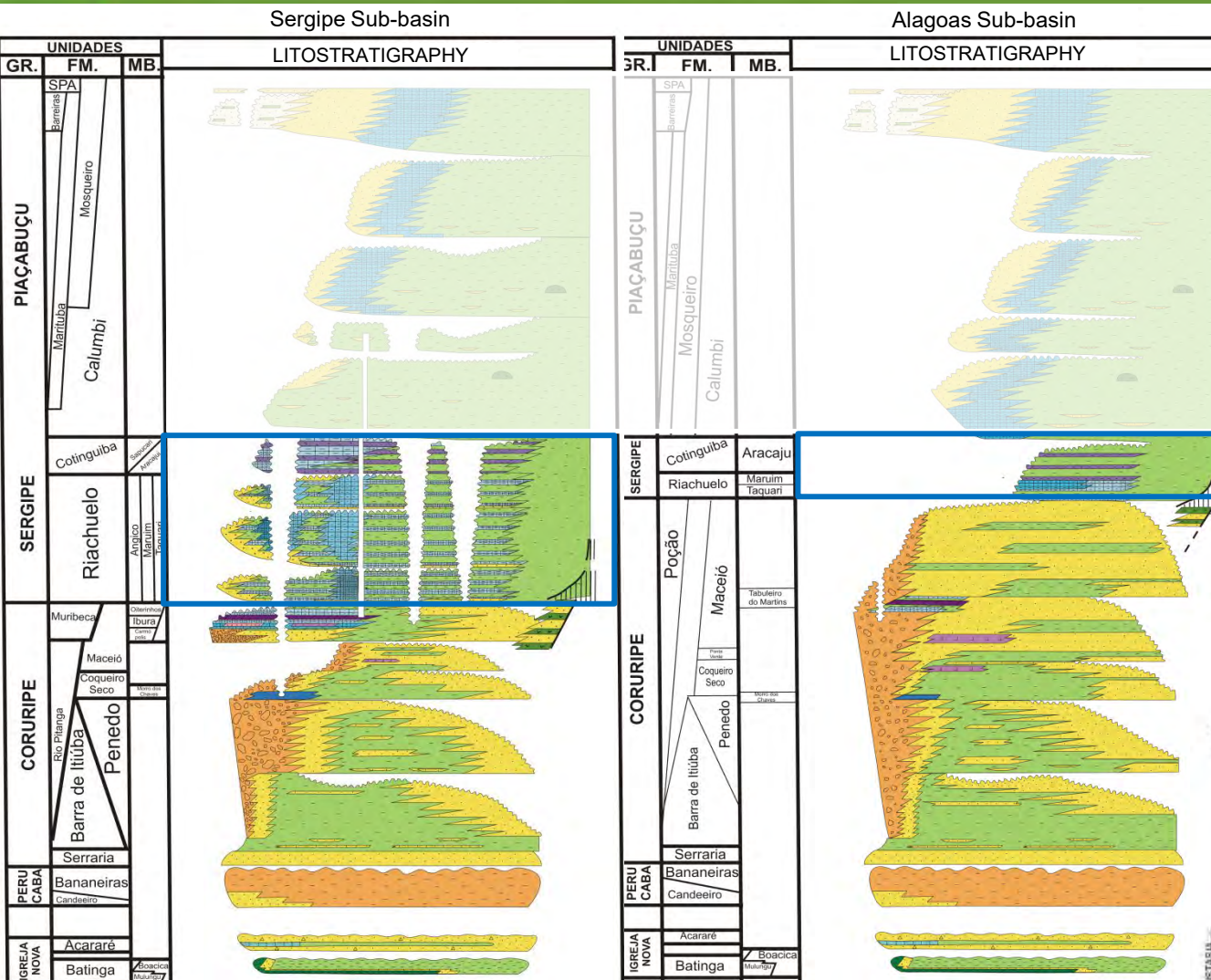


Rift
Early Cretaceous
Coruripe Group

*Fluvial-Deltaics, Alluvials
and Lacustrine*



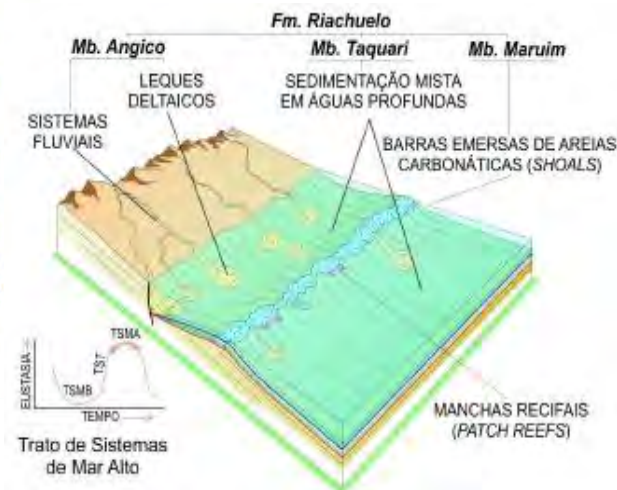
Tectonostratigraphic Evolution



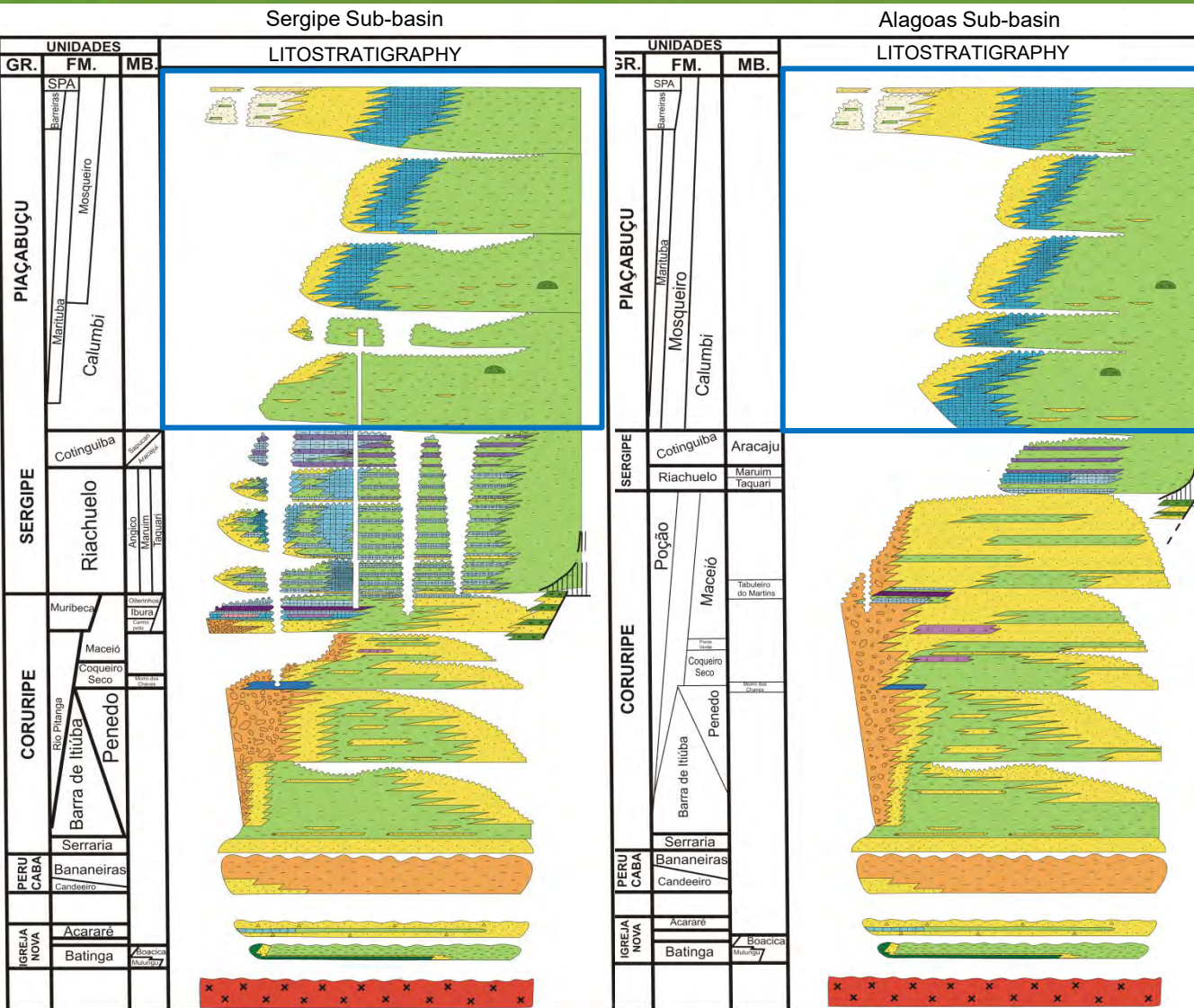
Transgressive Drift
Neoaptian to Turonian
Sergipe Group

Cotinguiba Fm.
Neritic to superior bathyal

Riachuelo Fm.
Carbonate Platform of shallow waters



Tectonostratigraphic Evolution

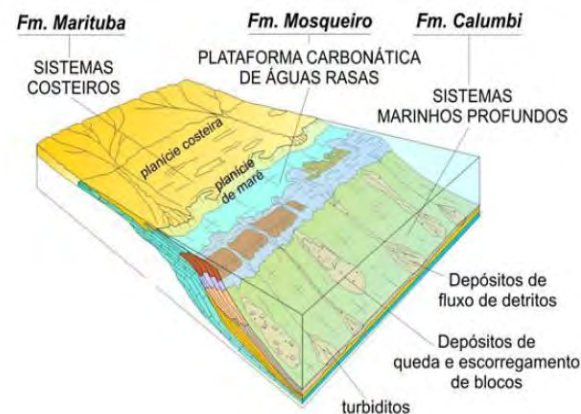


Regressive Drift Santonian to Recent Piacabucu Group

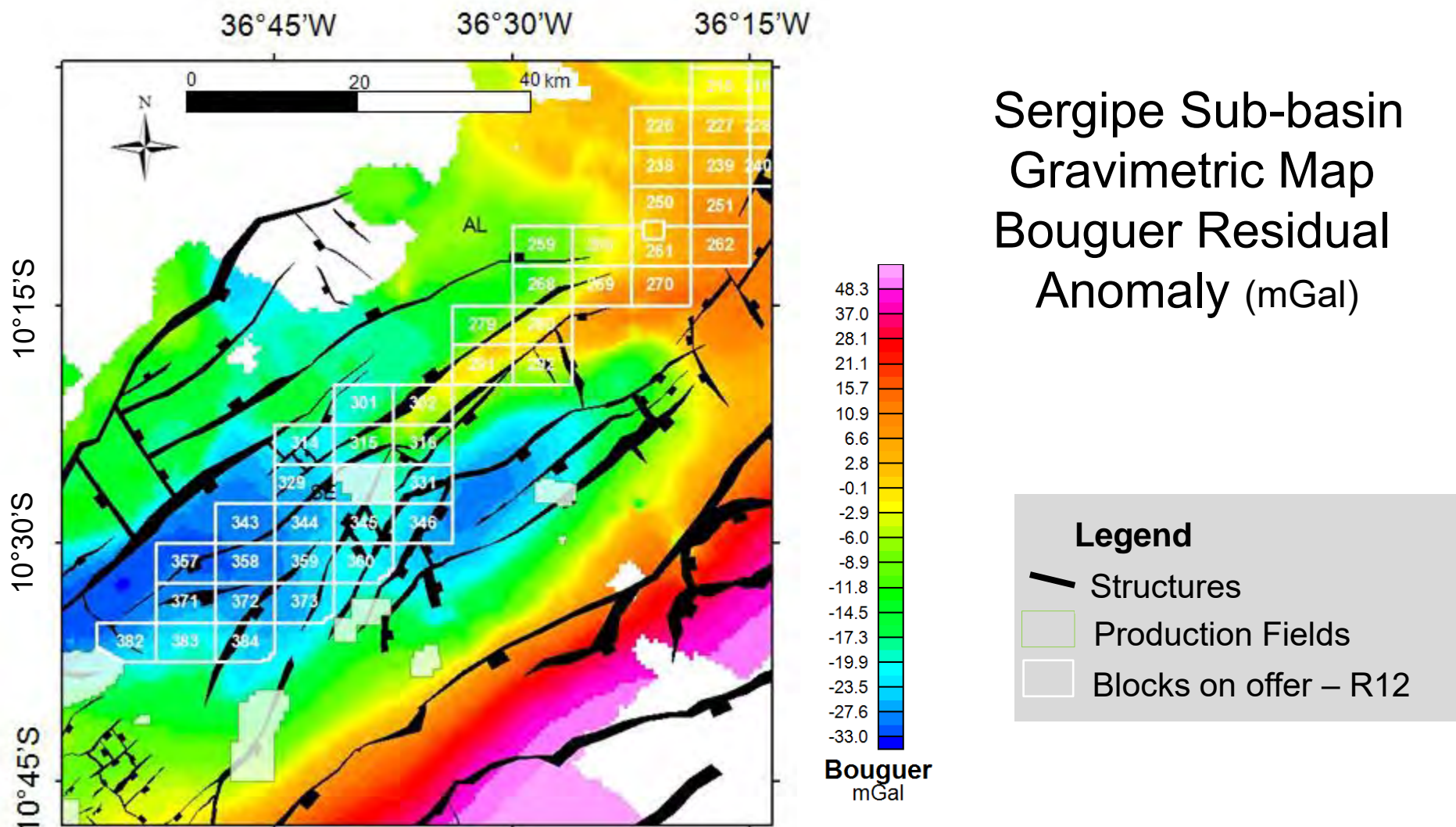
Calumbi Fm.
Deep Marine

Mosqueiro Fm.
Carbonate Platform

Marituba Fm.
Coastal

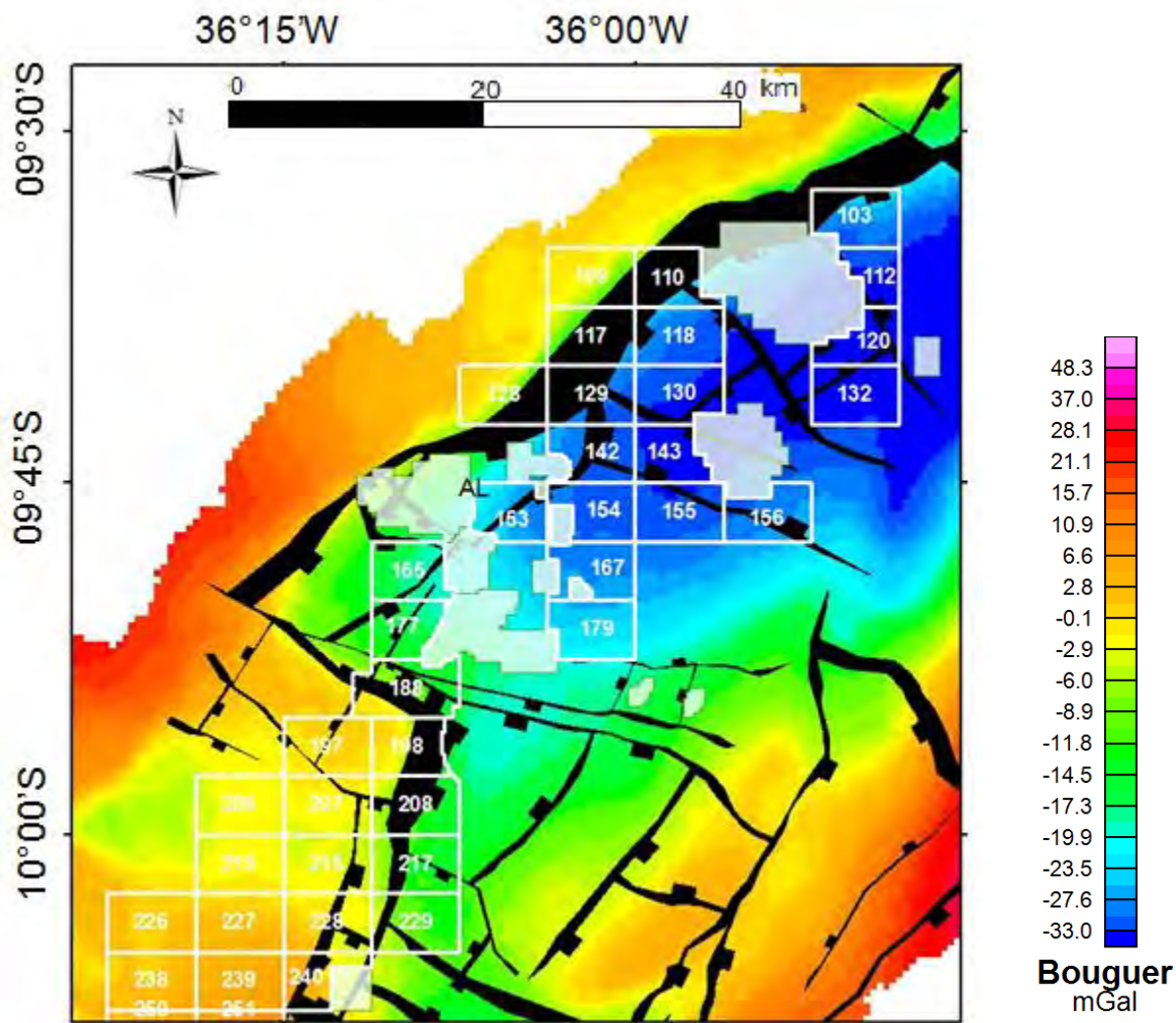


Structural Map






Sergipe Sub-basin
Gravimetric Map
Bouguer Residual
Anomaly (mGal)

Structural Map



Alagoas Sub-basin
Gravimetric Map
Bouguer Residual
Anomaly (mGal)

Legend

-  Structures
-  Production Fields
-  Blocks on offer - R12

Location and Characterization

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

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Plays

Area on Offer

Final Remarks

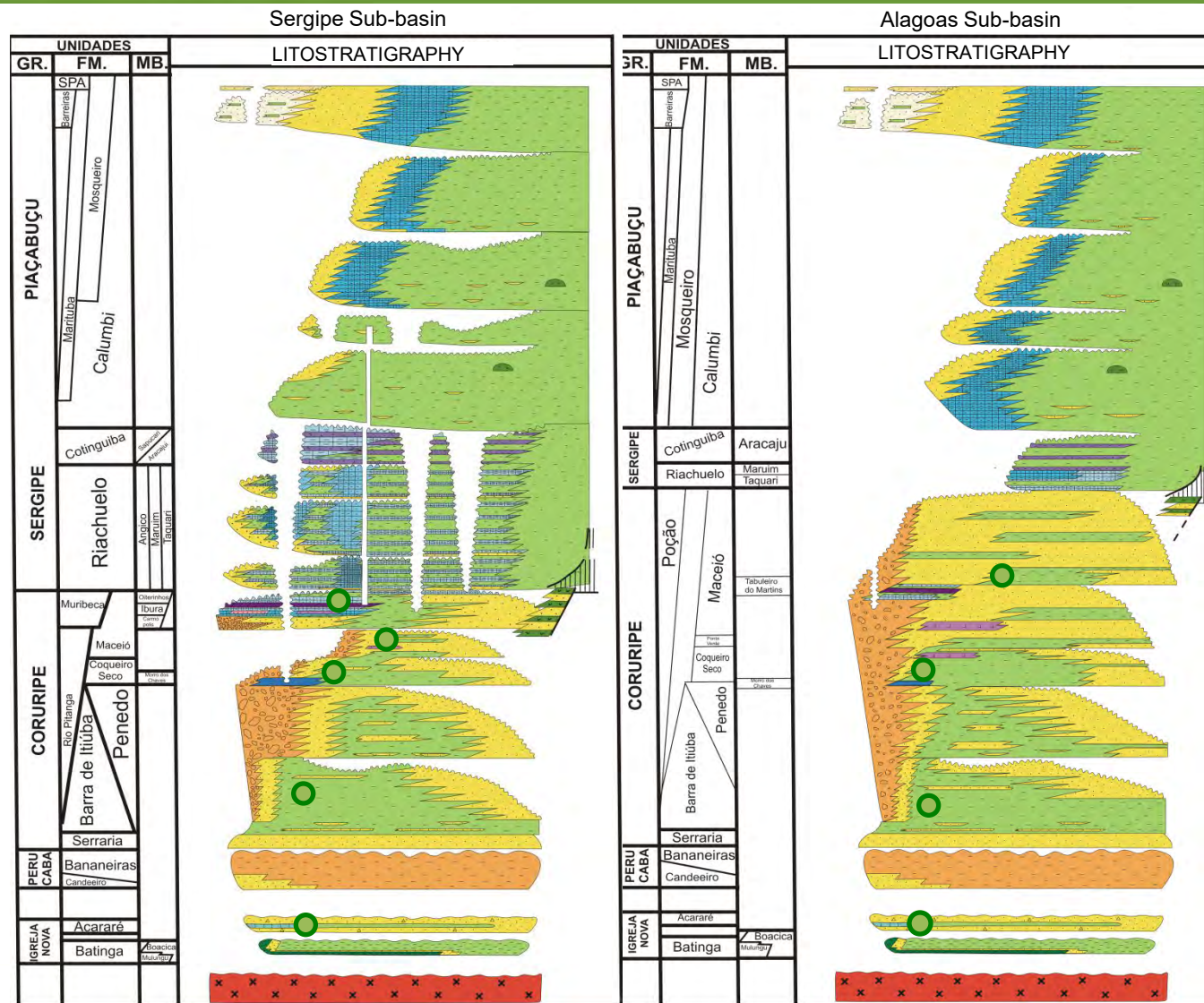
Source Rocks

Late Aptian
Muribeca Fm.(Sergipe)
TOC 2%

➔ **Middle Aptian**
Maceio Fm.
TOC 2%, up to 5%, high
generator potencial

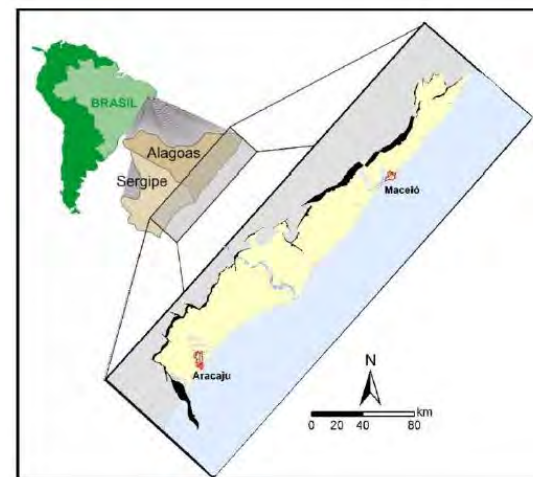
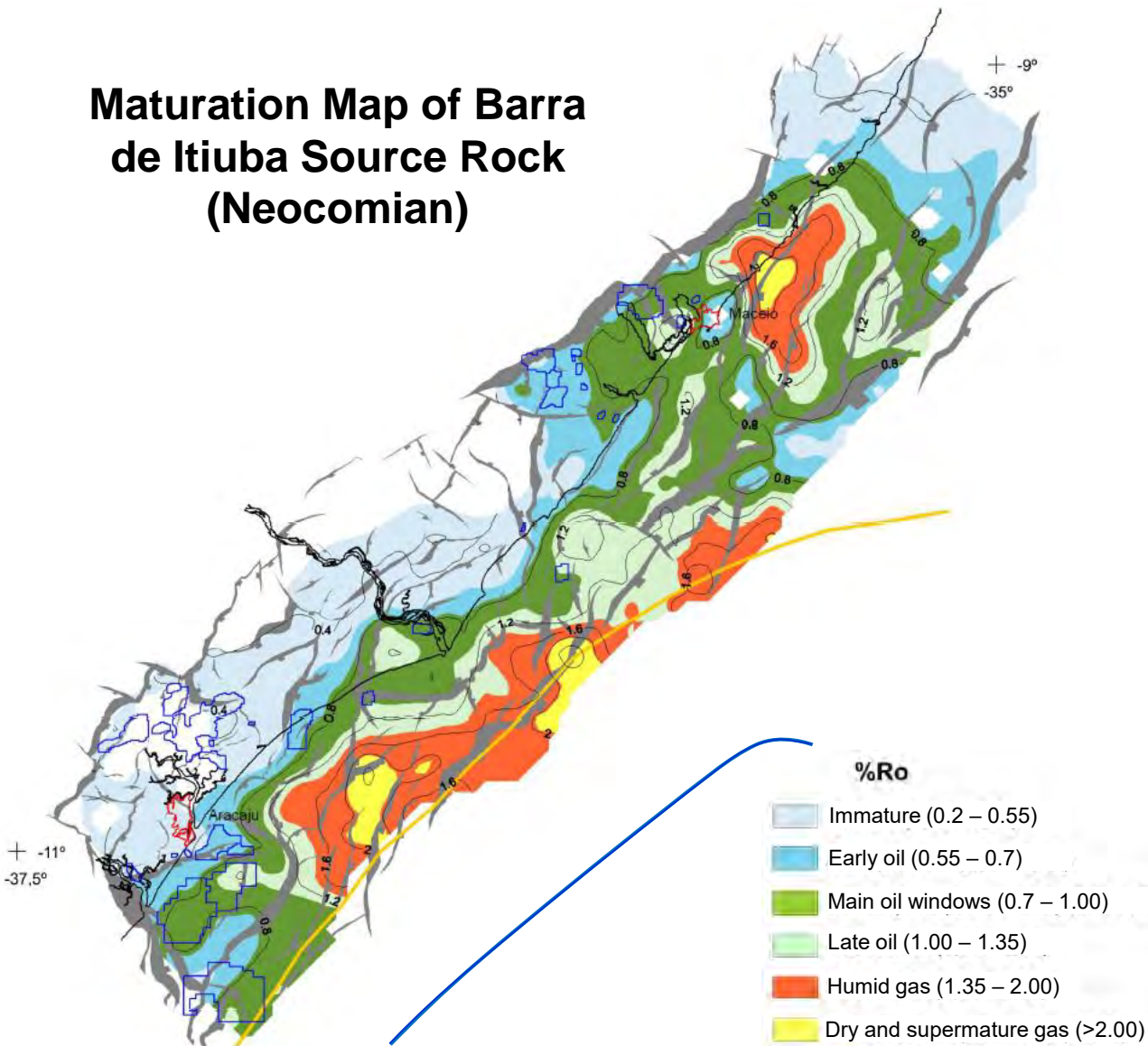
➔ **Aptian to Neocomian**
Barra de Itiuba and
Coqueiro Seco
Formations
TOC of 3%, high generator
potencial and
Kerogen Types I and II

Early Permian
Aracare Fm.
TOC 2% up to 5%



Source Rocks

Maturation Map of Barra de Itiuba Source Rock (Neocomian)



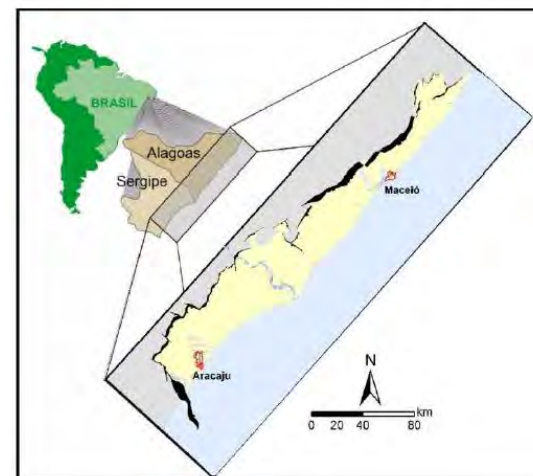
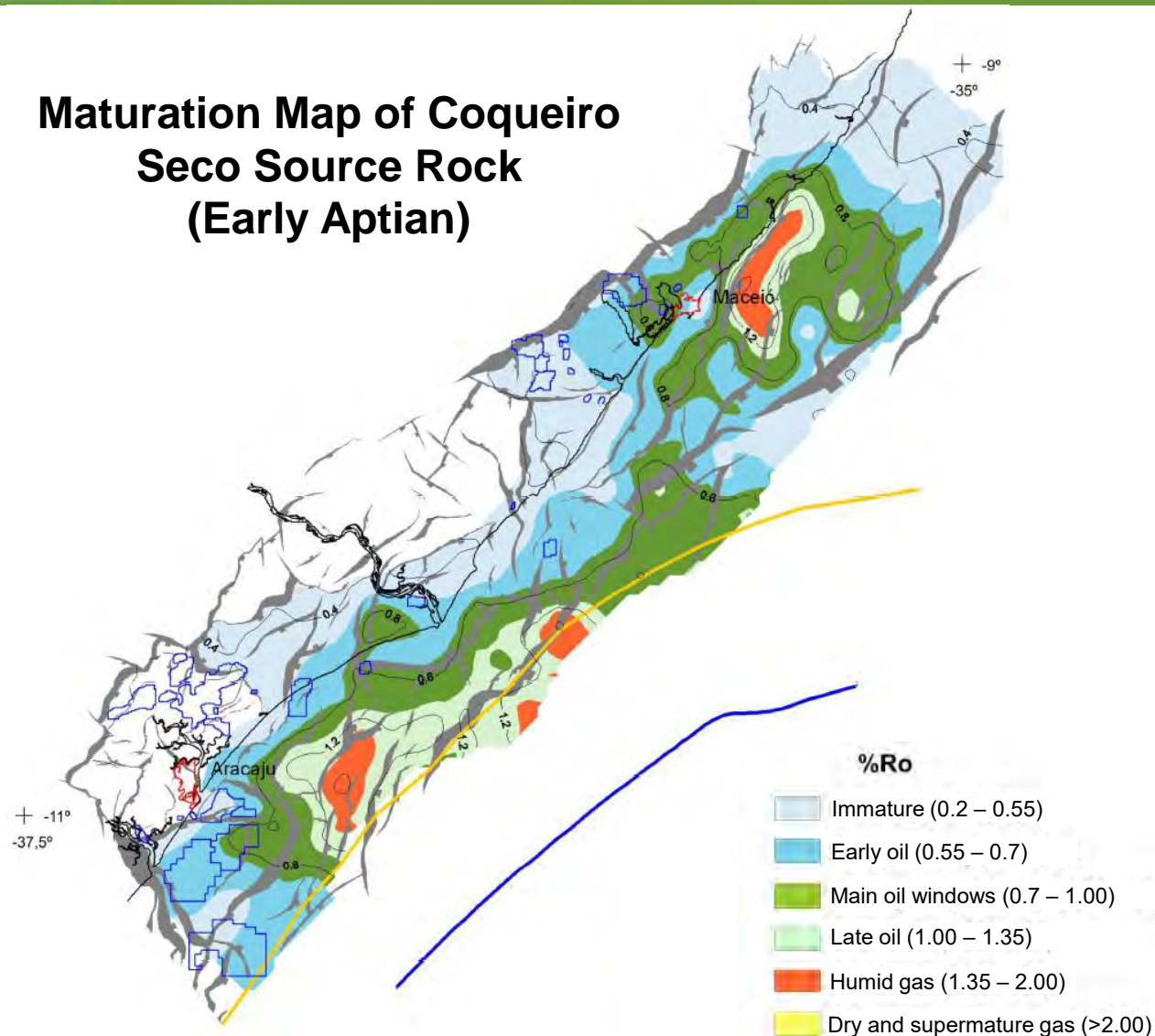
LEGEND

- Shoreline
- State Capitals
- Production Fields
- Sinrift faults interpreted in seismic
- Continental-oceanic crust boundary (gravimetry)
- Late rift volcanic rock boundary

Source: ANP/UFRN/FUNPEC, 2008

Source Rocks

Maturation Map of Coqueiro Seco Source Rock (Early Aptian)



LEGEND

- Shoreline
- ◻ State Capitals
- ◻ Production Fields
- Sinrift faults interpreted in seismic
- Continental-oceanic crust boundary (gravimetry)
- Late rift volcanic rock boundary

Reservoirs

Albian to Aptian
Sintectonic
Conglomerates

Aptian to Barremian
Maceio, Penedo and
Coqueiro Seco Fm.
Sinrift Sandstones
Ø = 10% to 25%

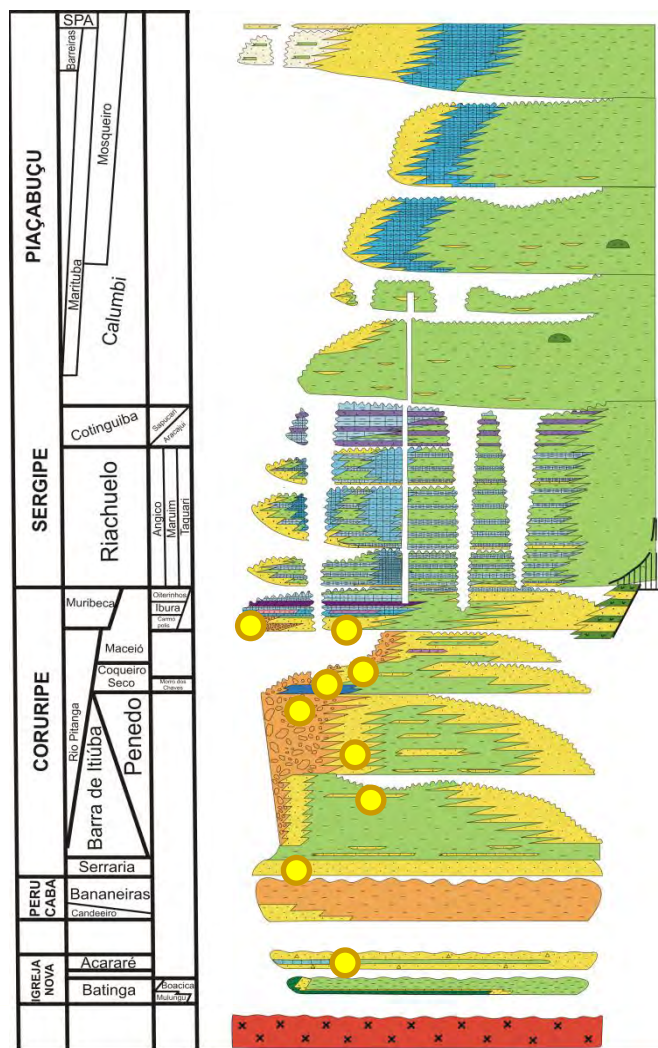
Early Aptian
Morro do Chaves Coquina

Neocomian
Rift Turbidites

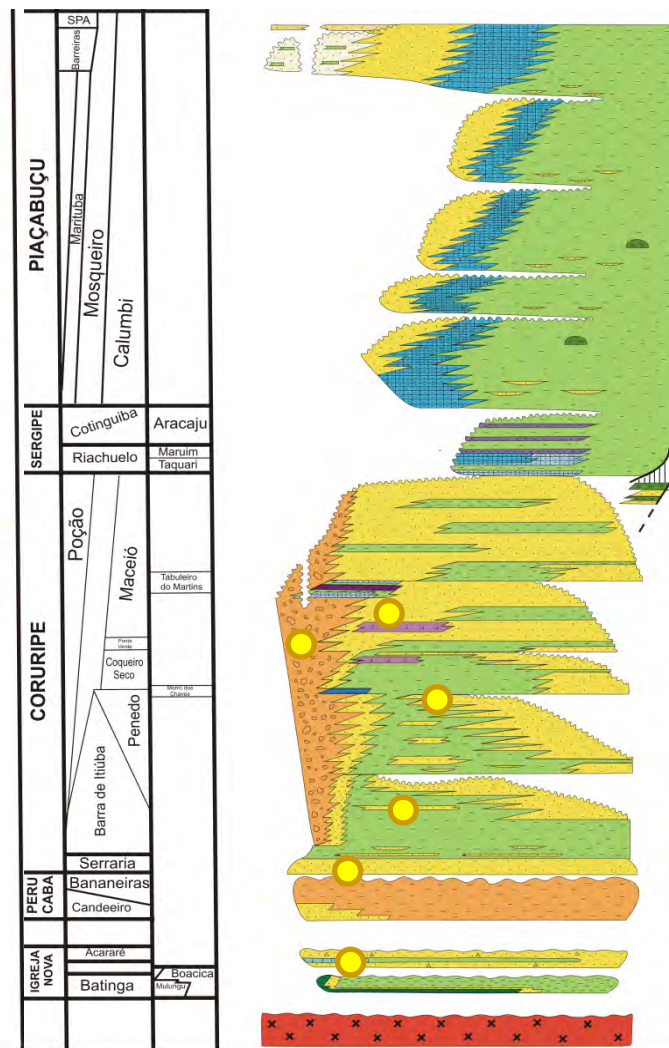
Neocomian to Jurassic
Pre-Rift Sandstone and
Serraria Fm.

Early Permian
Aracare Fm.

Sergipe Sub-basin



Alagoas Sub-basin



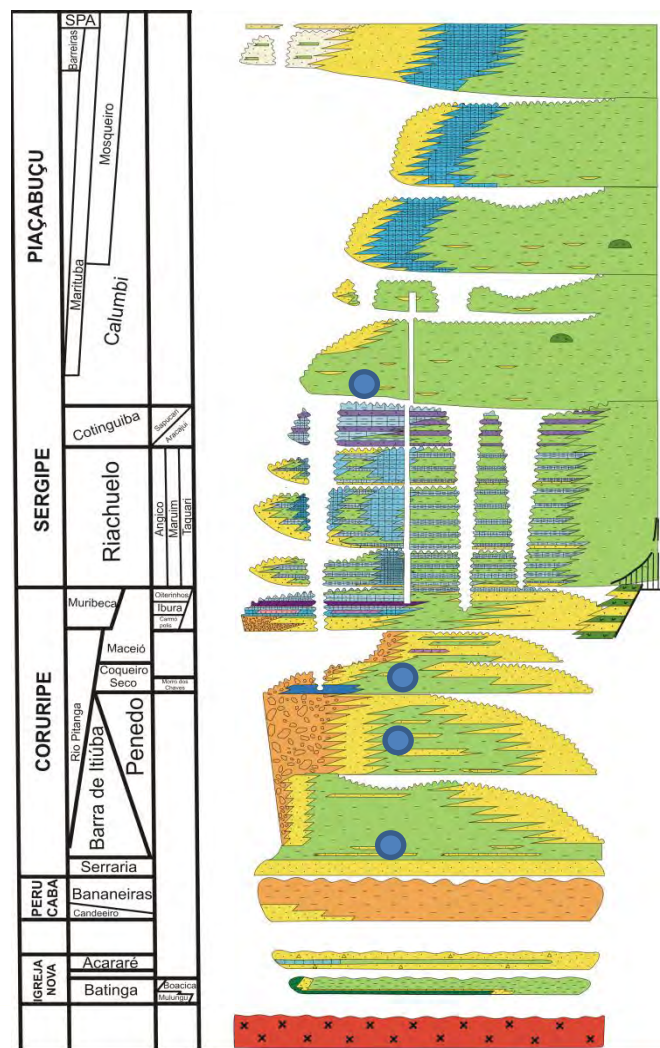
Seals

Shales of Calumbi Fm.

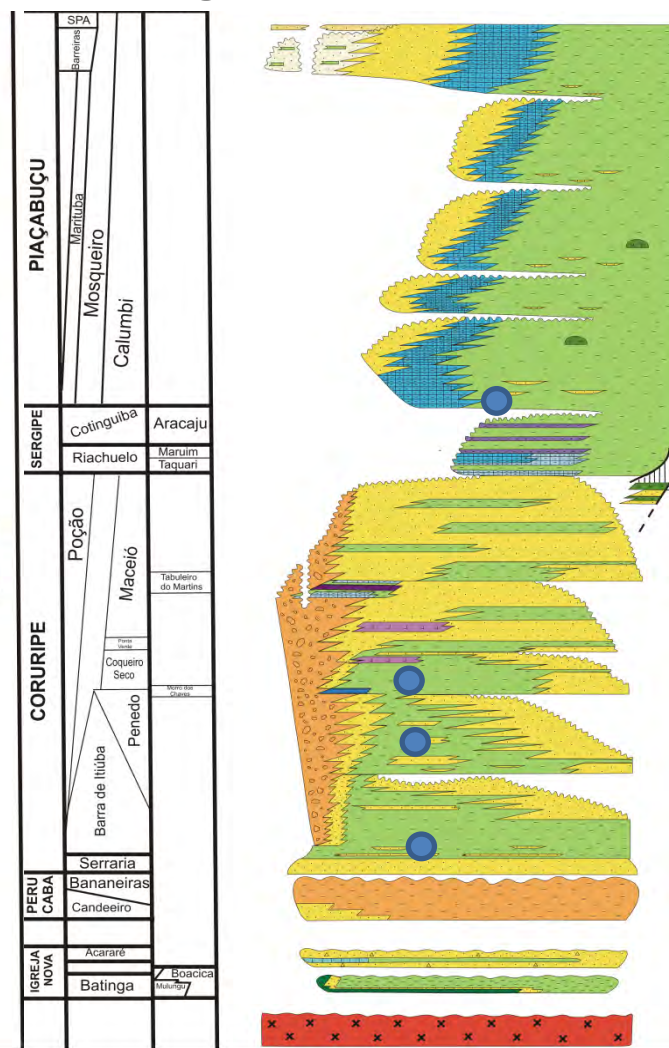
Shales of Barra do Itiuba
and Coqueiro Seco
Formations

Shales of Feliz Deserto
Formation and base of
Barra do Itiuba
Formation

Sergipe Sub-basin



Alagoas Sub-basin



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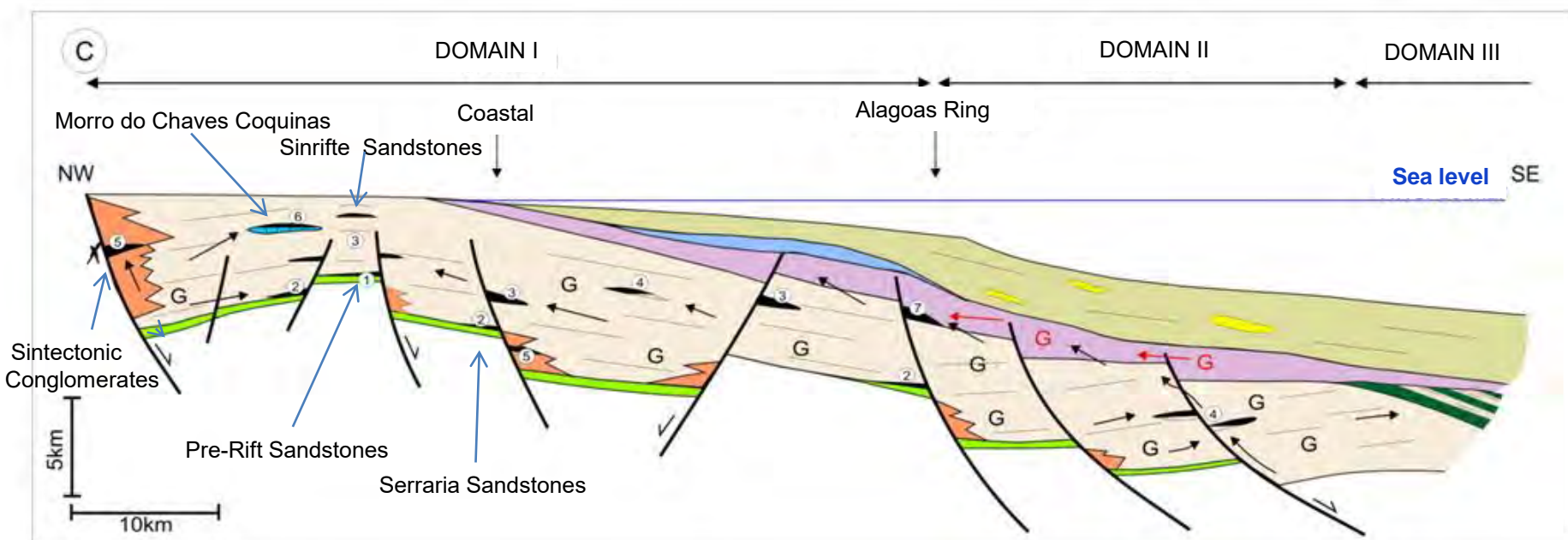
Final Remarks

Expected Plays

Aptian	Sintectonic Conglomerates
	Sinrift Sandstones
	Carbonates
Neocomian	Rift Turbidites
	Serraria Sandstones
	Pre-Rift Sandstones
Basement	Fractured Basement

Accumulation Models

Source Rock: Barra de Itiuba – Coqueiro Seco

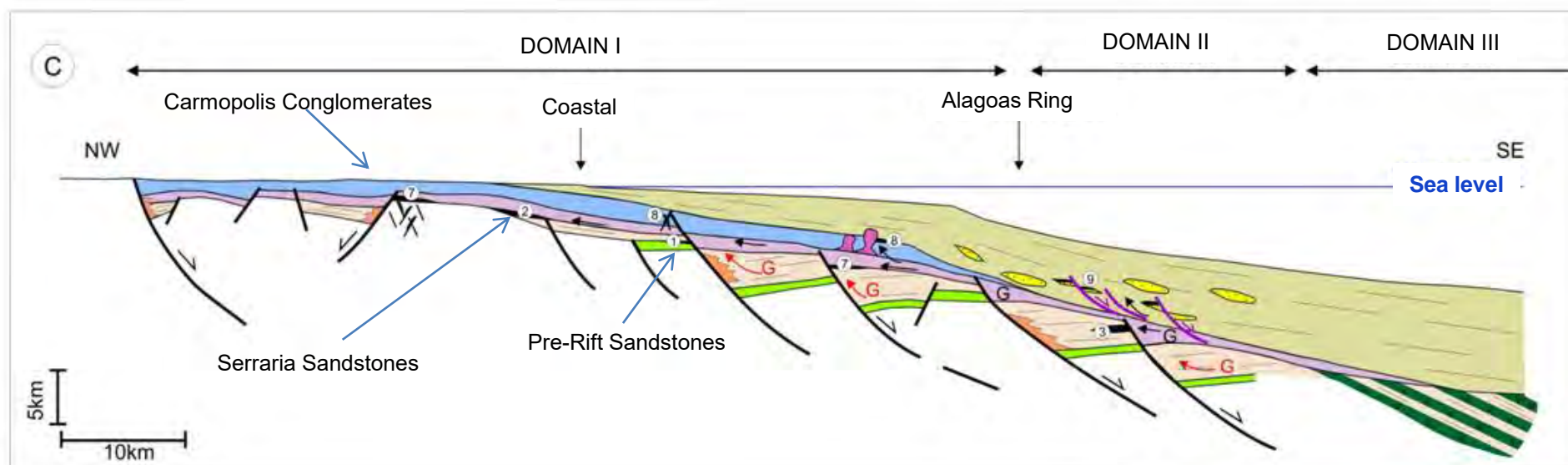


Legend



Accumulation Models

Source Rock: Muribeca



Legend



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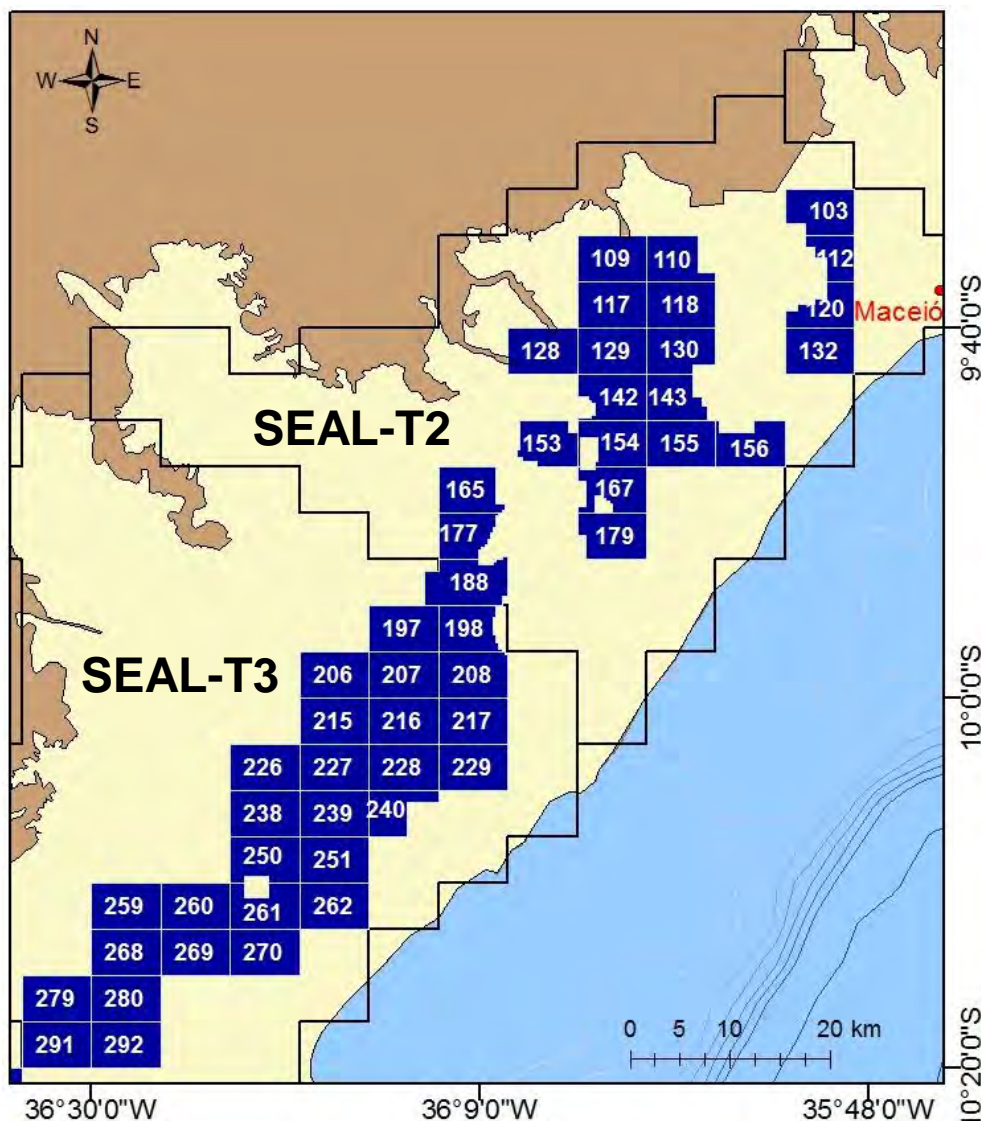
Petroleum Systems

Plays

Area on Offer







Final Remarks

Blocks on Offer Alagoas Sub-basin

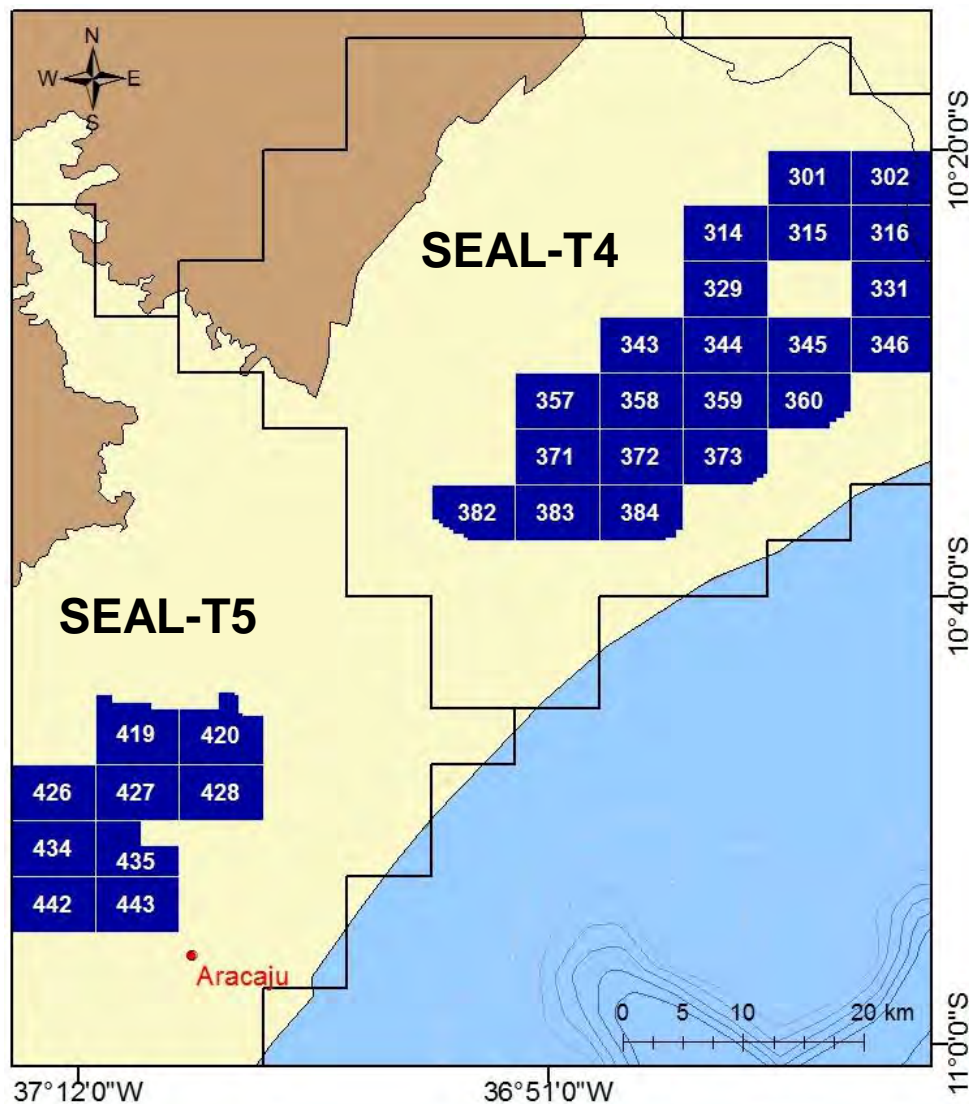


- . Sectors SEAL-T2 and SEAL-T3
- . 50 Blocks
- . Total Area of 1,490 km²

Legend:

-  Capital
-  Production/Development Fields
-  Sectors Round 12
-  Blocks on Offer - Round 12
-  Sedimentary basins
-  Basement

Blocks on Offer Sergipe Sub-basin

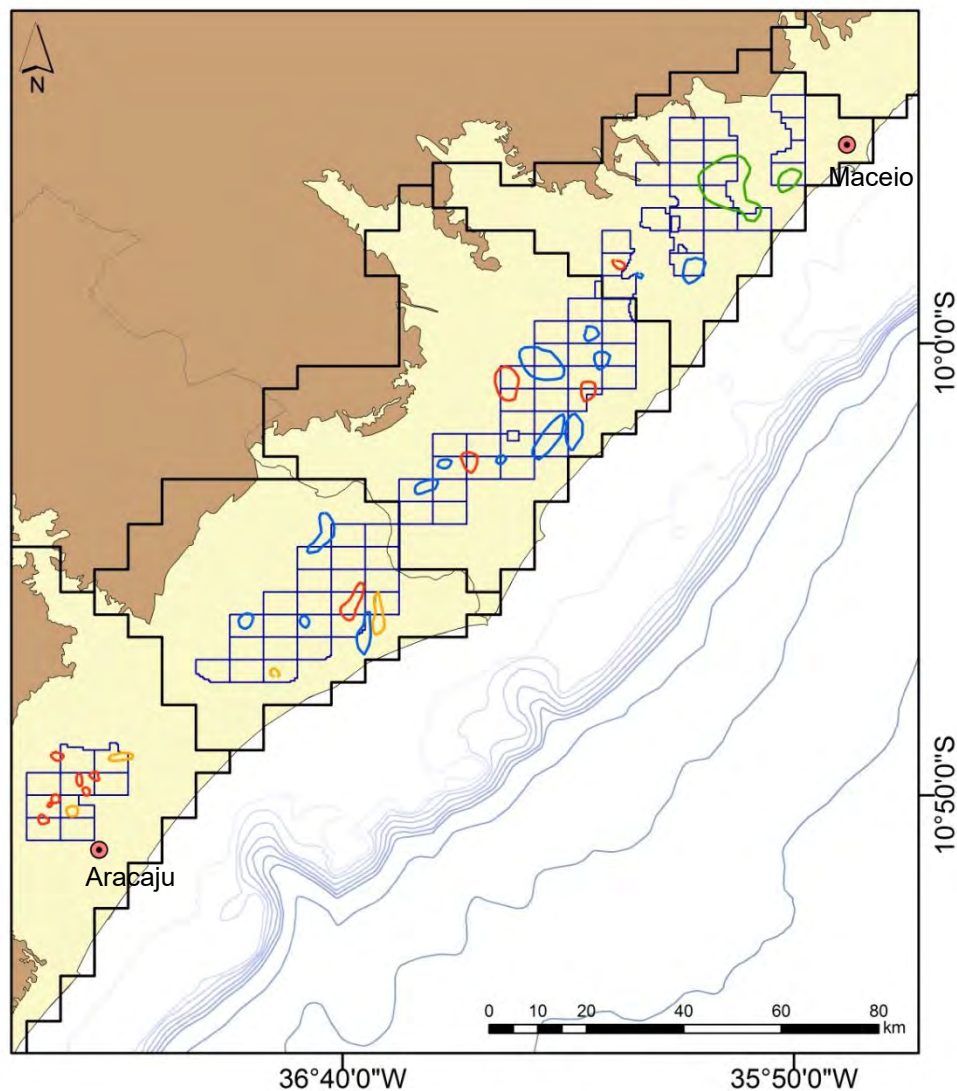


- . Sectors SEAL-T4 and SEAL-T5
- . 30 Blocks
- . Total Area of 953 km²

Legend:

- Capital
- Production/Development Fields
- Sectors Round 12
- Blocks on Offer - Round 12
- Sedimentary basins
- Basement

Leads

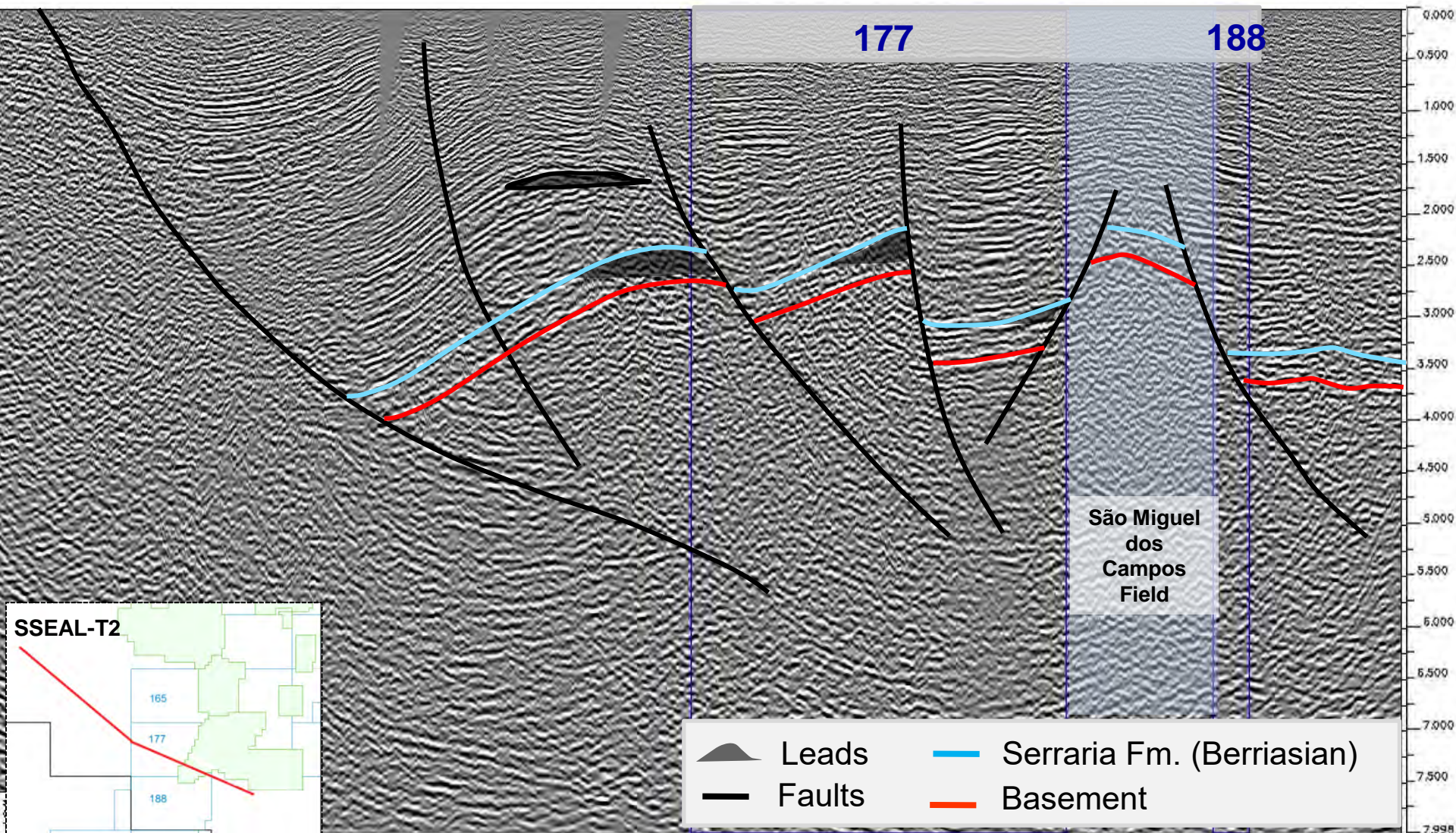


Legend:

-  Capitals
-  Leads Muribeca Fm./Carmópolis Mb.- Aptian
-  Leads Barra do Itiuba Fm. - Barremian
-  Leads Serraria Fm. - Berriasian
-  Leads Fractured Basement
-  Blocks on Offer - Round12
-  Sedimentary Basin
-  Basement

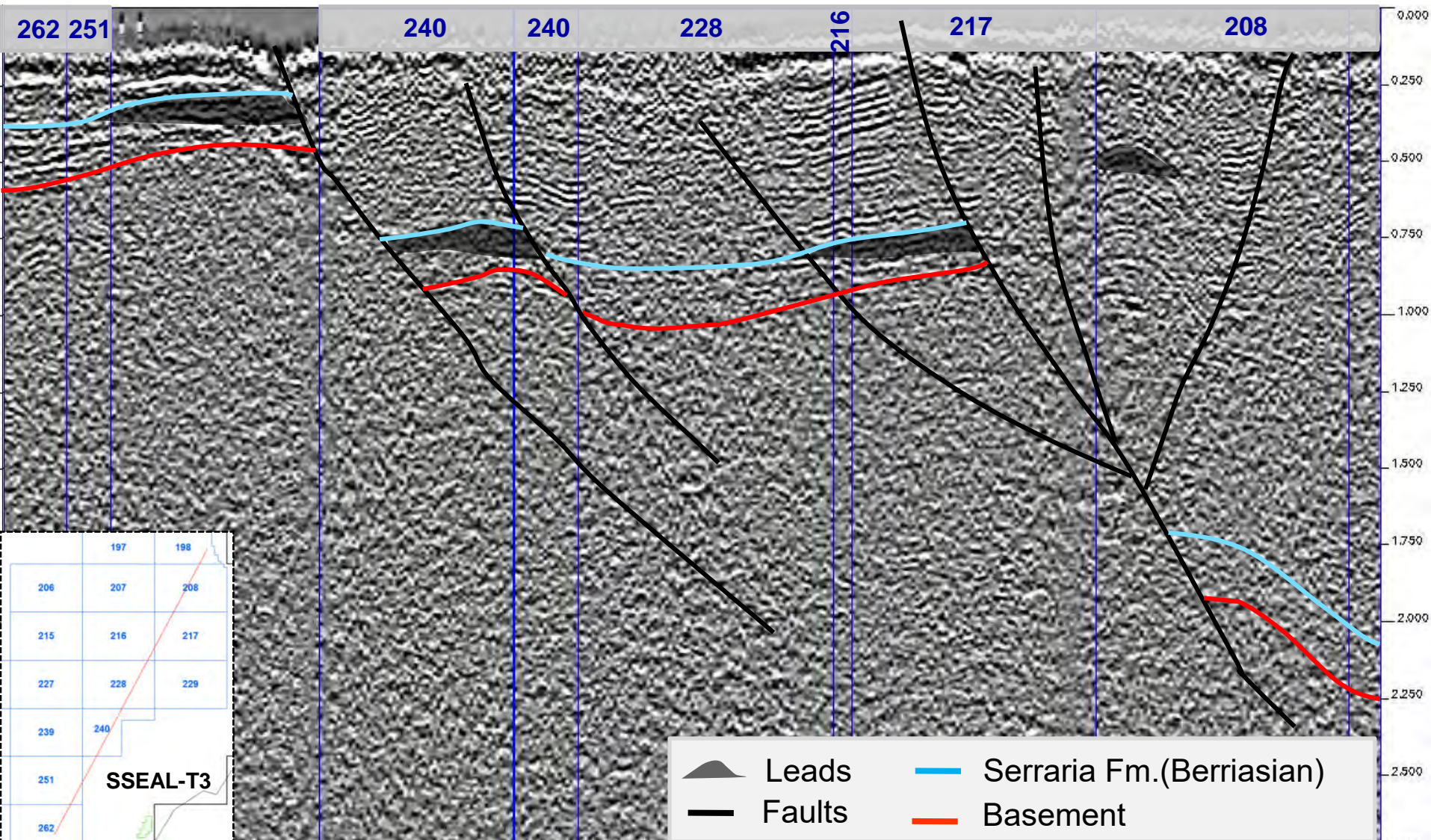
Leads

Seismic Line 027-1464



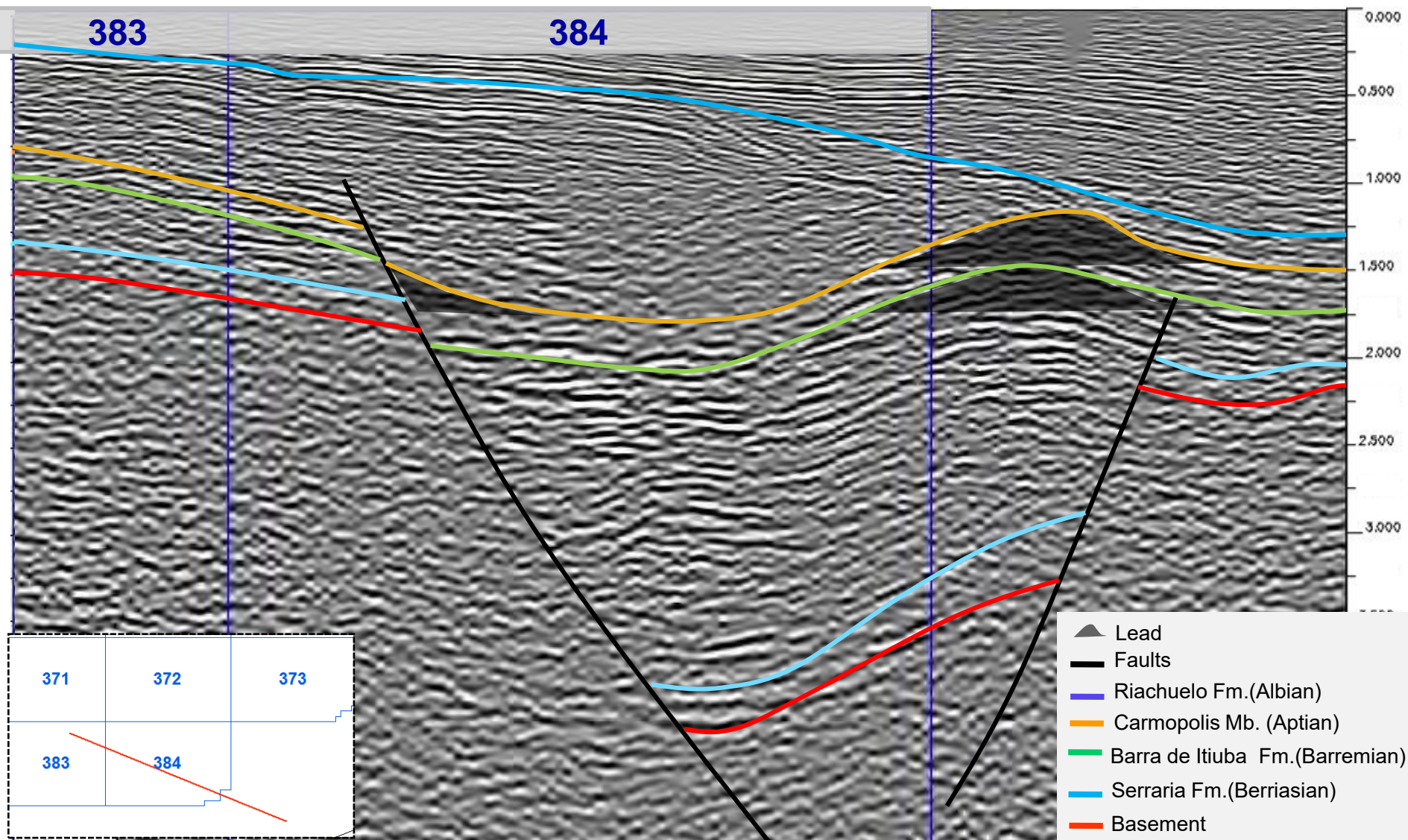
Leads

Seismic 027-0505



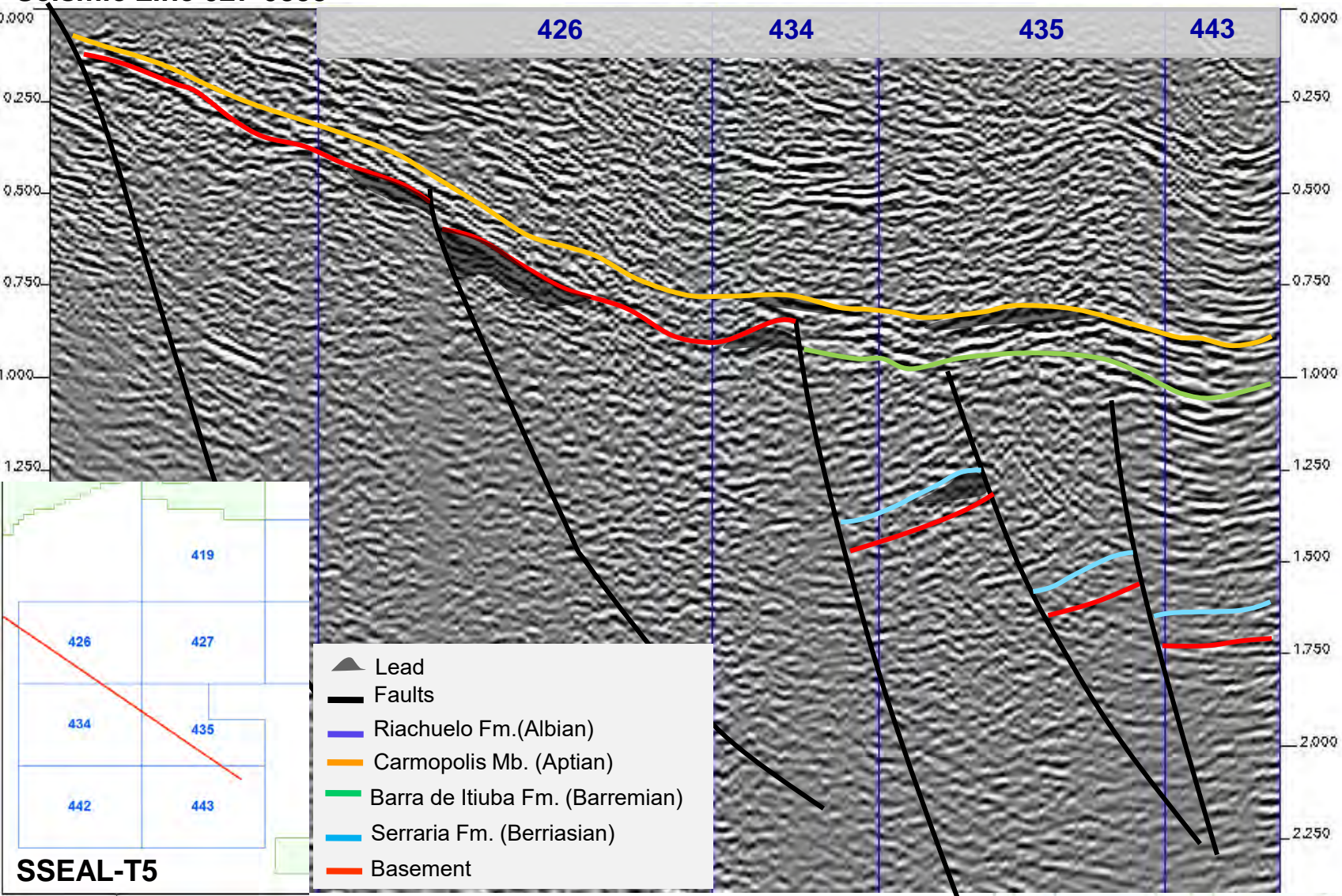
Leads

Seismic Line 027-1171



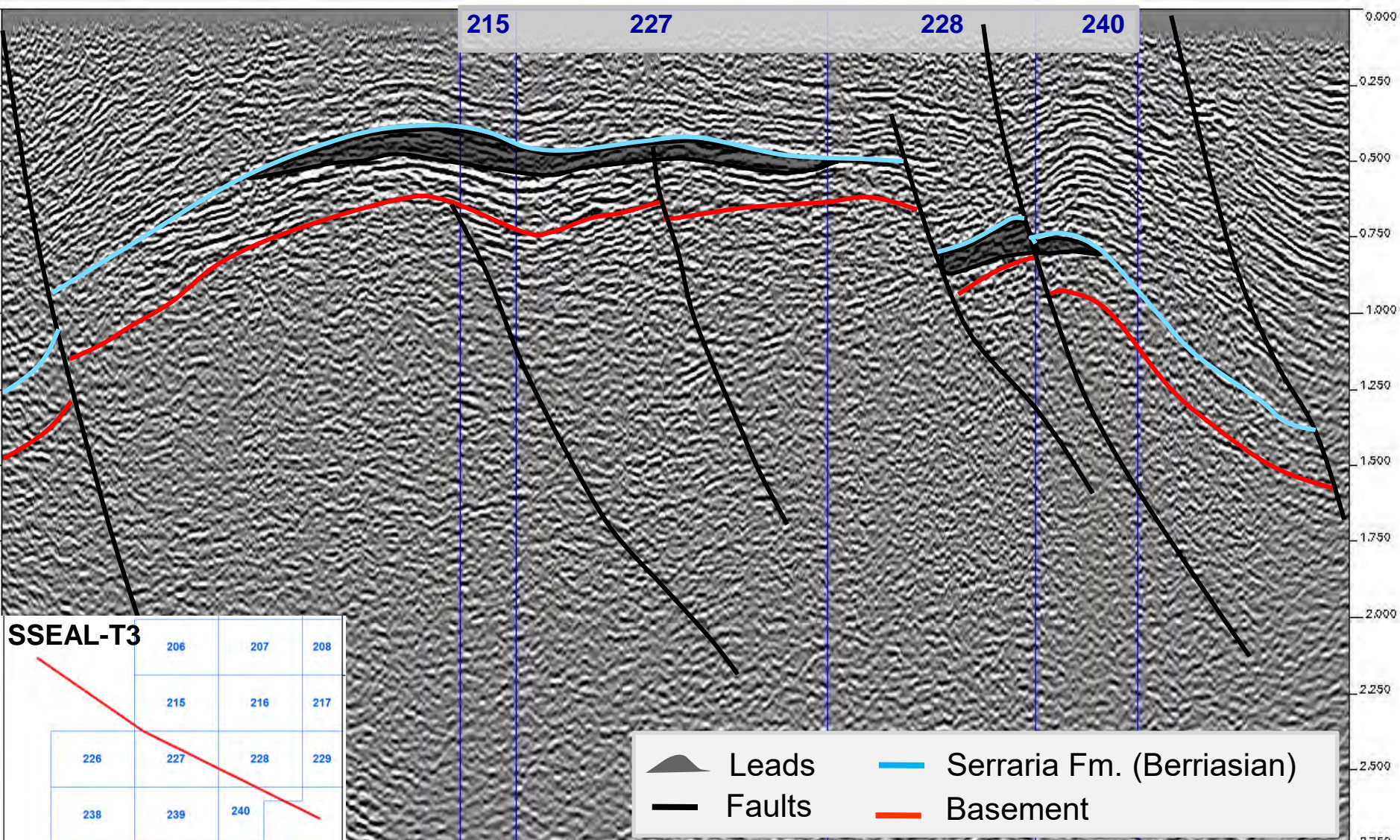
Leads

Seismic Line 027-0853



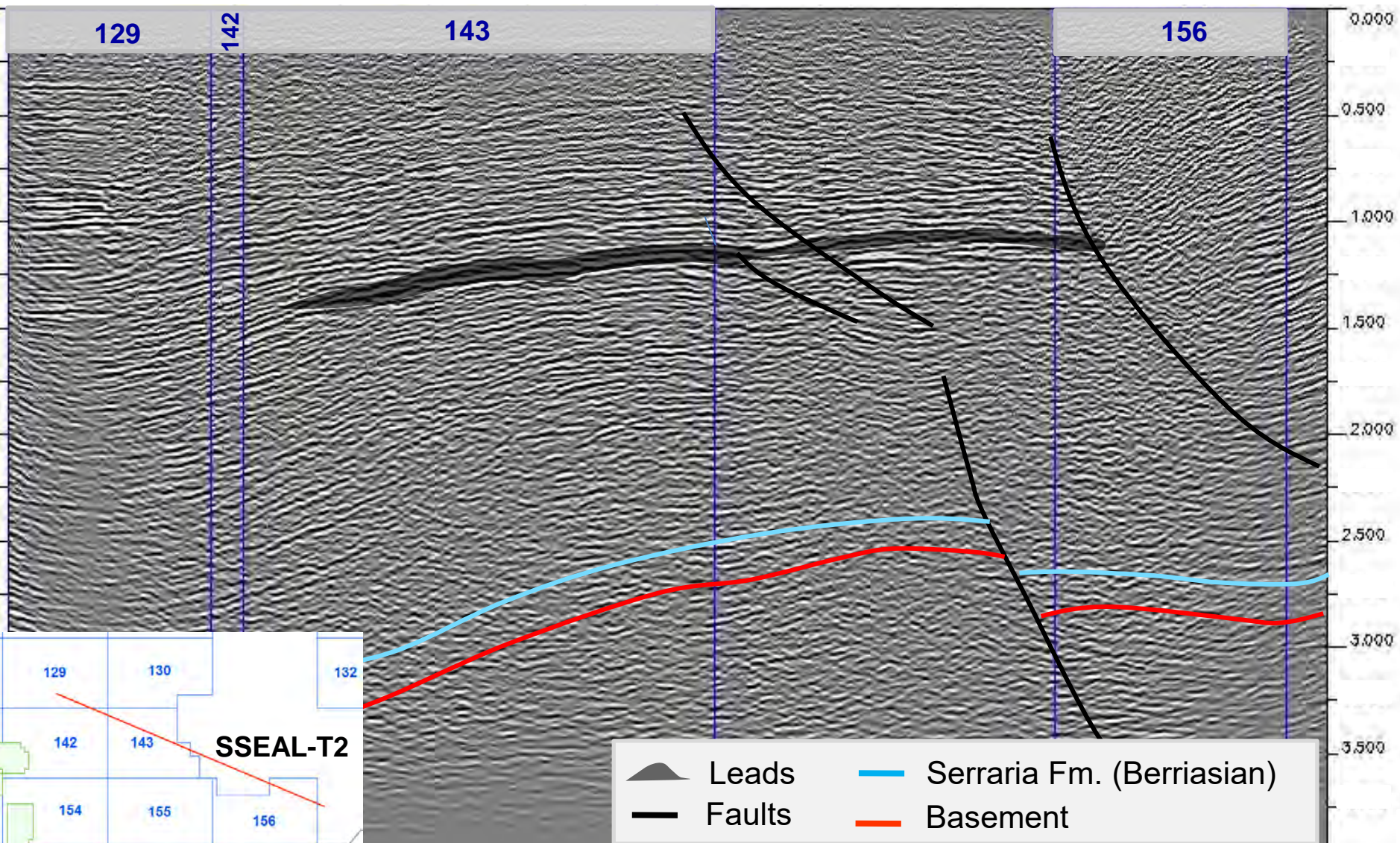
Leads

Seismic Line 027-0502



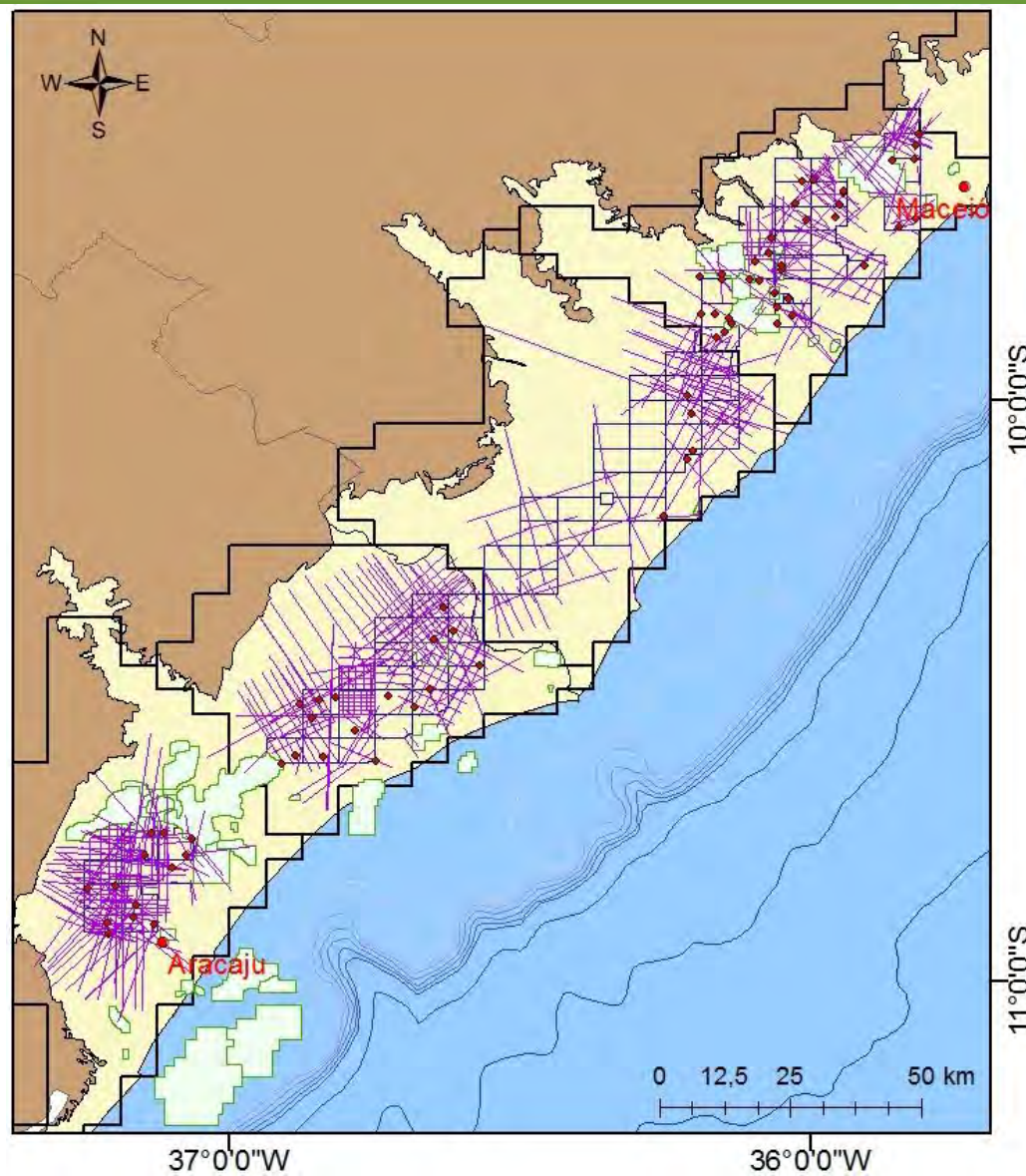
Leads

Seismic Line 027-0933



Data Package

- 6,061 km of 2D Seismic Surveys
- 70 Wells
- Petroleum System Study of Sergipe-Alagoas Basin- ANP/UFRN 2008
- Gravimetry



Contractual Aspects

Name of the Sector	SECTORS SSEAL-T2 to SSEAL-T5
Exploration Model	Mature
Number of Blocks	80
Area on Offer	2,418.77 km ²
Exploration Phase	5 years
Exploration Period	3+2 years
Tecnichal Qualification of the Operator	C
Minimum Bonus	R\$ 63,936.08 to R\$ 293,248.00
Exploration Objective	Berraiasian (Serraria Fm.)
Stratigraphic Objective	Aptian (Muribeca Fm.)

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Final Remarks

Final Remarks

- Mature basin
- Active production of oil and gas in the northeast of Brazil
- Infrastructure for the oil industry
- 20% of the onshore reserves of the country
- Efficient petroleum system and diversity of plays
- Favorable conditions for oil and gas accumulations
- Adequate opportunities for small and medium-sized companies

National Agency of Petroleum, Natural Gas and Biofuels

Marcos André Rodrigues Alves
maalves@anp.gov.br

Gustavo Santana Barbosa
gbarbosa@anp.gov.br

www.anp.gov.br

