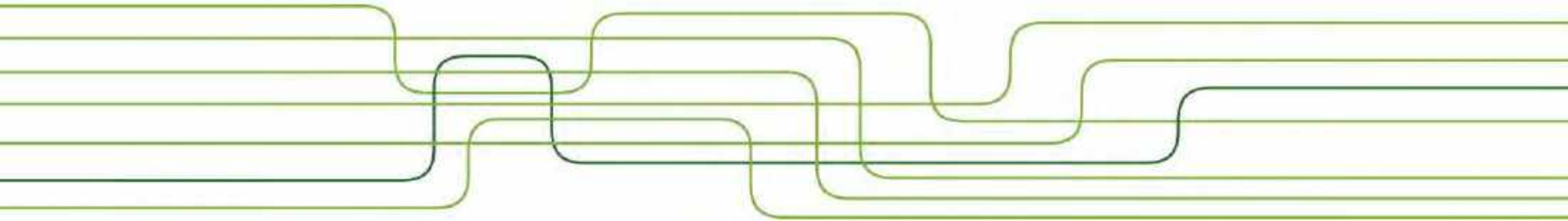


Brasil12thRound

Oil & Gas Bidding Rounds

Parnaíba Basin

Marina Abelha



Agenda

Location

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Exploration Overview

Tectonostratigraphic Evolution

Petroleum Systems

Plays

Exploration Successes

Area on Offer

Final Remarks

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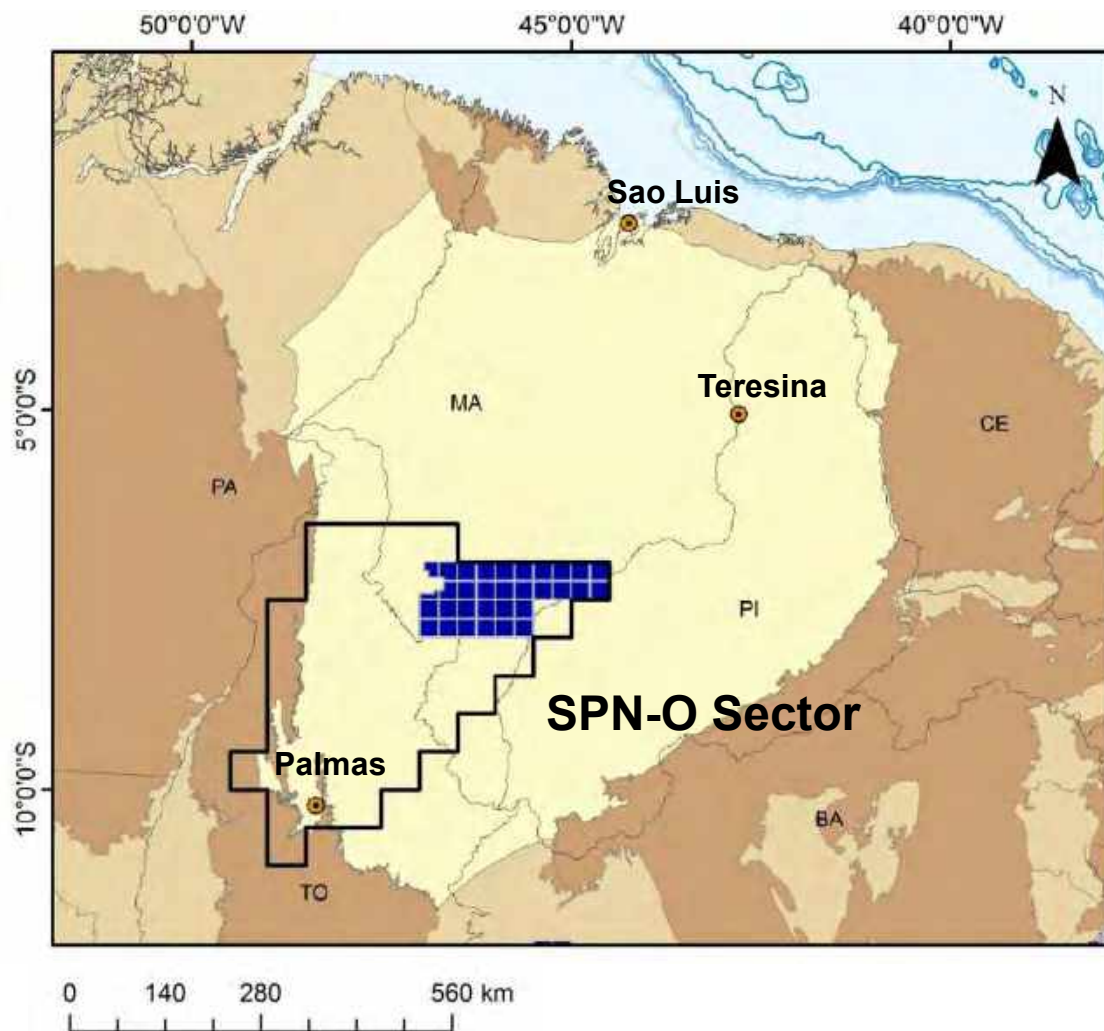
Plays

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Paleozoic Basin

Total Area ~ 670,000 km²

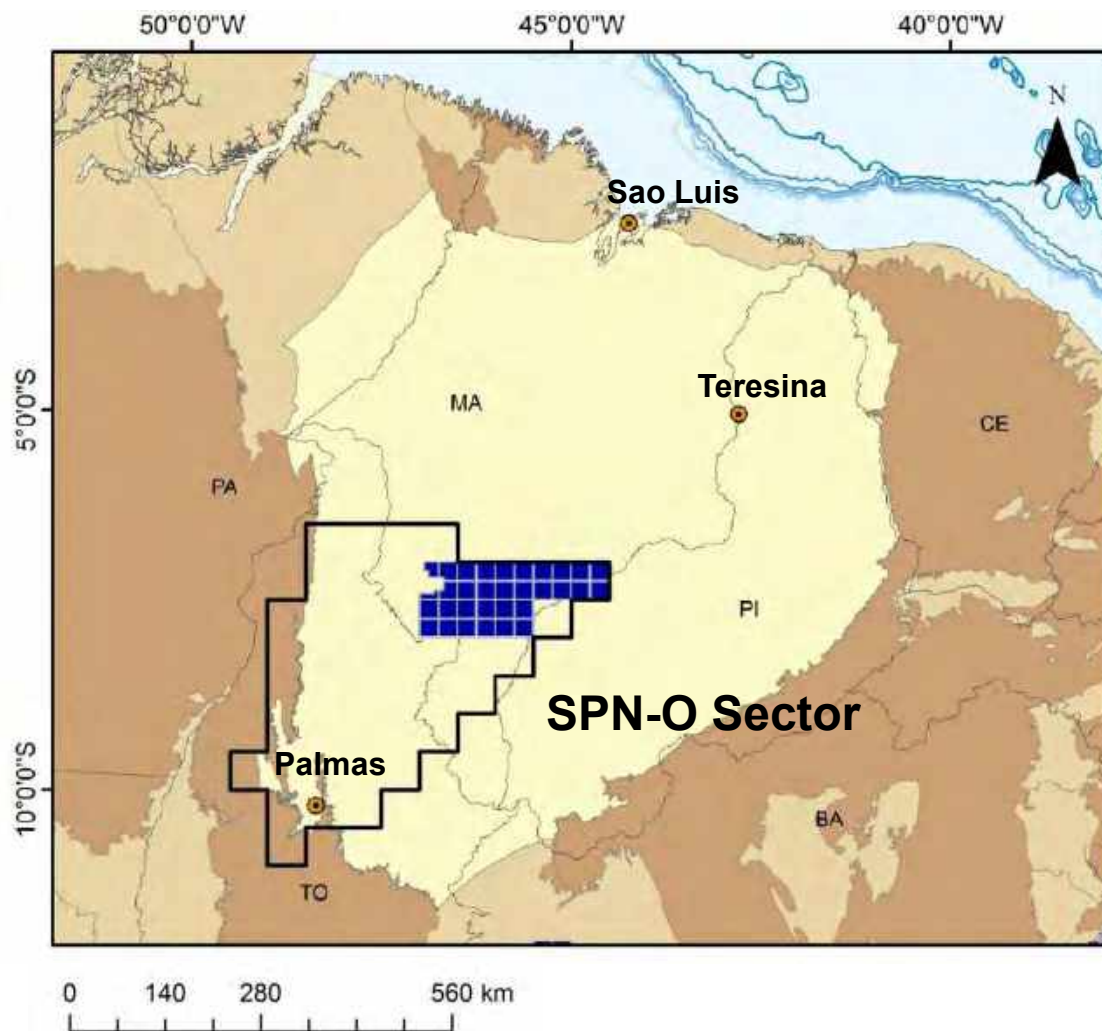
> 3,500 m thickness

Legend

 R12 Blocks






Location

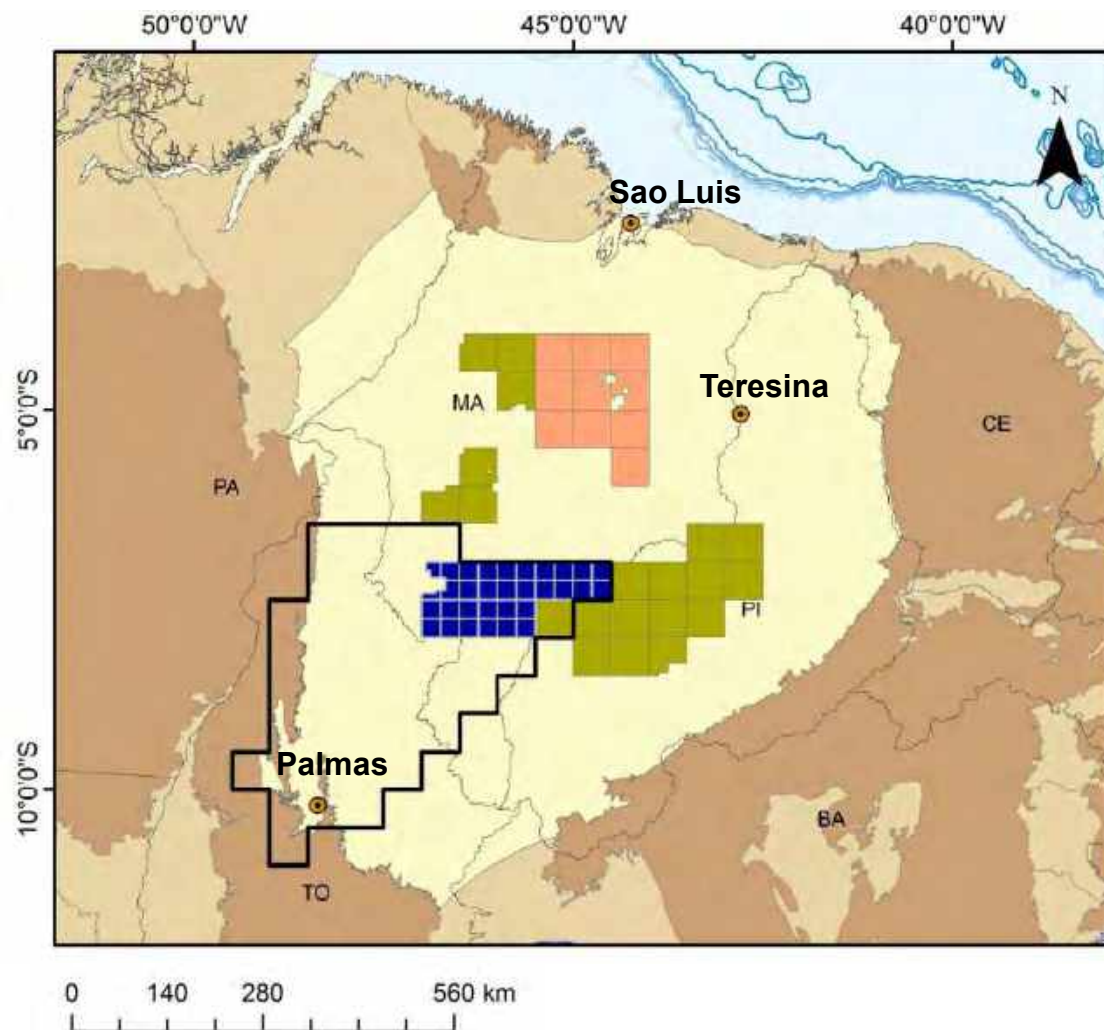


32 blocks offered
SPN-O Sector
Area/block ~ 756 km²
Total area ~23,500 km²

Legend

-  R12 Blocks
-  Sedimentary Basins
-  Basement

Location

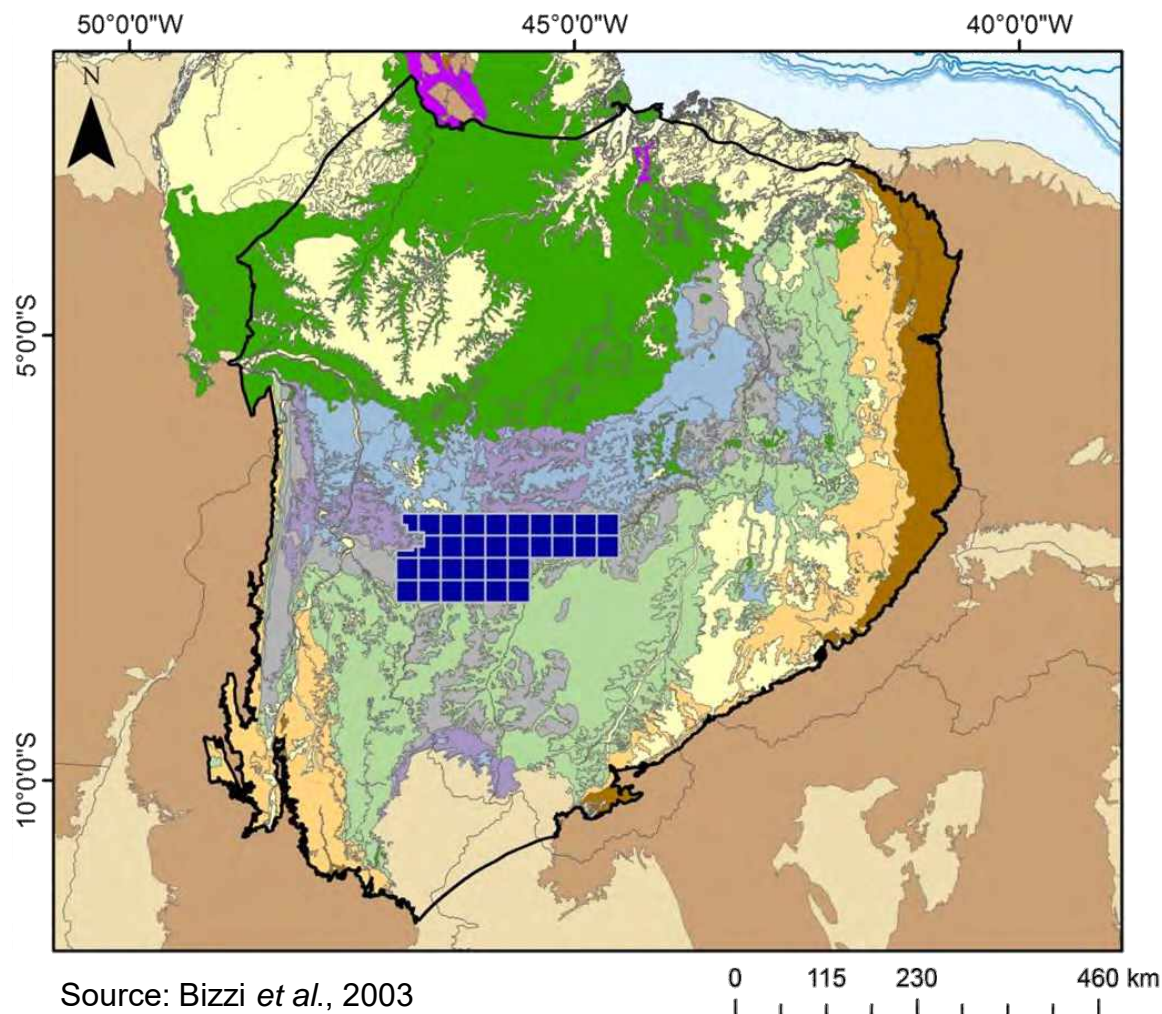


Legend

- R12 Blocks
- R11 Auctioned Blocks
- Blocks Under Concession (R9)
- Gas Fields



Outcrops



Neogene/Quat.

Cretaceous

Jurassic

Triassic

Permian

Carboniferous

Devonian

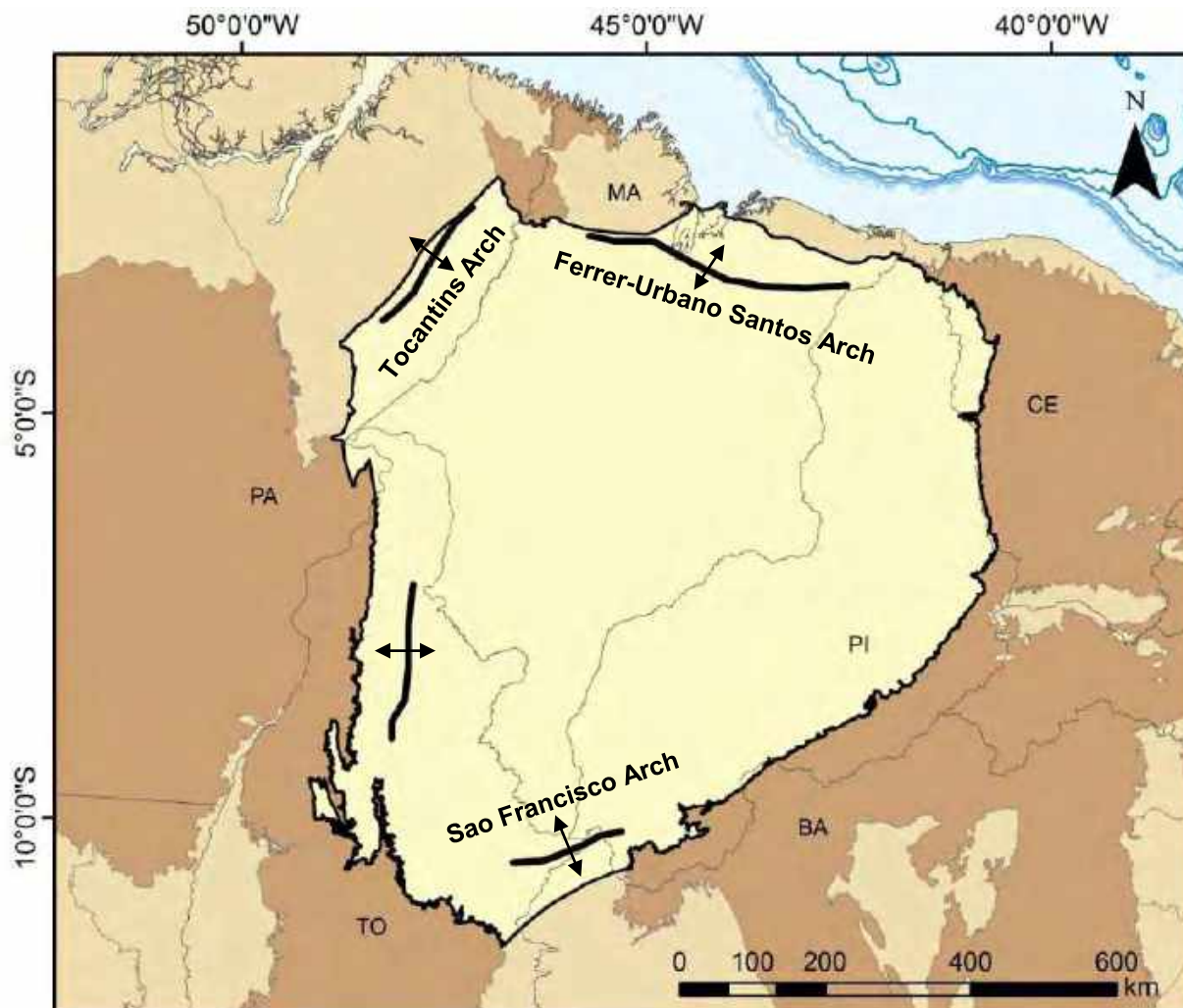
Silurian






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Natural Gas and Biofuels

Brasil
12th Round
Oil & Gas Bidding Rounds

Limits



Legend

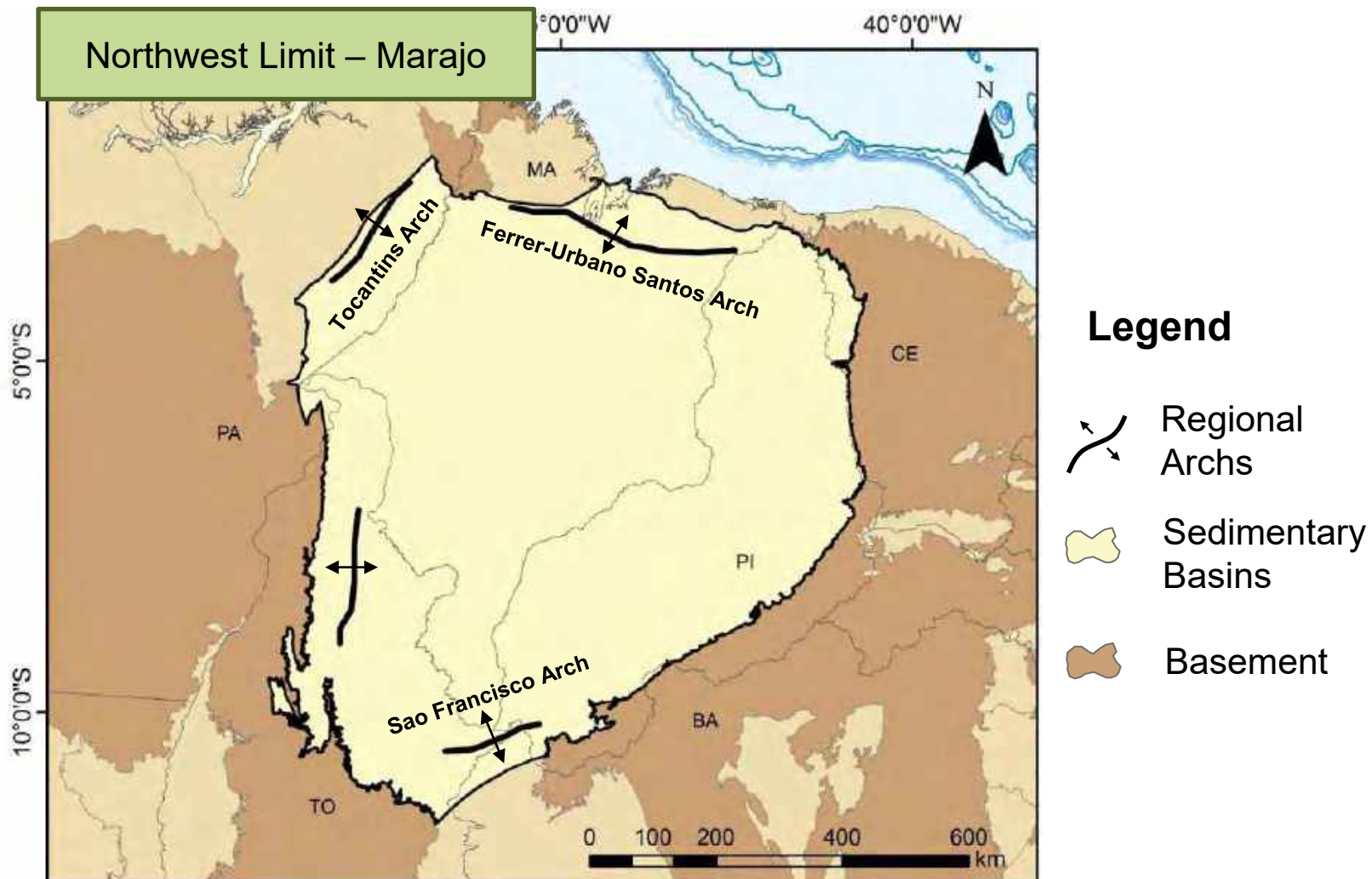
-  Regional Arches
-  Sedimentary Basins
-  Basement



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of Petroleum,
Natural Gas and Biofuels

Brasil
12th Round
Oil & Gas Bidding Rounds

Limits

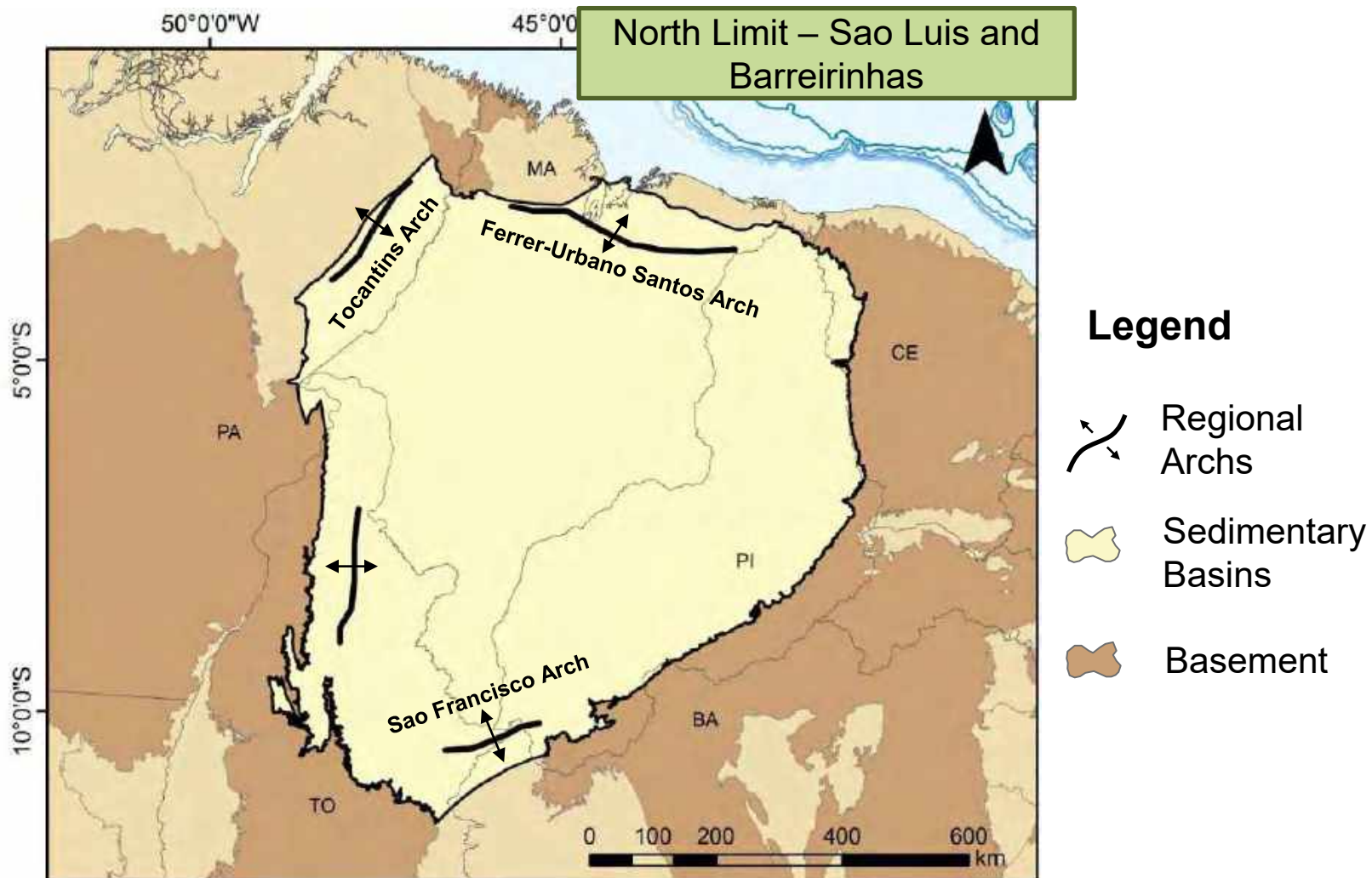




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Brasil
12th Round
Oil & Gas Bidding Rounds

Limits

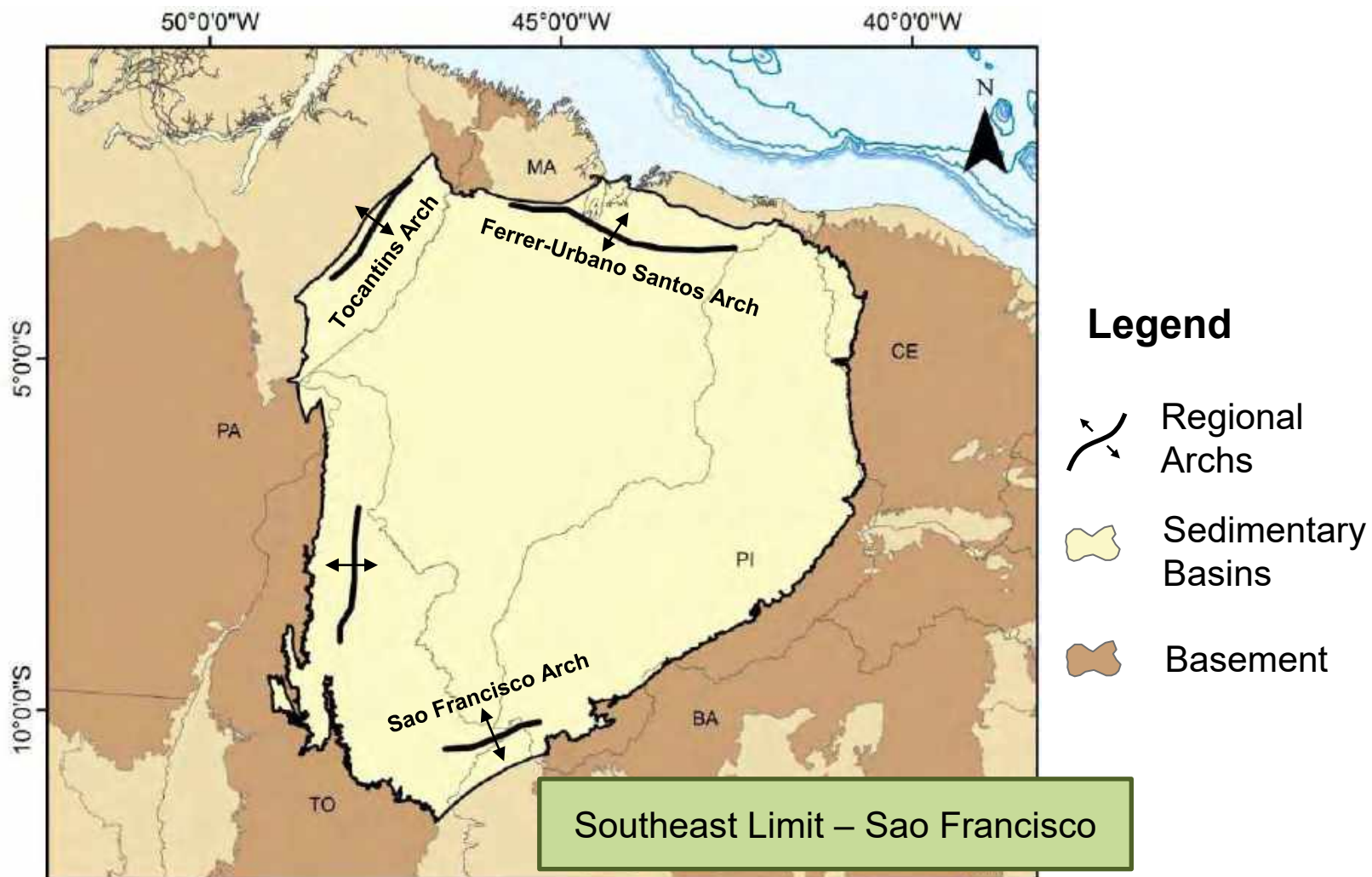




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Natural Gas and Biofuels

Brasil
12th Round
Oil & Gas Bidding Rounds

Limits



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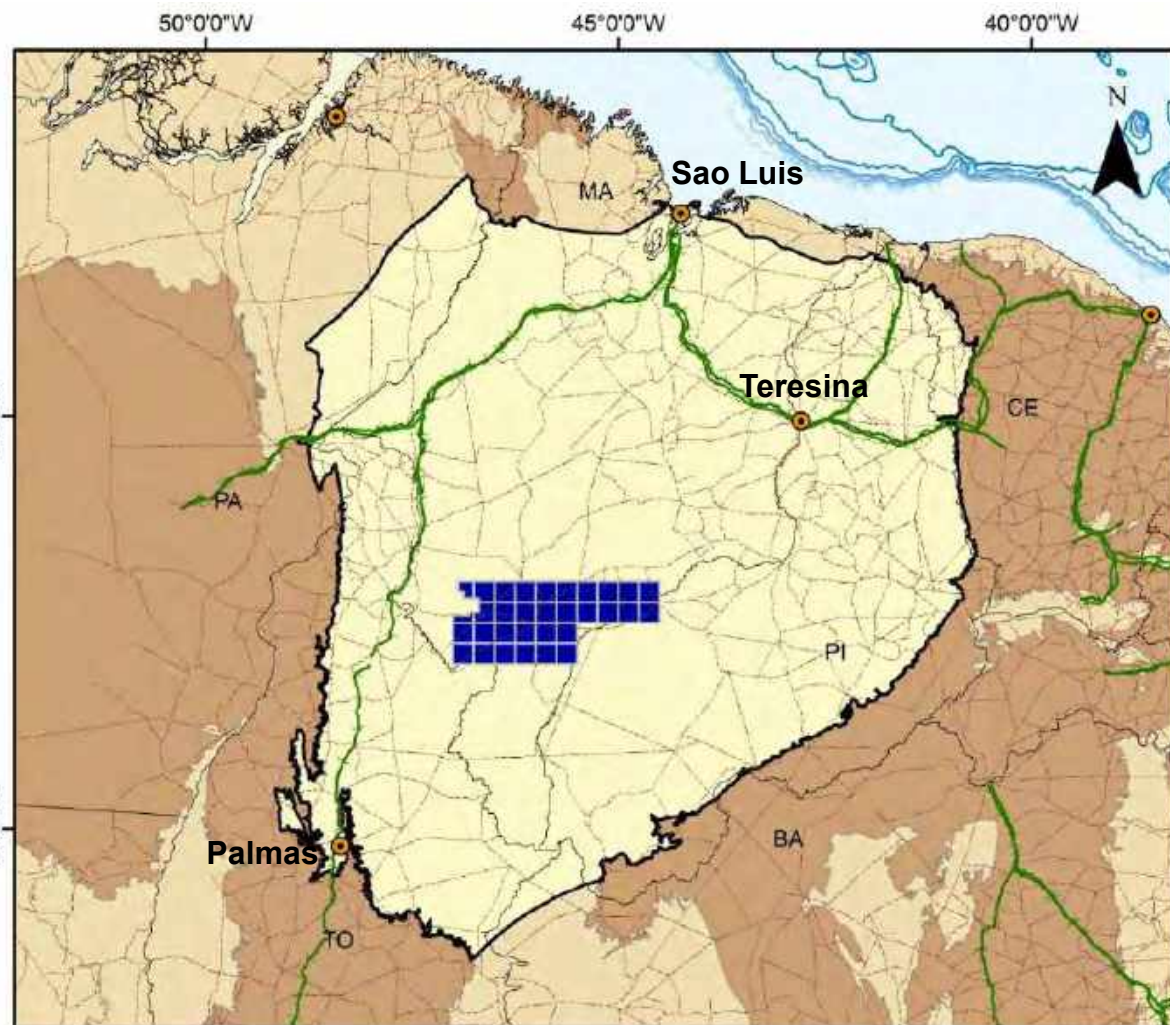
Plays

Exploration Successes







Area on Offer

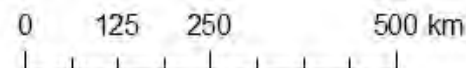
Final Remarks

Infrastructure

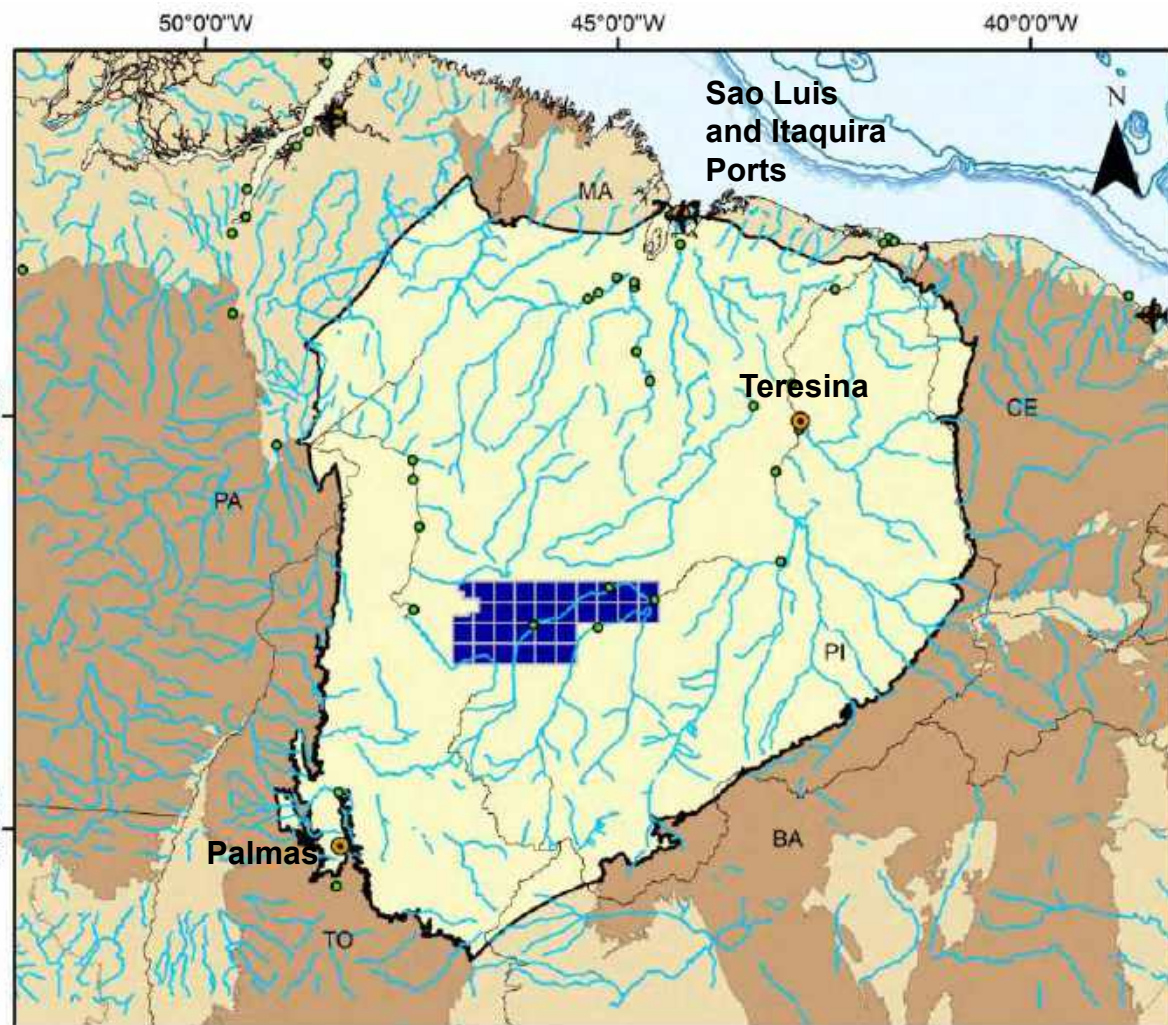


Legend








-  Capitals
-  Railroads
-  Federal and State Roads
-  R12 Blocks
-  Sedimentary Basins
-  Basements



Infrastructure

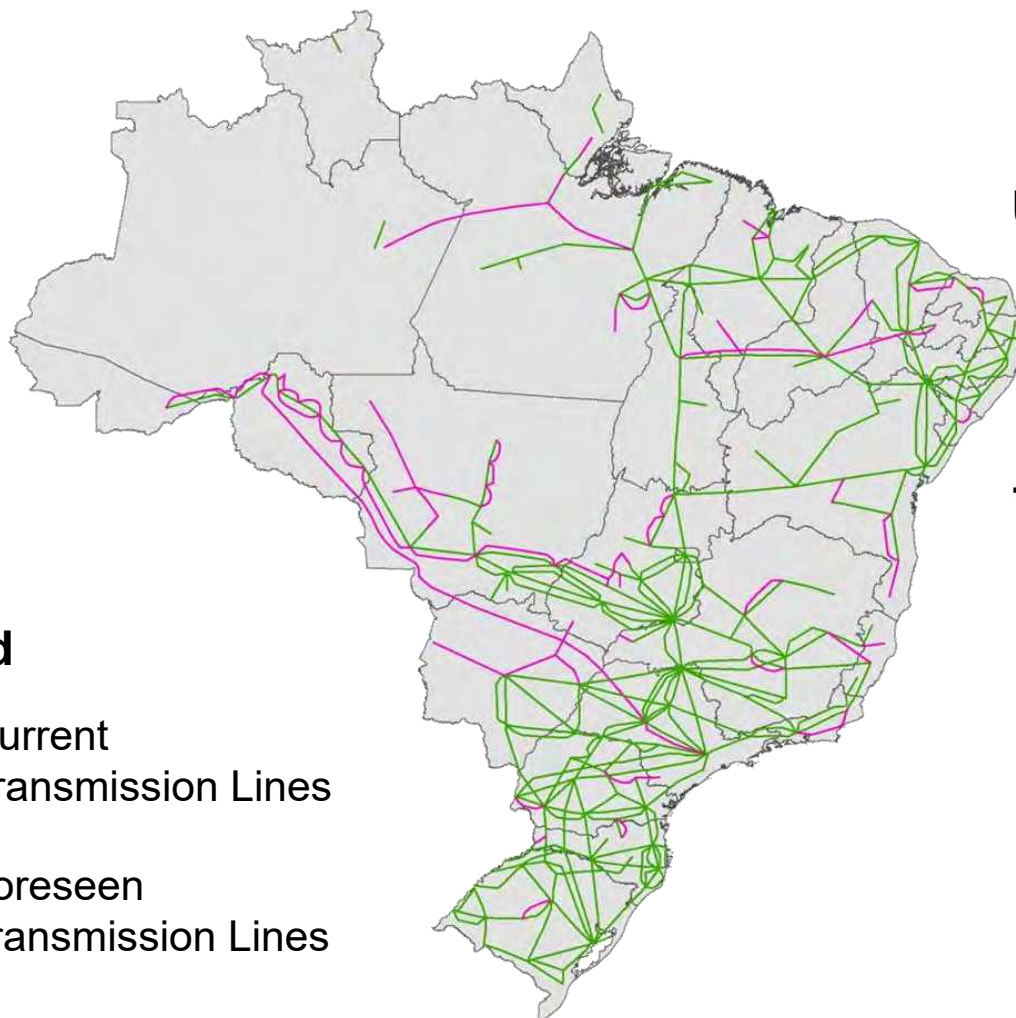


Legend

-  Capitals
-  Ports
-  International Airports
-  Main Rivers
-  R12 Blocks
-  Sedimentary Basins
-  Basement

0 125 250 500 km

Infrastructure



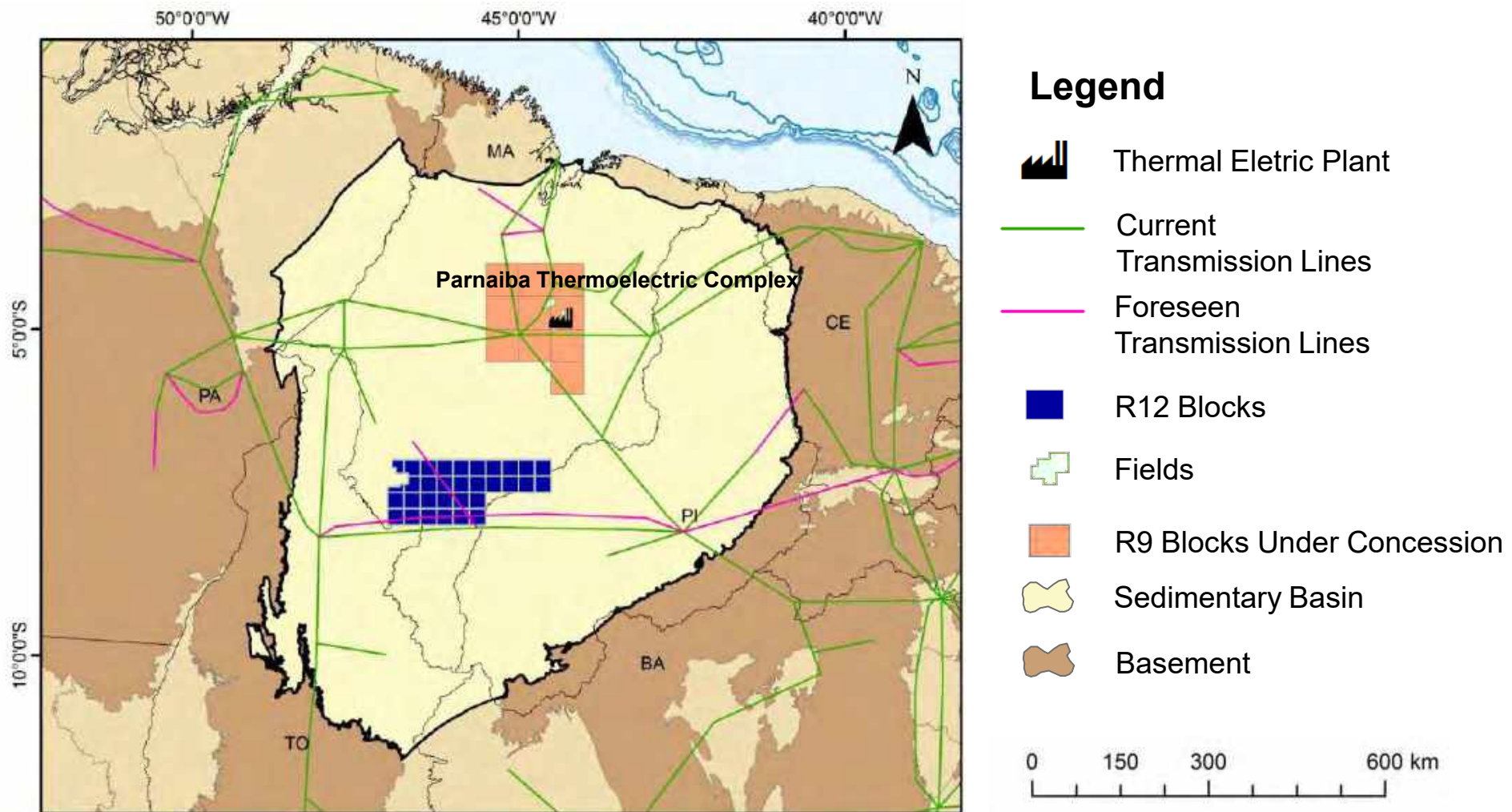
**Utilization of Natural Gas in
Thermal Power Plants**

**Electricity Distribution
through transmission grids**

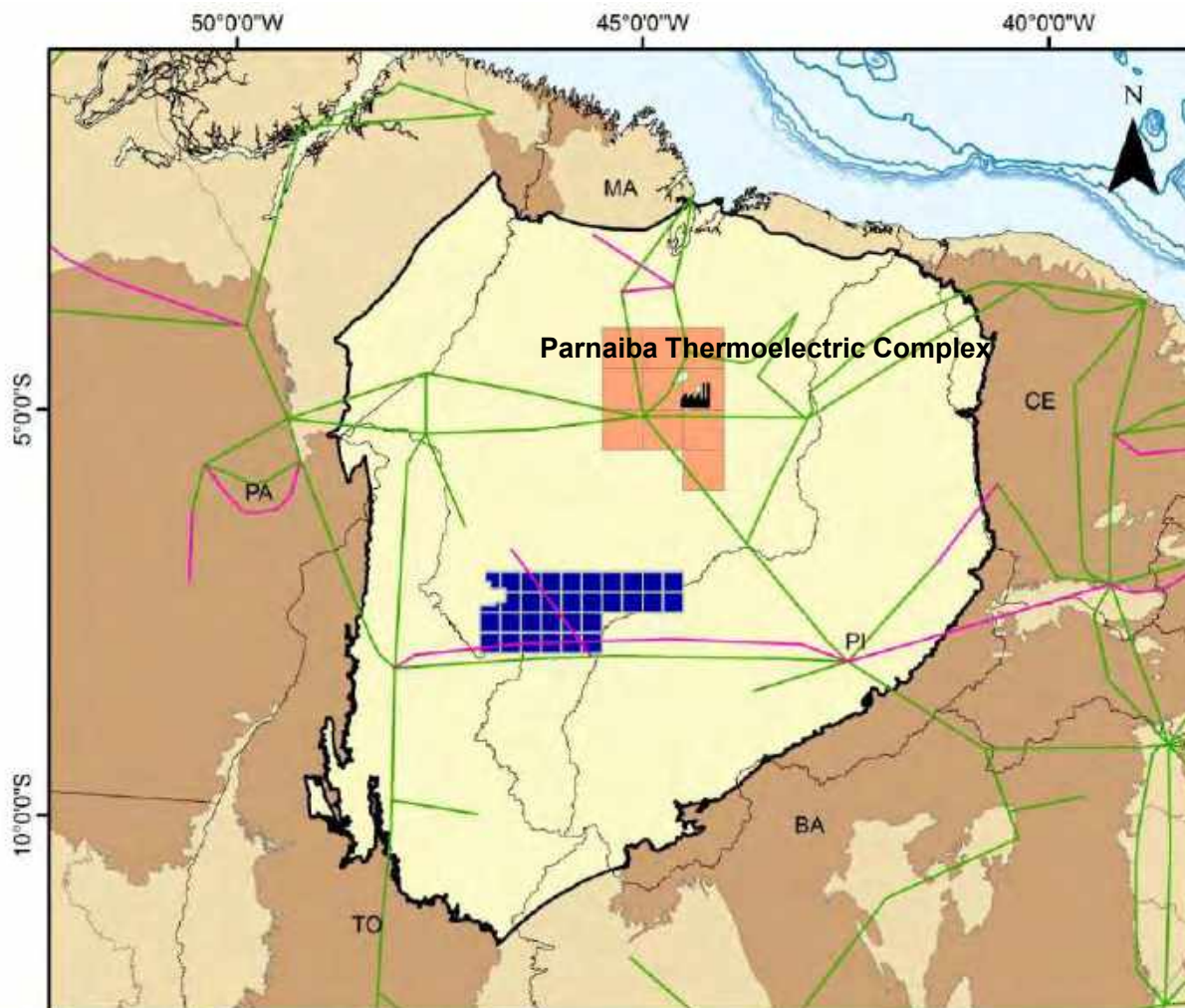
Legend

- Current
Transmission Lines
- Foreseen
Transmission Lines

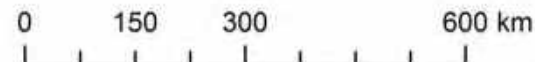
Infrastructure



Infrastructure



Parnaíba Thermoelectric Complex
Current Capacity: 676 MW
Foreseen Capacity*: 1,369 MW
* end of 2013



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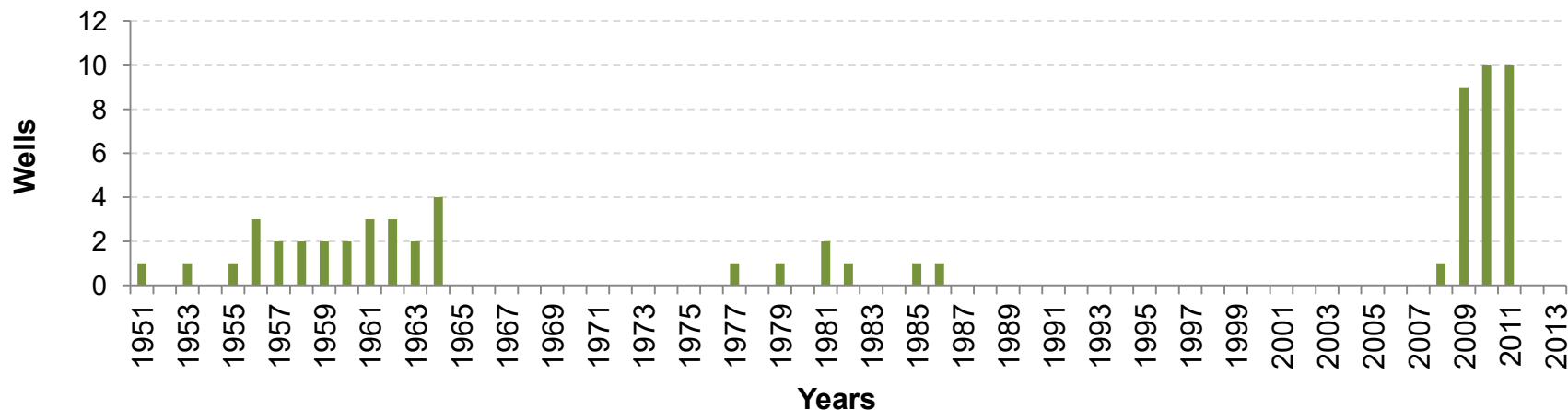
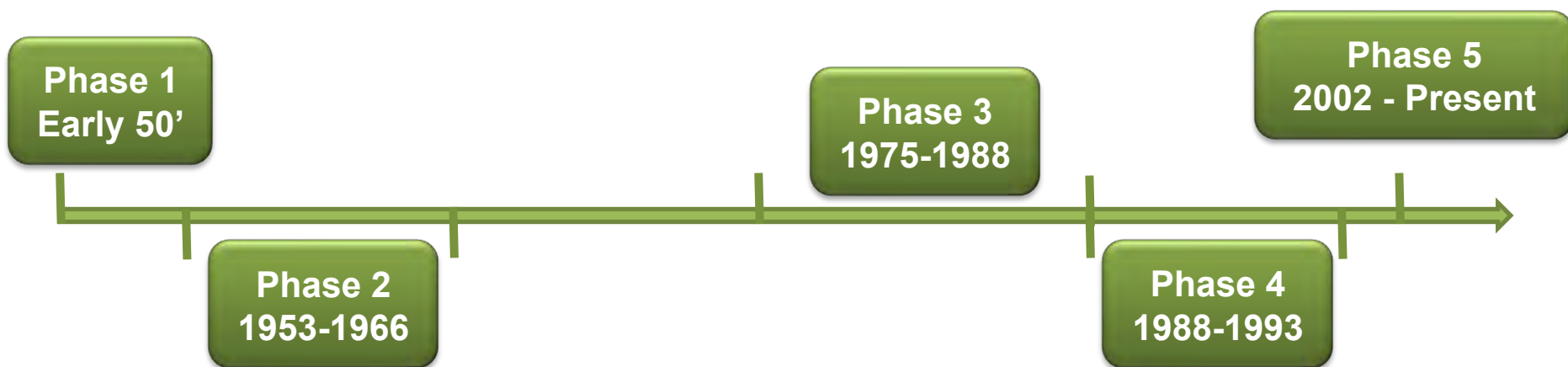
Exploration Successes

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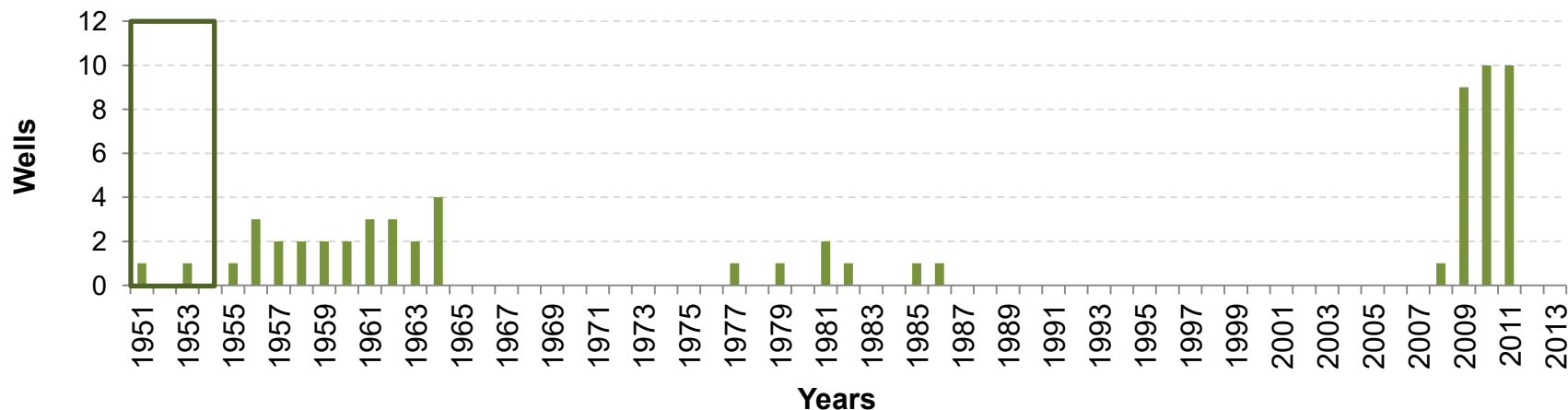
Hydrocarbon exploration efforts in Parnaíba Basin: 5 main phases



Exploration Overview

Phase 1: National Council of Petroleum (CNP) efforts, which resulted in the drilling of two wells in Maranhao State

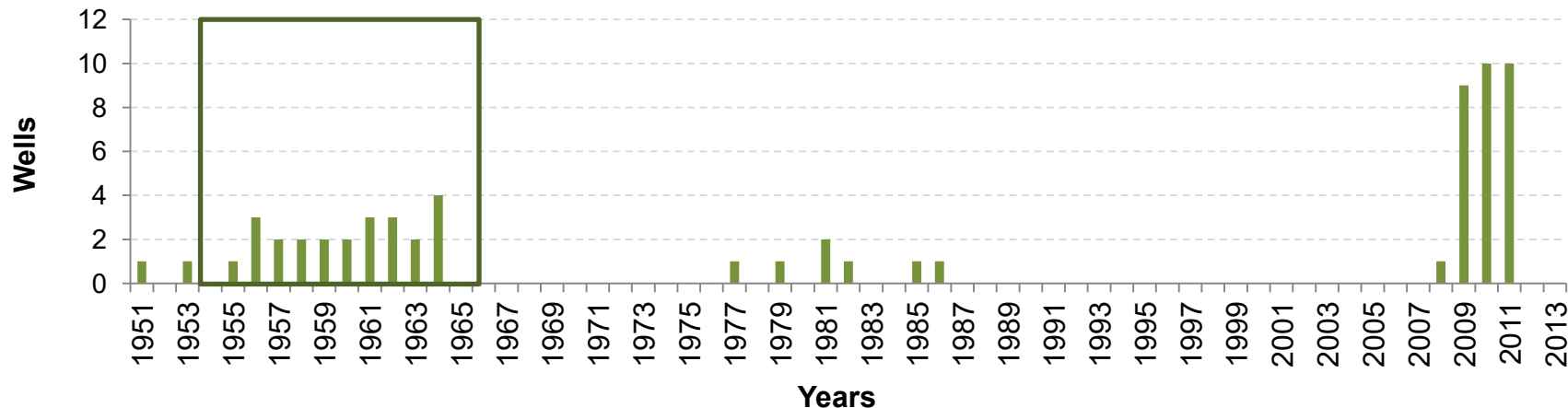
Phase 1
Early 50'



**Phase 2: Petrobras creation in 1953. Surface geological surveys.
25 exploration wells drilled**

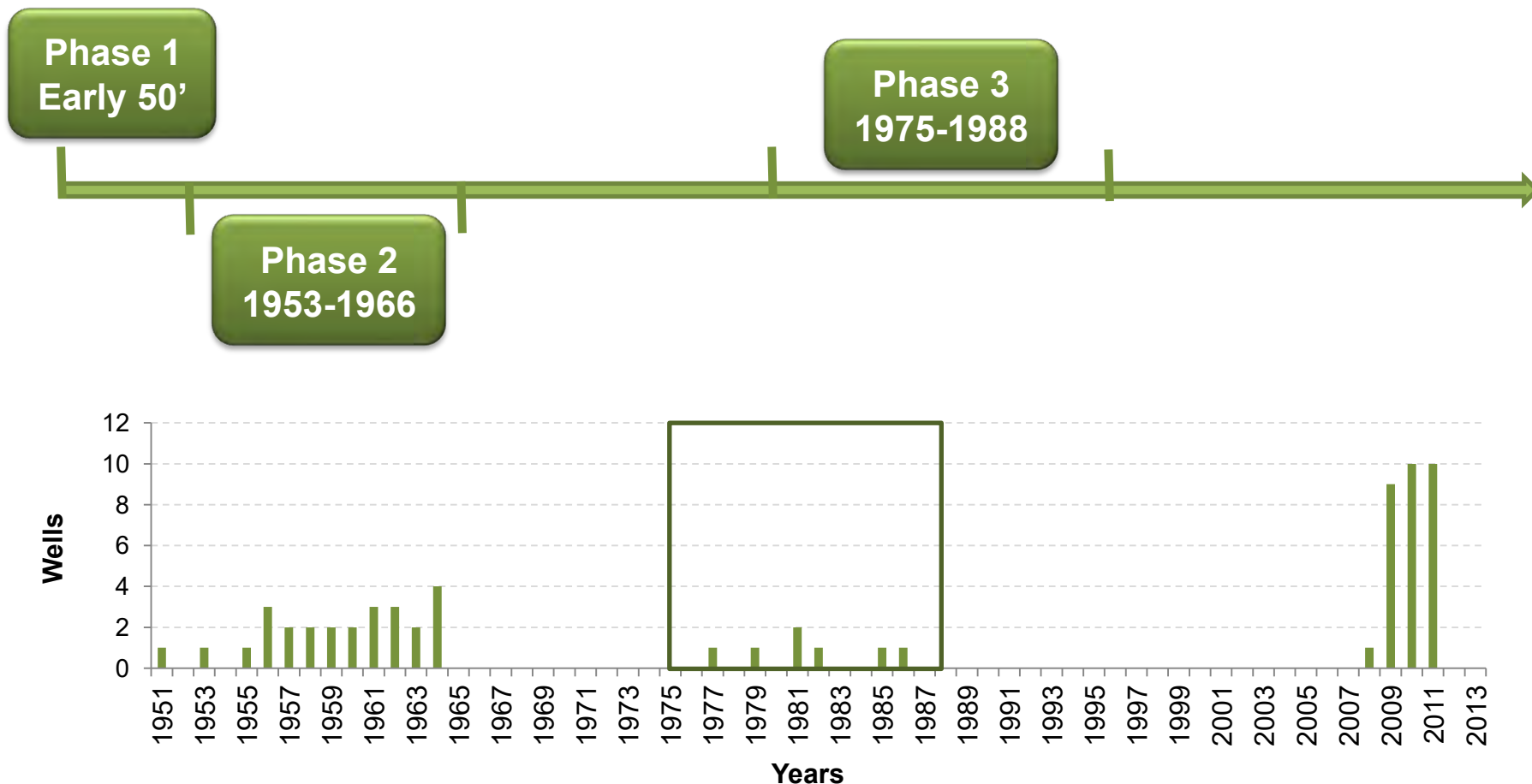
Phase 1
Early 50'

Phase 2
1953-1966

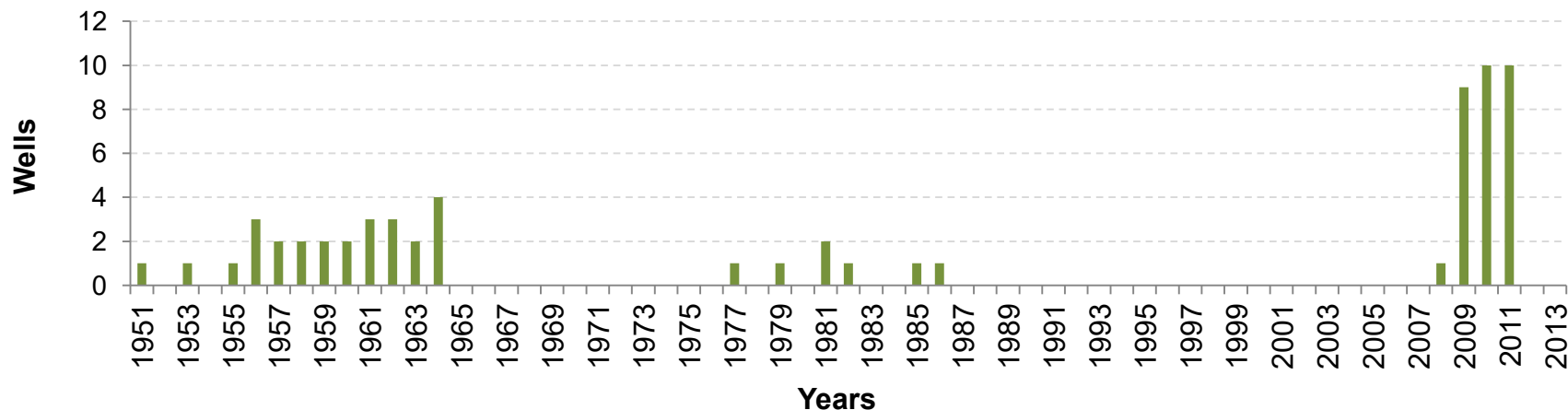
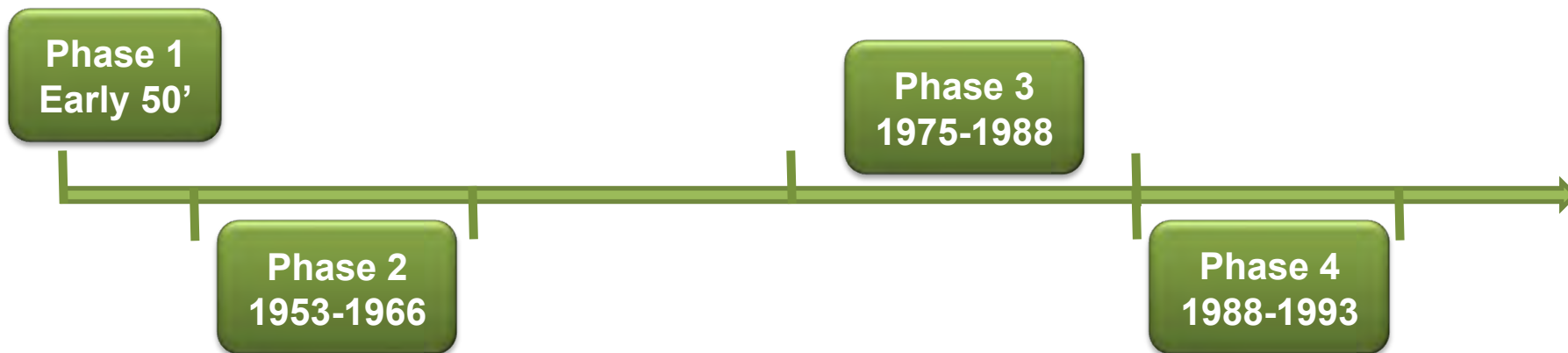


Exploration Overview

Phase 3: New exploratory phase with reflection seismic as the main tool.
Risk contracts. Seven wells drilled

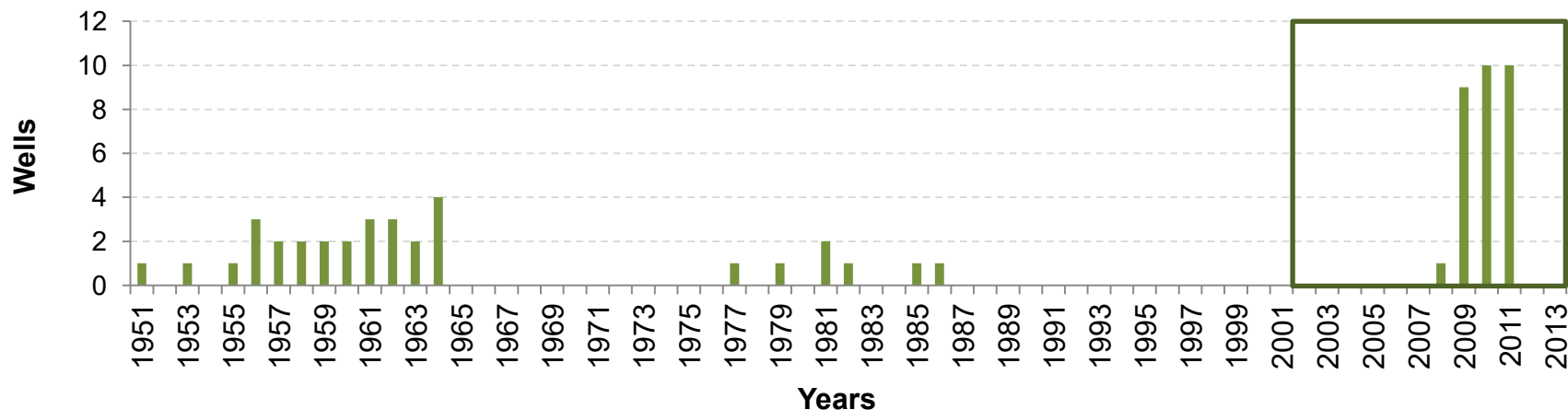
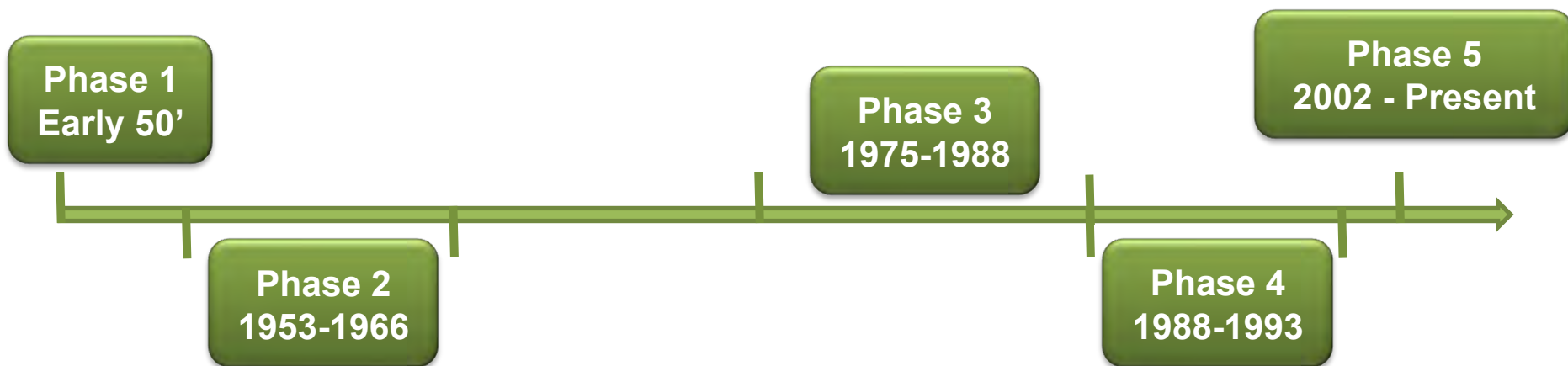


Phase 4: Seismic data reprocessing, areomagnetic surveys and surface geochemistry



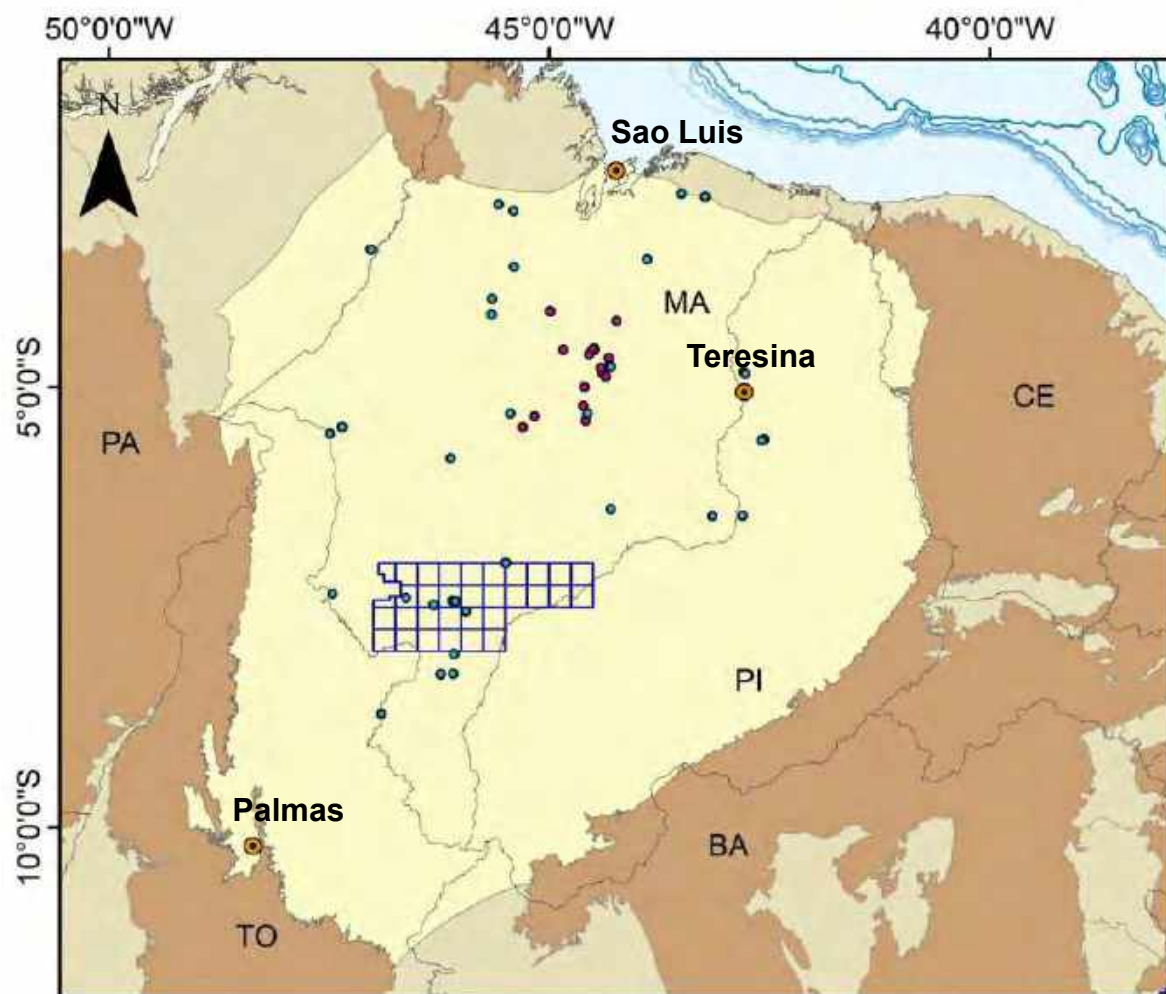
Exploration Overview

Phase 5: ANP creation. Blocks offered on 3 bid rounds (4, 9 and 11)
Resume of the investments in the basin (ANP and concessionaires)



Available Data

Exploration Wells



Wells

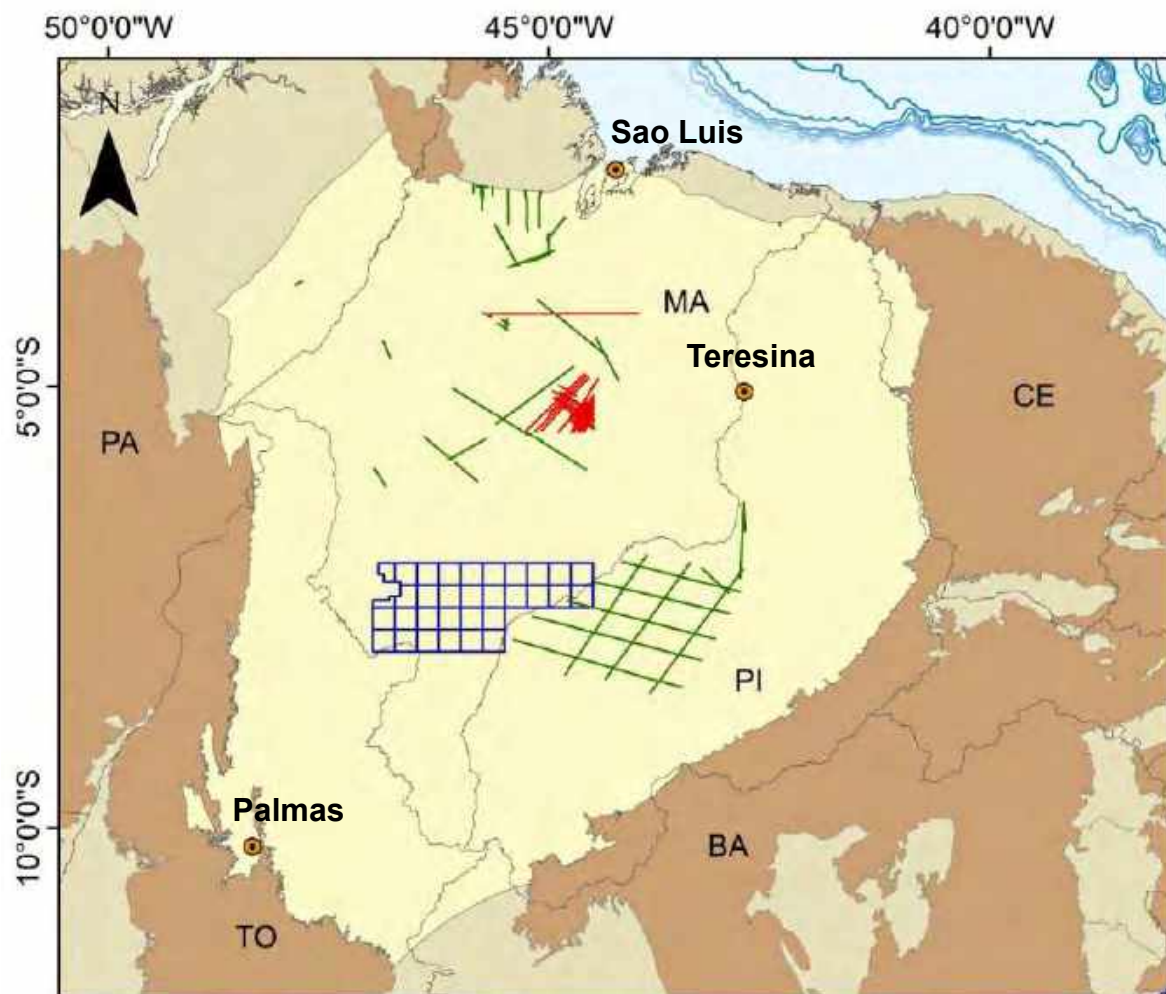
69 Exploration
28 Development

Legend

- Public Exploration Wells
- Confidential Exploration Wells
- R12 Blocks
- Sedimentary BASins
- Basement

0 135 270 540 km

Available Data



Post-Stack 2D Seismic

Confidential Post-Stack:
~1,200 km

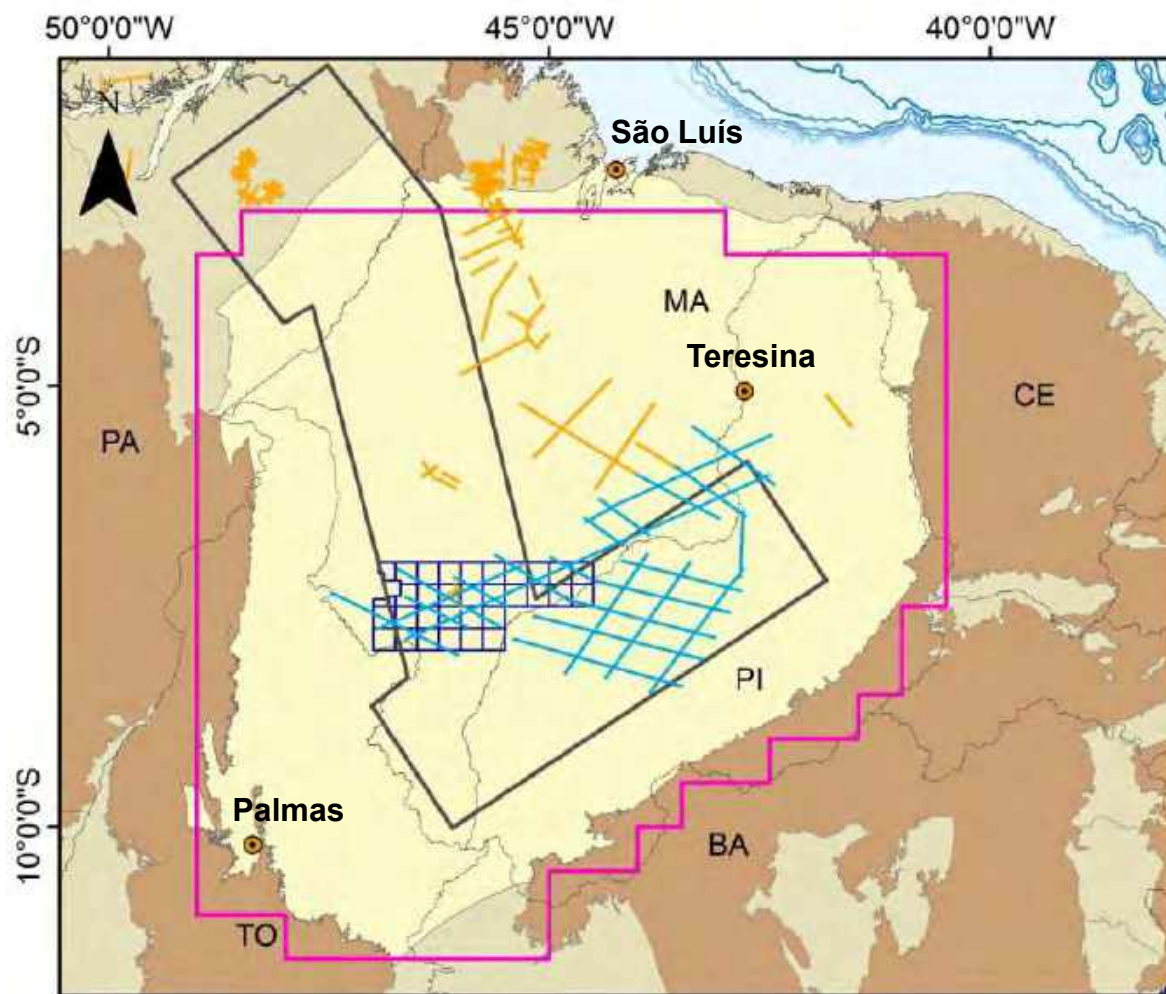
Public Post-Stack :
~2,840 km

Legend

- Public Seismic (Post-Stack)
- Confidential Seismic (Post-Stack)
- R12 Blocks
- Sedimentary Basins
- Basement




0 135 270 540 km

Pluriannual Plan and ANP Investments



Investment
~ R\$ 200 million

Legend

- 2D Seismic Survey
- Old Seismic Data Processing
-  Surface Geochemistry
- Geophysical Survey
- R12 Blocks
-  Sedimentary Basins
-  Basement

0 135 270 540 km

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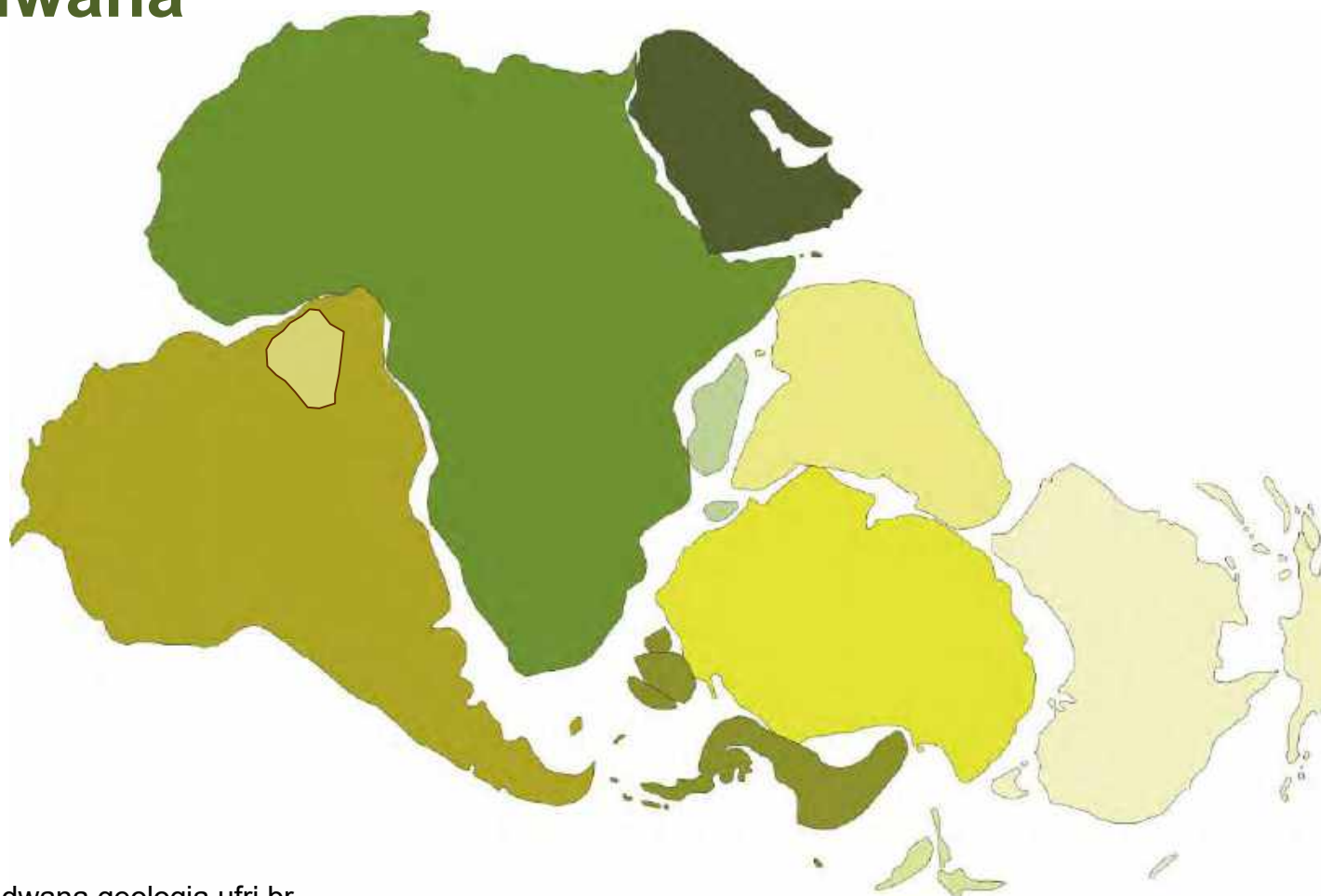
Exploration Successes

Area on Offer

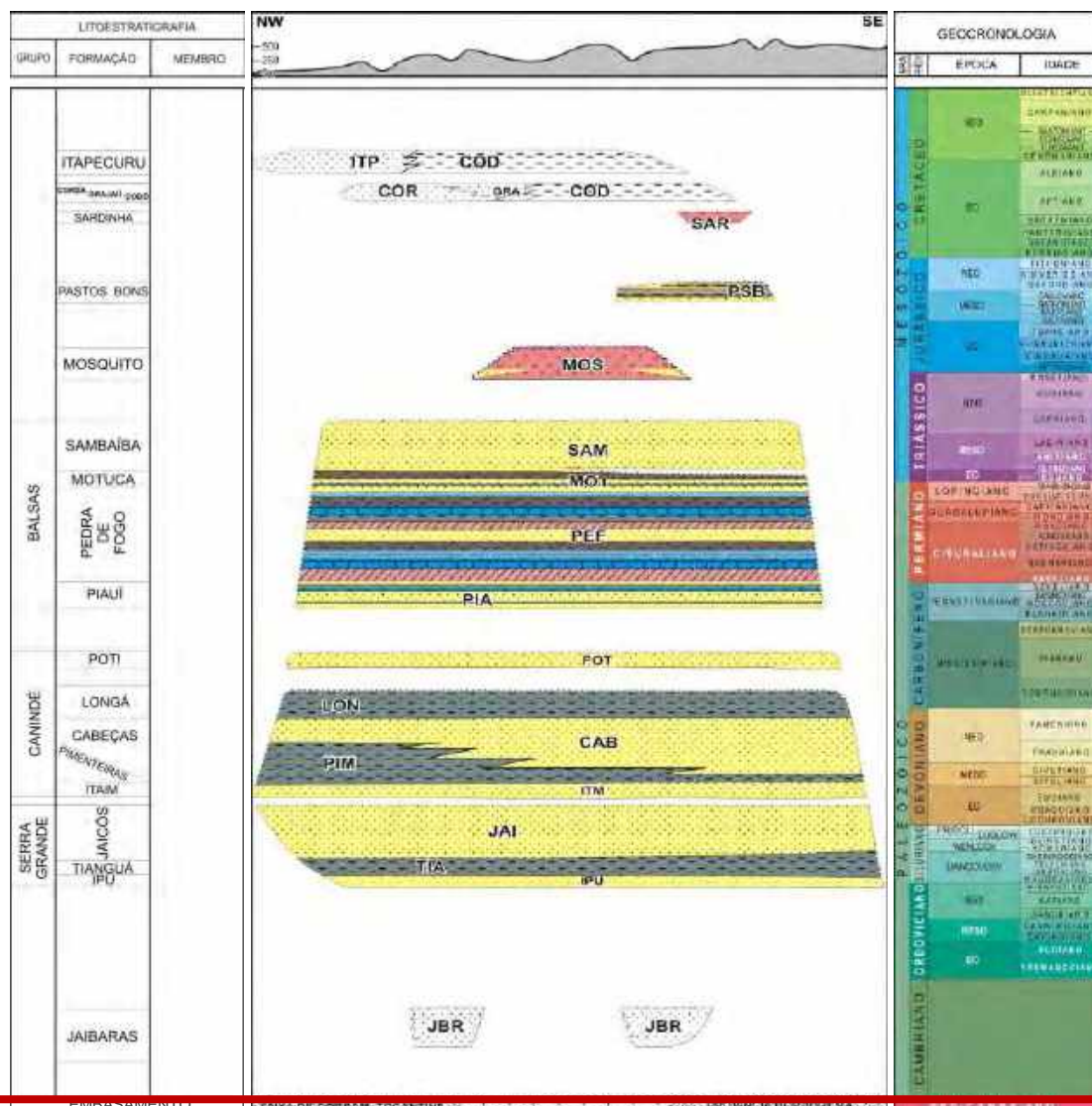
Final Remarks

Tectonic Framework

Gondwana



Stratigraphic Evolution

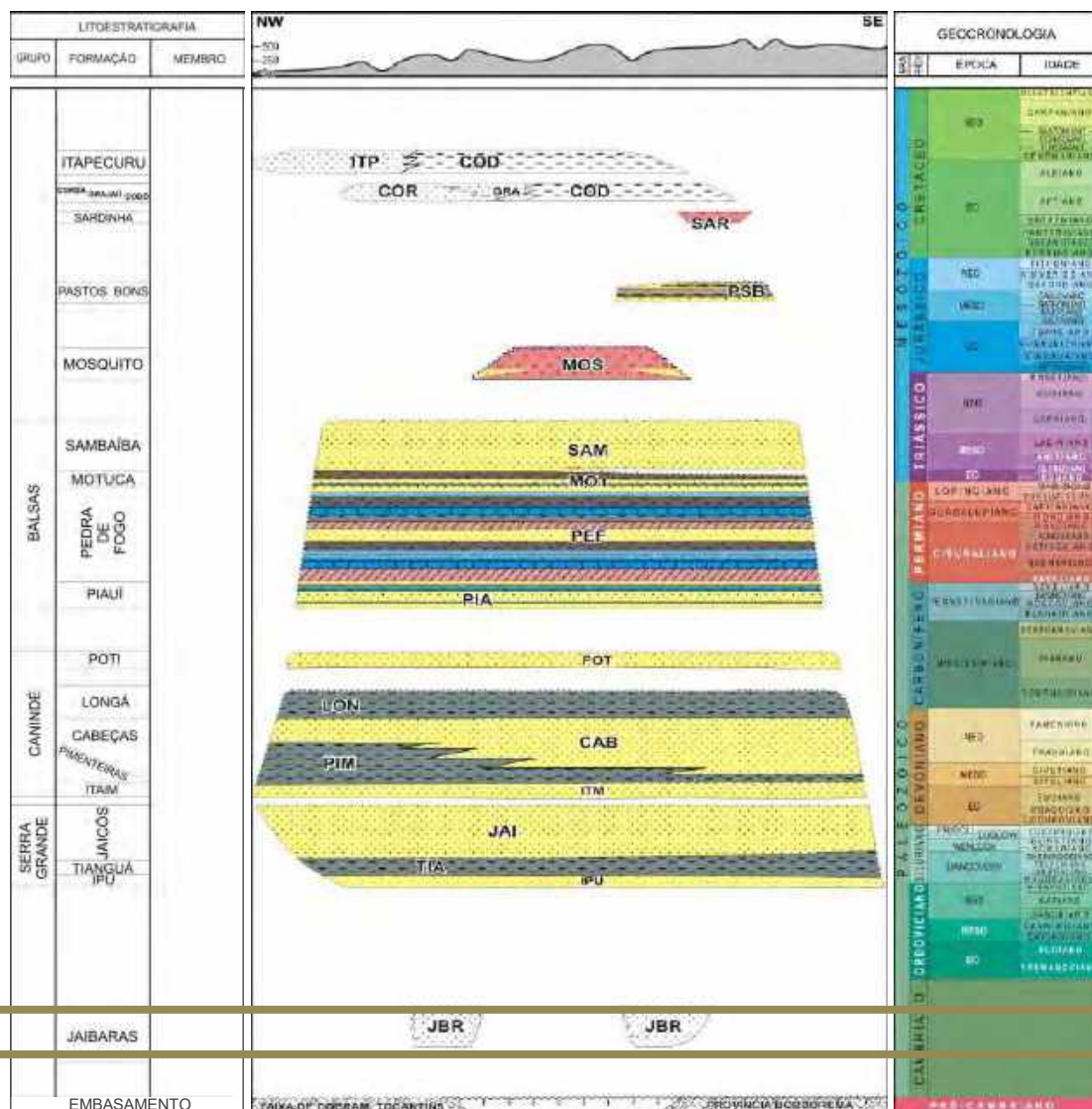


Basement

Neoproterozoic (Riachao Fm.)
Immature Deposits

Mesoproterozoic
Crystalline Rocks

Cambrian (Jaibaras Gr.) Fluvial, Alluvial and Lacustrine Deposits



Stratigraphic Evolution

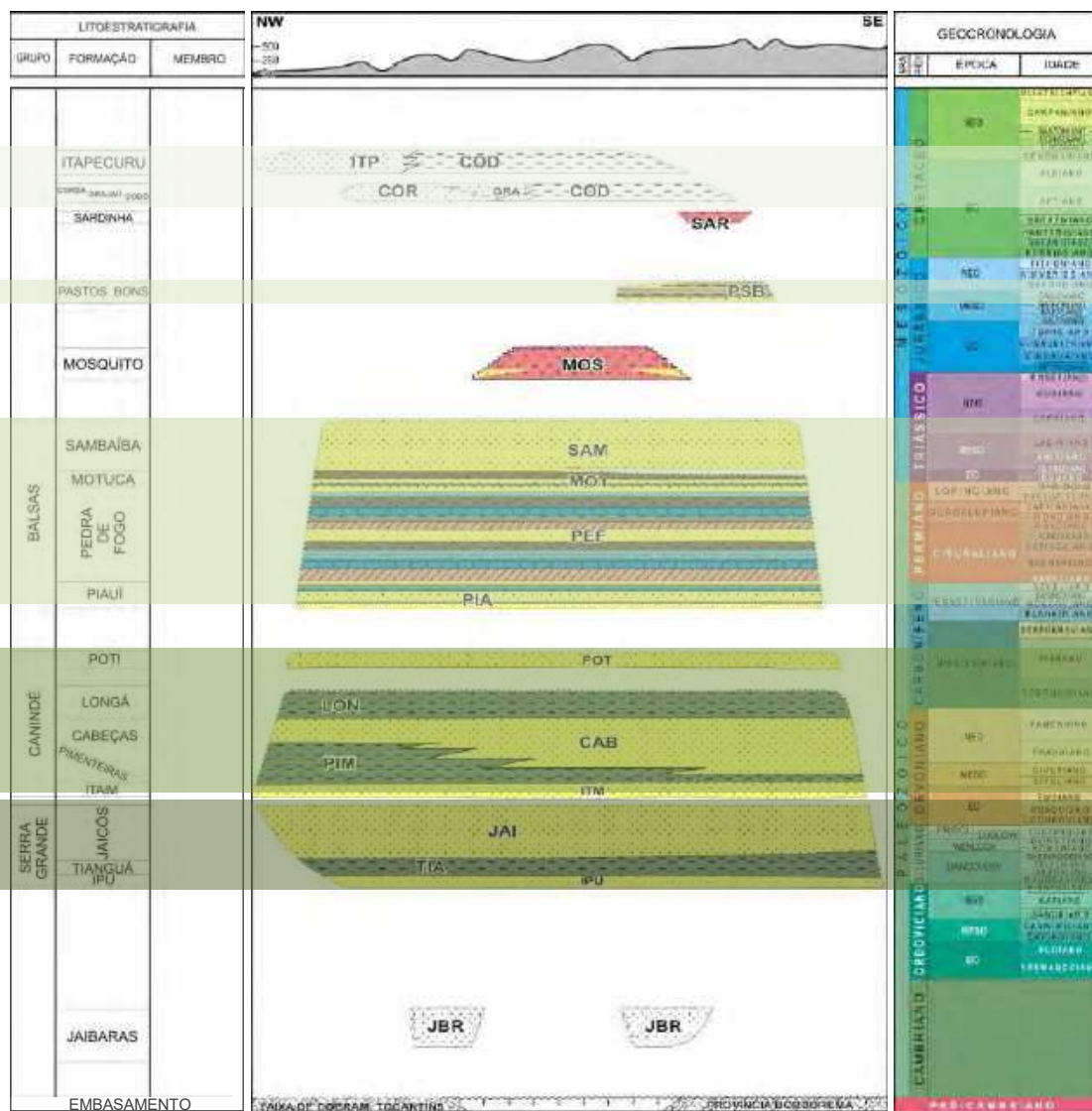
Cretaceous Sequence

Jurassic Sequence

Late Carboniferous-Early Triassic Sequence

Mesodevonian-Early Carboniferous Sequence

Silurian Sequence



Stratigraphic Evolution

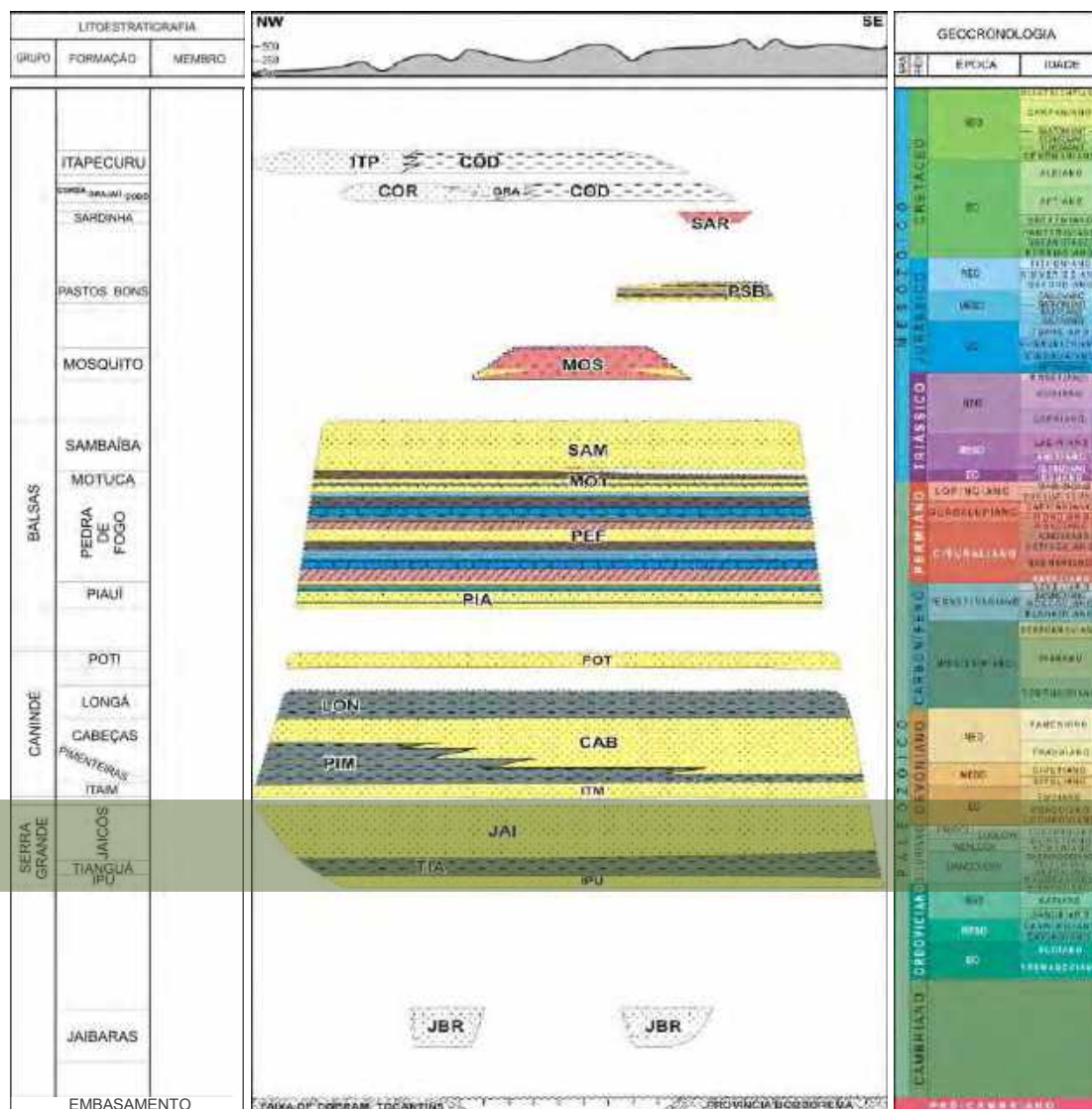
Silurian/Devonian (Jaicos Fm.)
Fluvial Braided System

Silurian (Tiangua Fm.)
Shale – Neritic Zone

Silurian (Ipu Fm.)
Glaciofluvial/deltaic sandstones

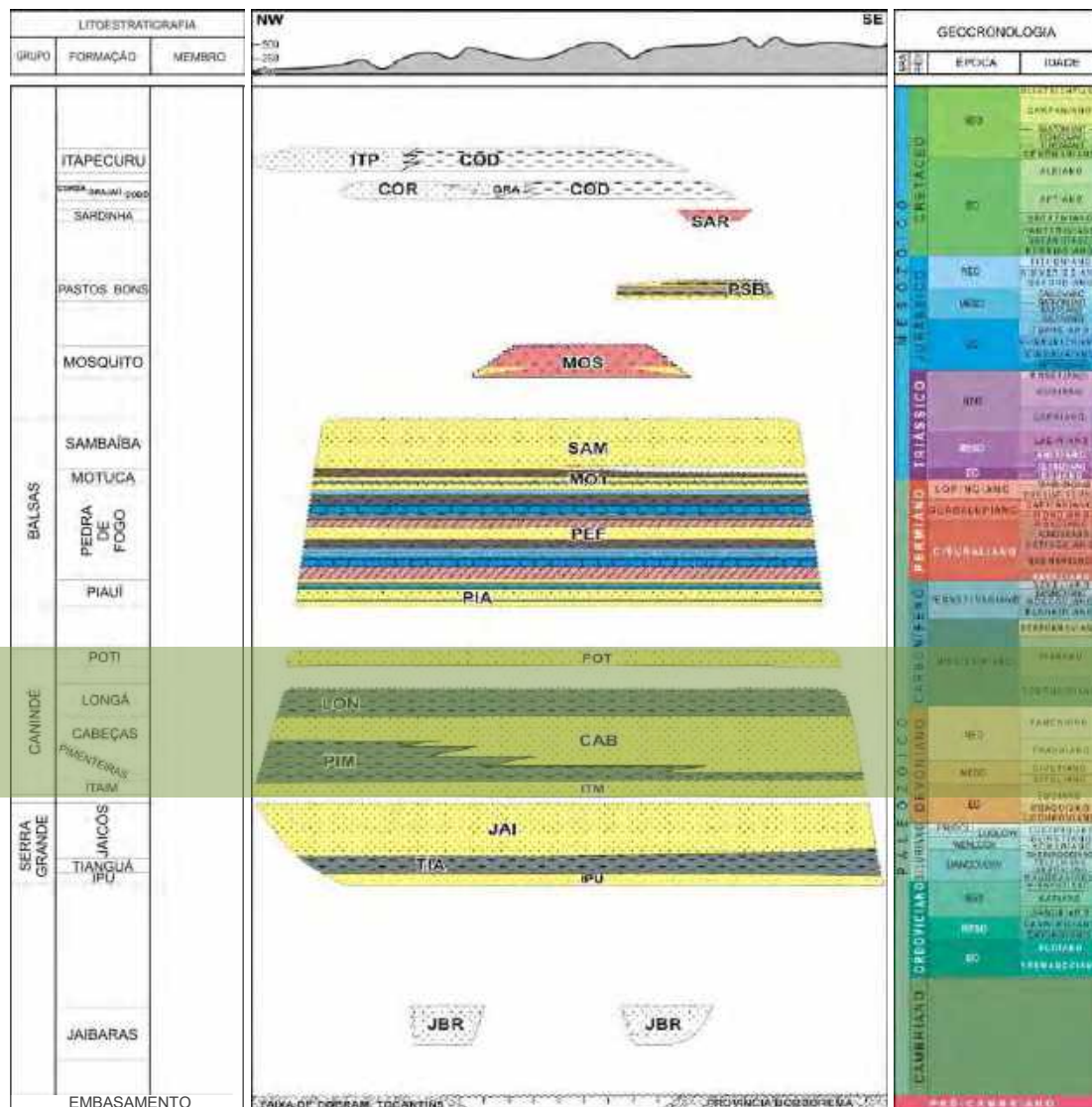
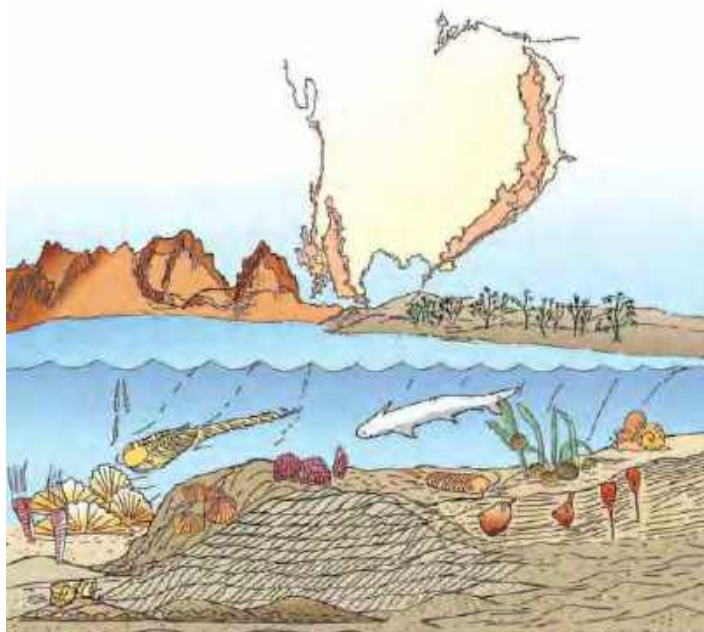
Silurian Sequence

(Serra Grande Group)



Stratigraphic Evolution

Source: Santos & Carvalho, 2004



Mesodevonian-Early Carboniferous Sequence

(Canide Group)

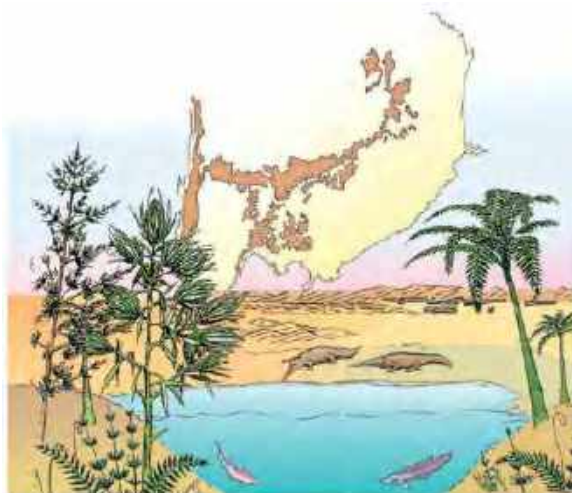
Marine/Storm
Depositional System

Source: Vaz et al., 2007

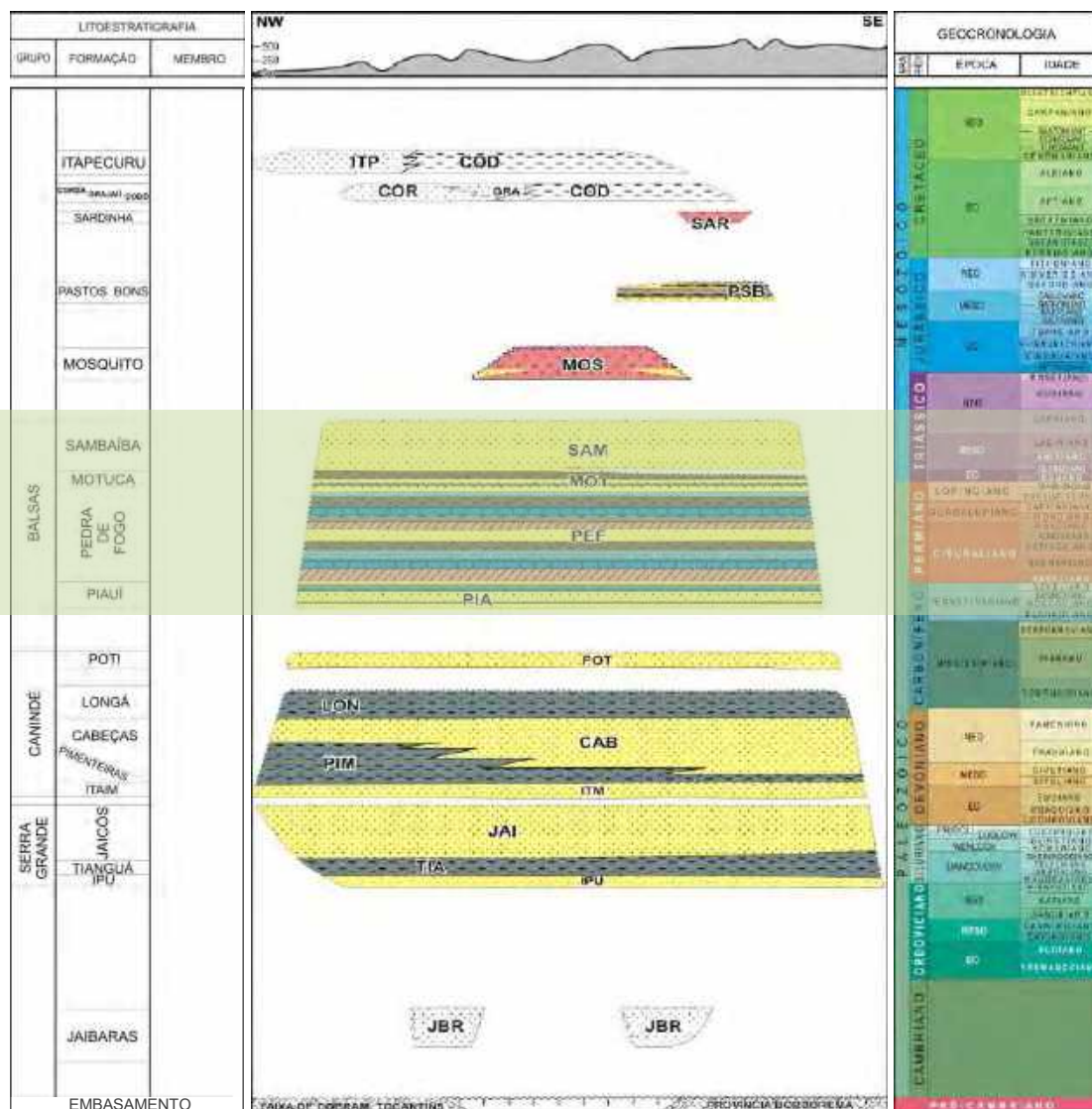
Stratigraphic Evolution

Continental Framework Pangea

Late Carboniferous Early Triassic Sequence (Balsas Group)



Source: Santos & Carvalho, 2004

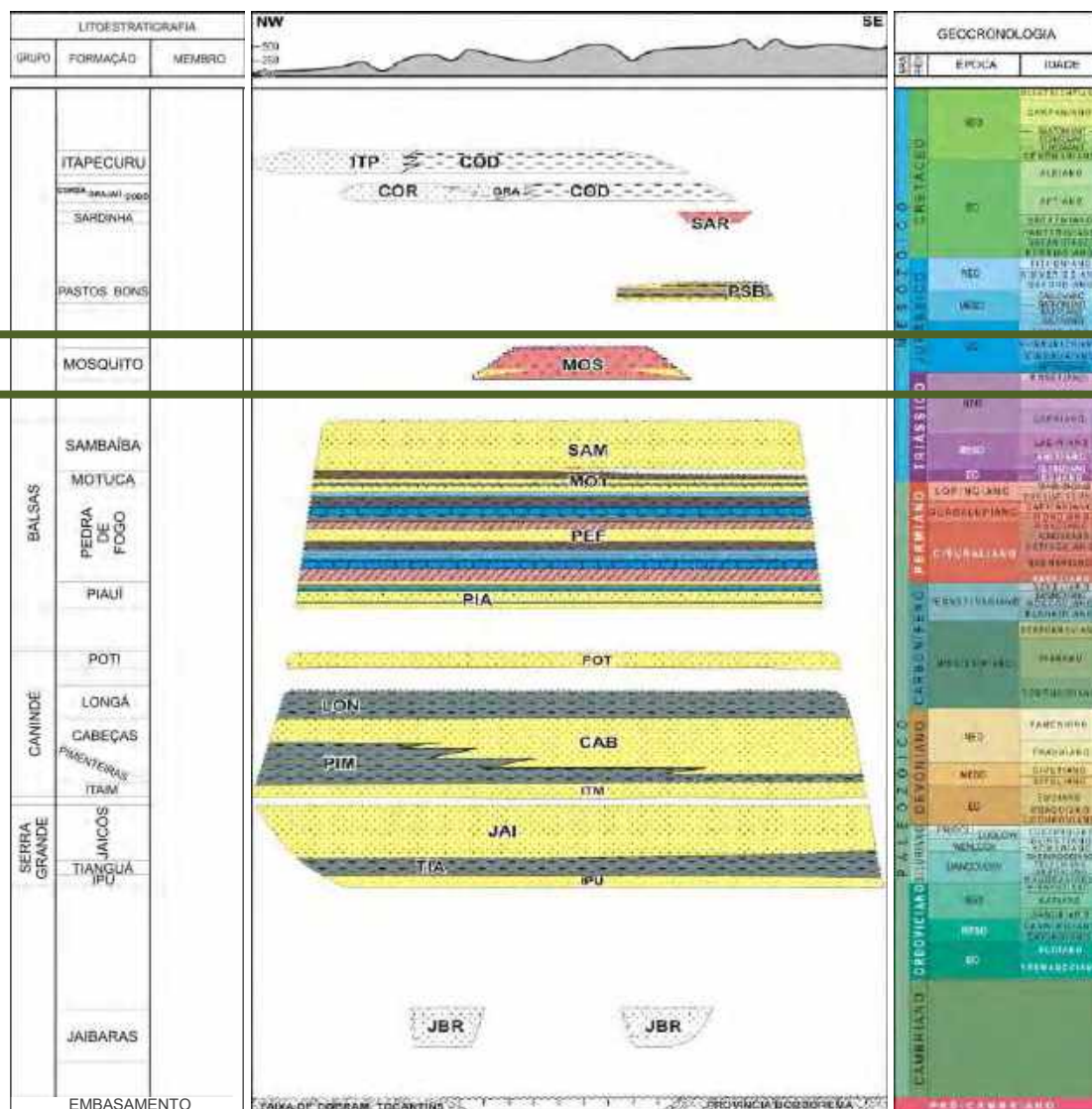


Source: Vaz et al., 2007

Stratigraphic Evolution

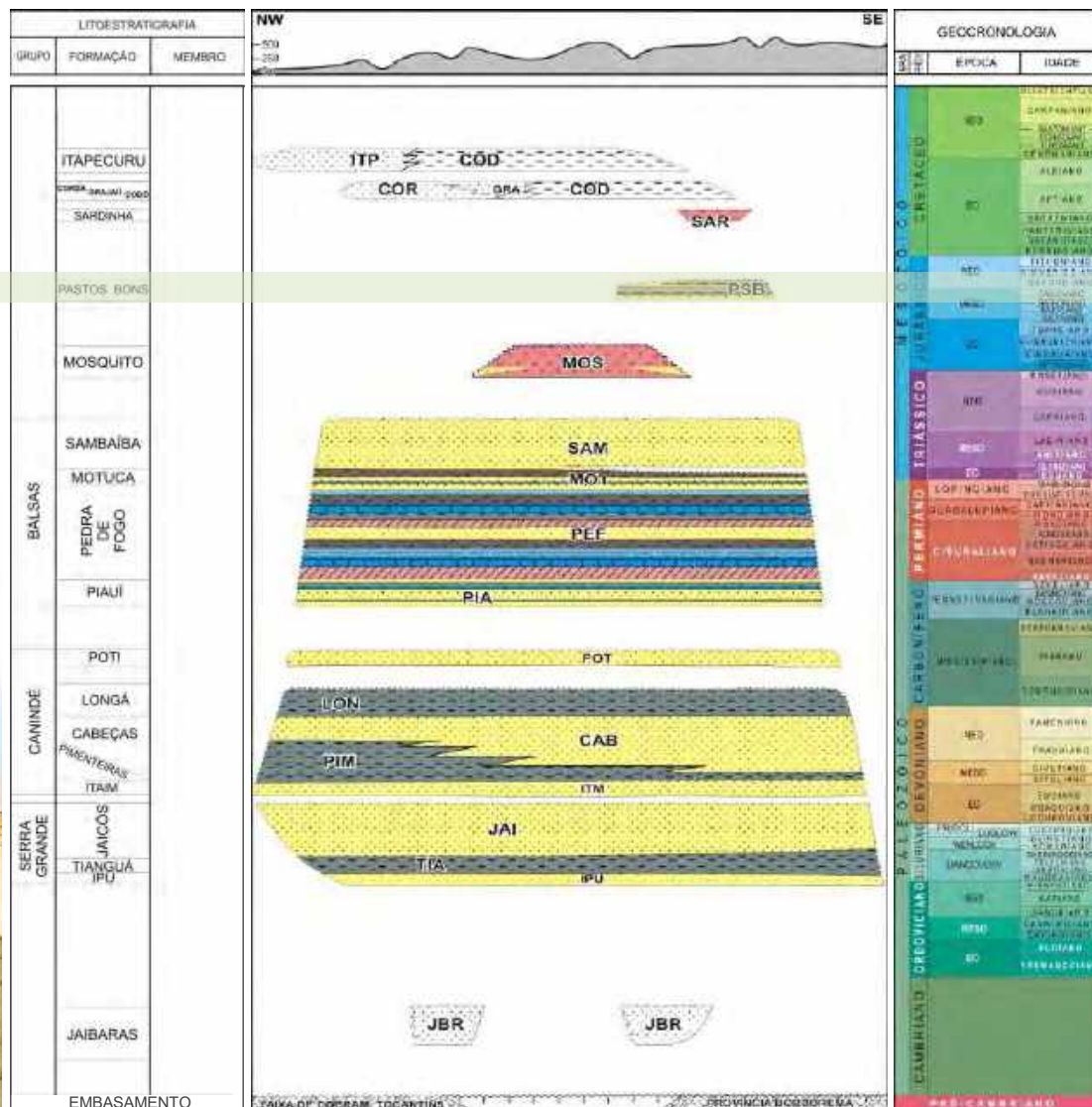
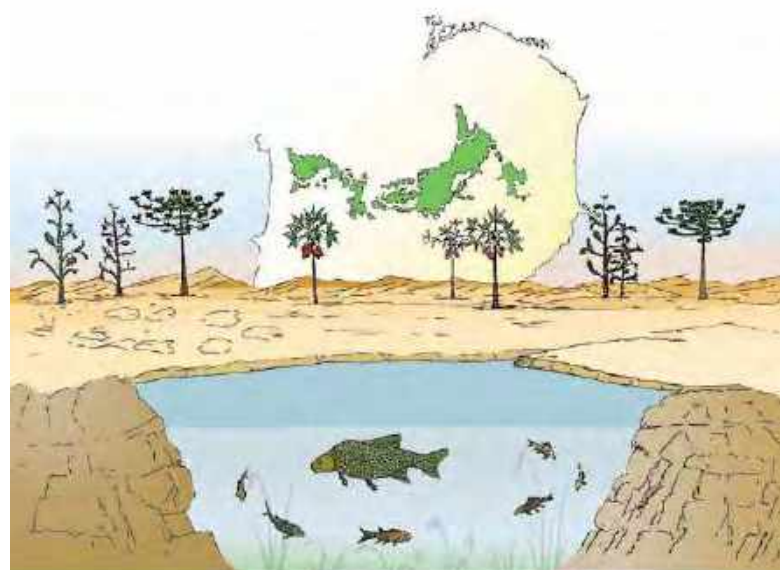
Jurassic (Mosquito Fm.)

Igneous Rocks



Stratigraphic Evolution

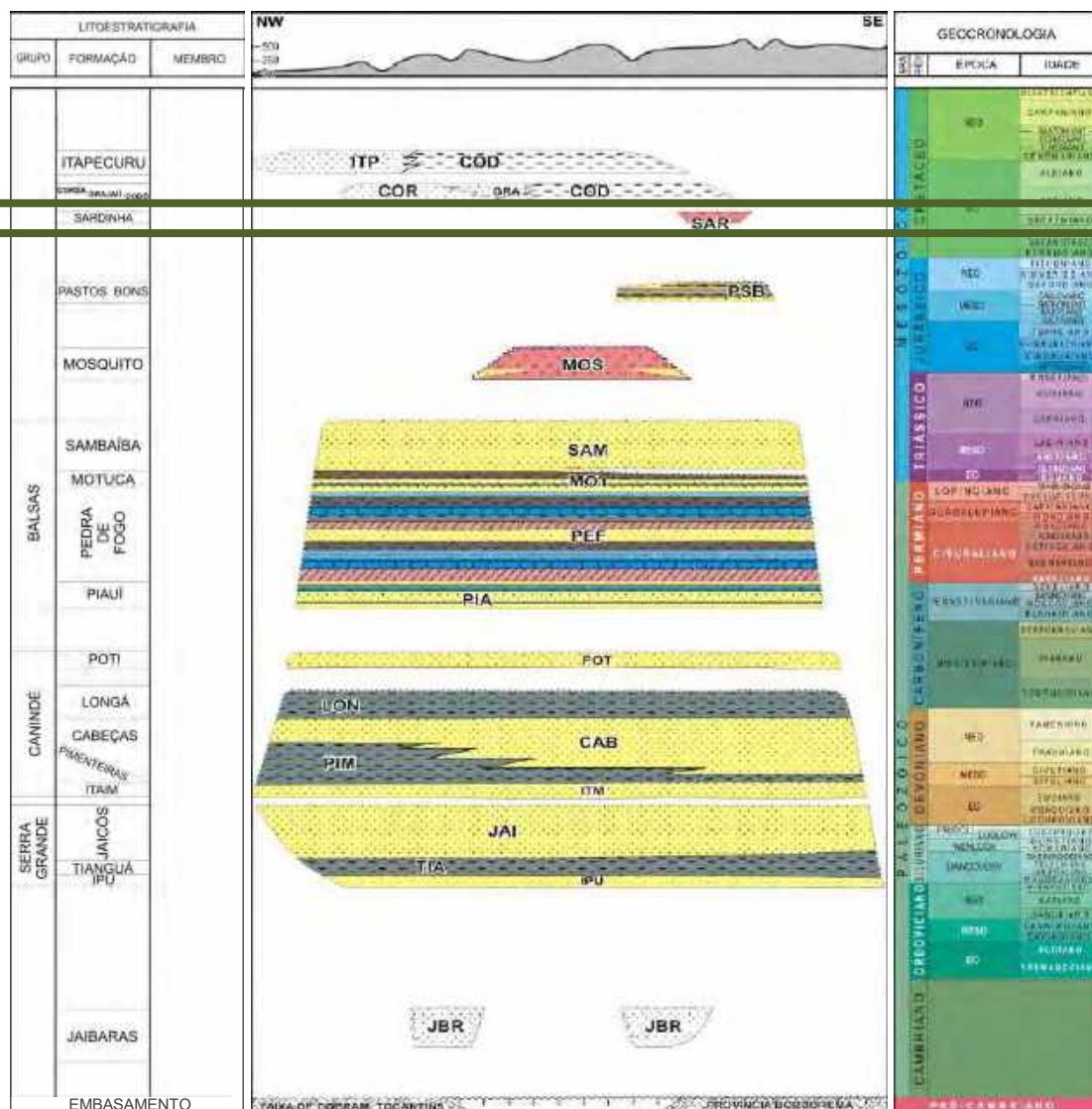
Jurassic Sequence (Pastos Bons Fm.) Fluvio-Lacustrine



Stratigraphic Evolution

Cretaceous (Sardinha Fm.)

Igneous Rocks



Stratigraphic Evolution

Cretaceous sequence

Corda Fm.

Desertic

Graju Fm.

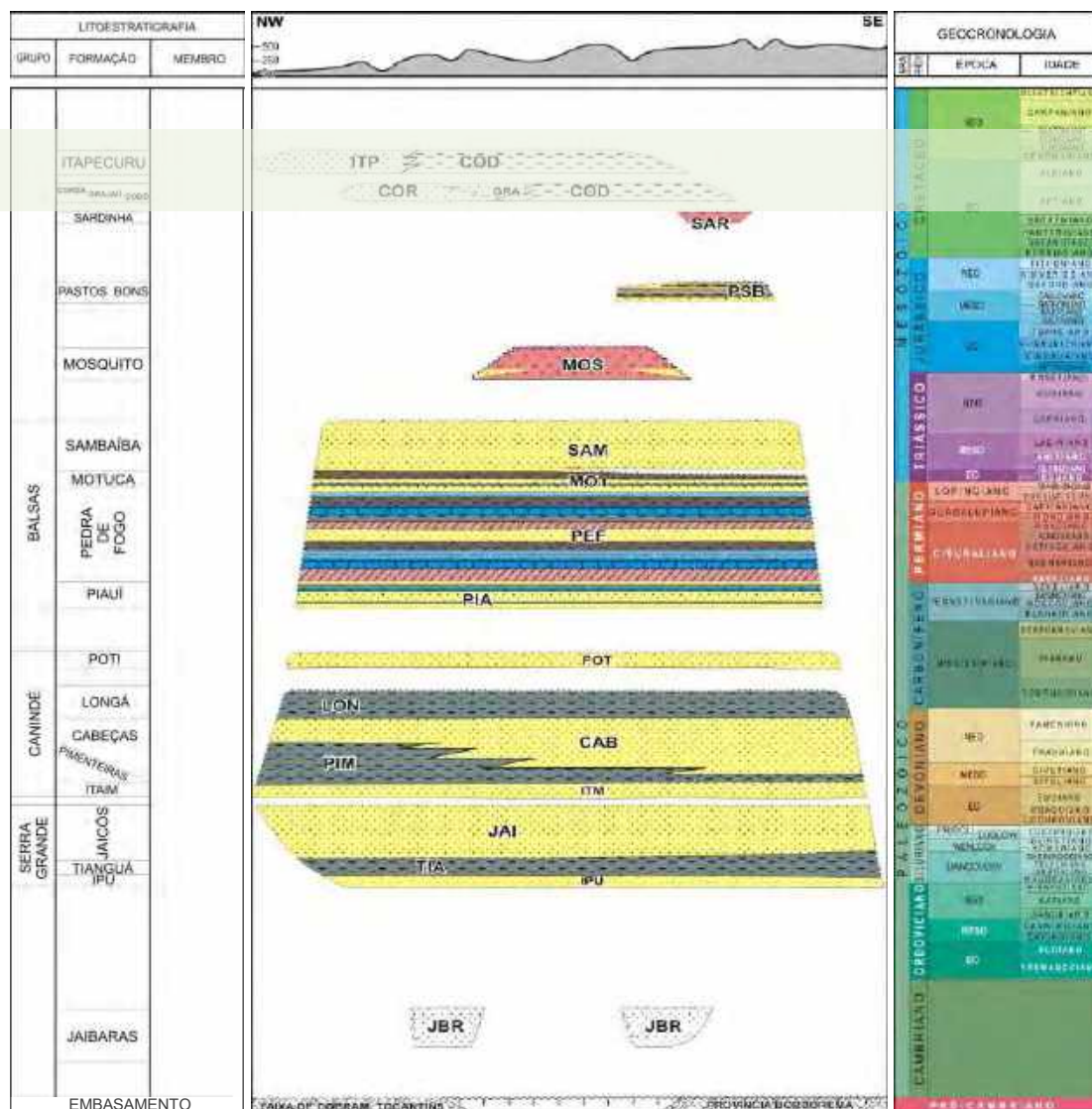
Fluvio-Deltaic

Codo Fm.

Alluvial

Lacustrine

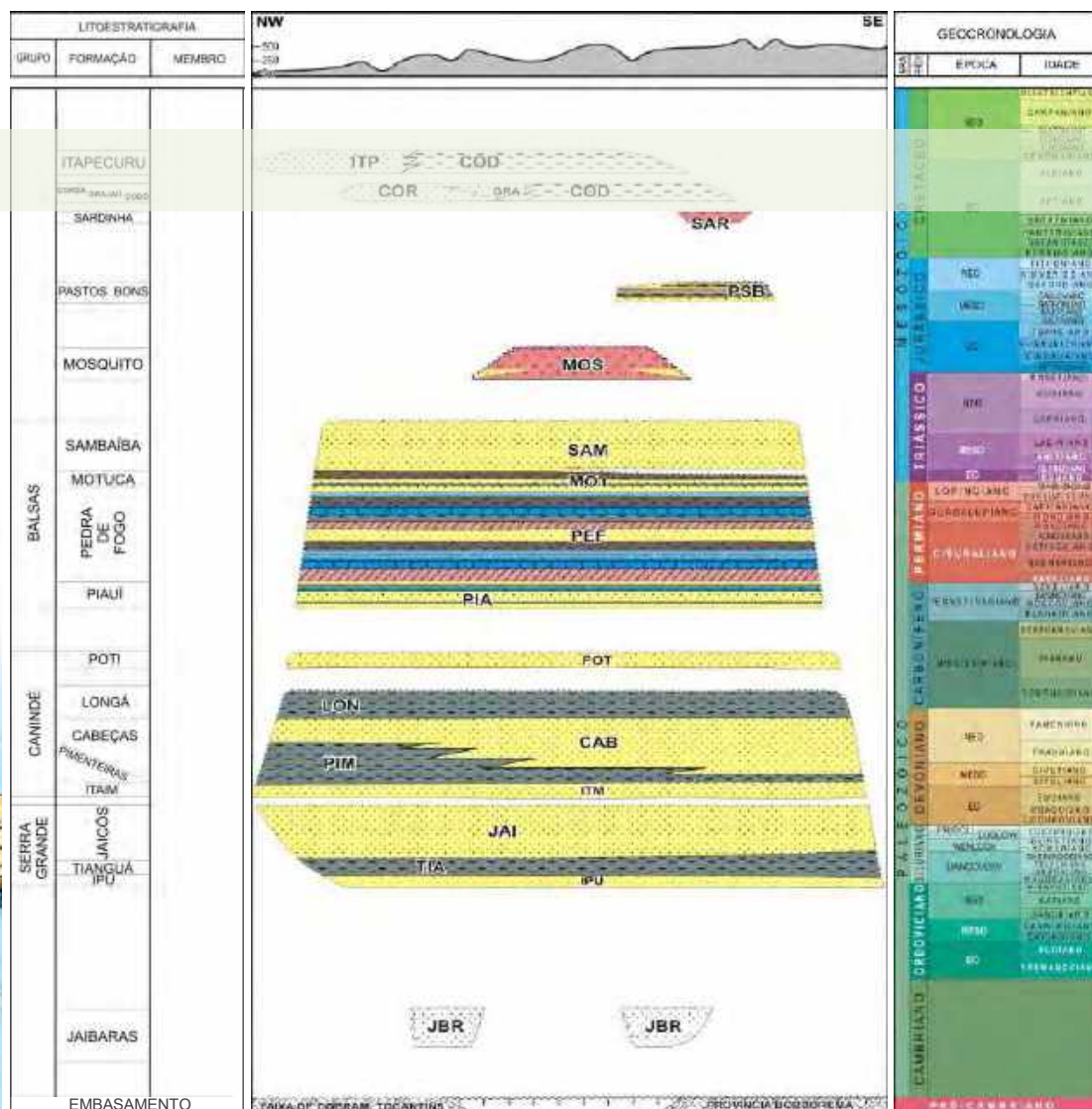
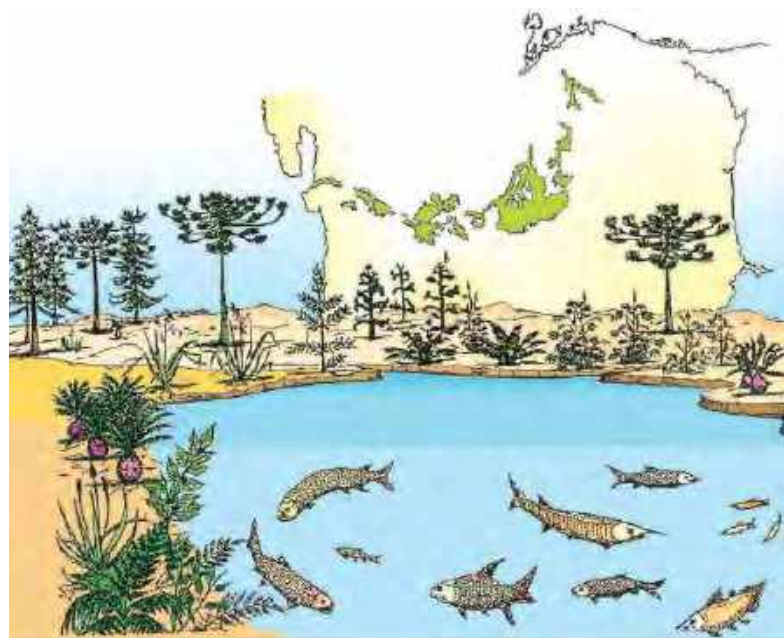
Shallow Shelf



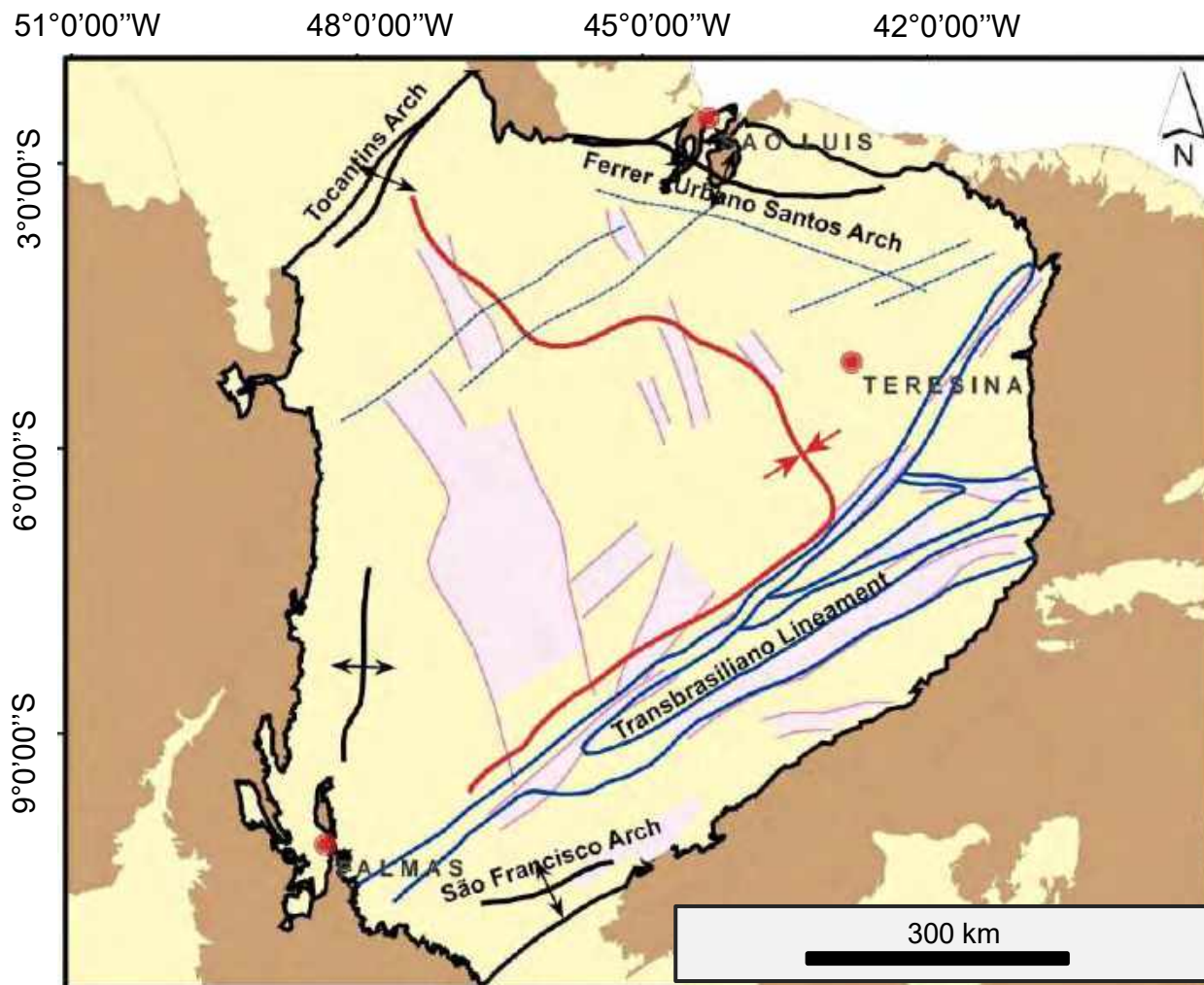
Stratigraphic Evolution

Cretaceous sequence

Itapecuru Fm./Codo Fm.
Estuarine/Lagoon

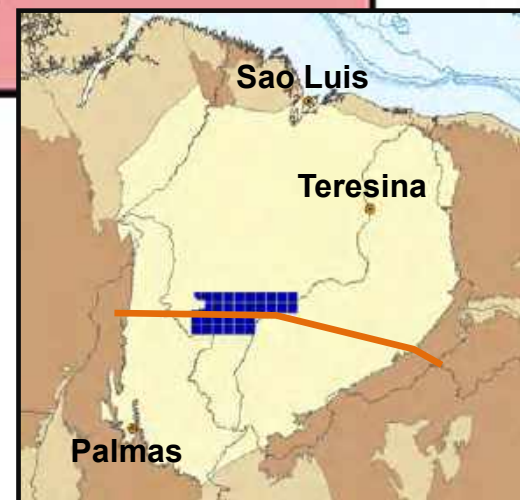
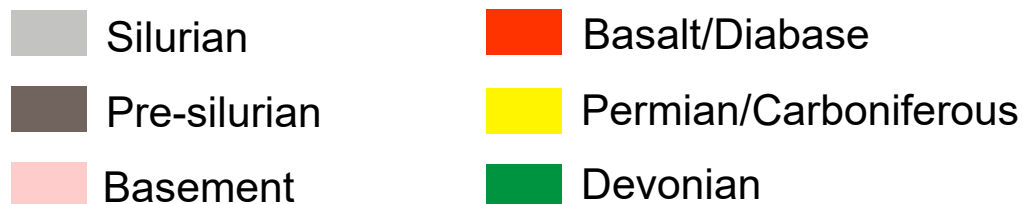
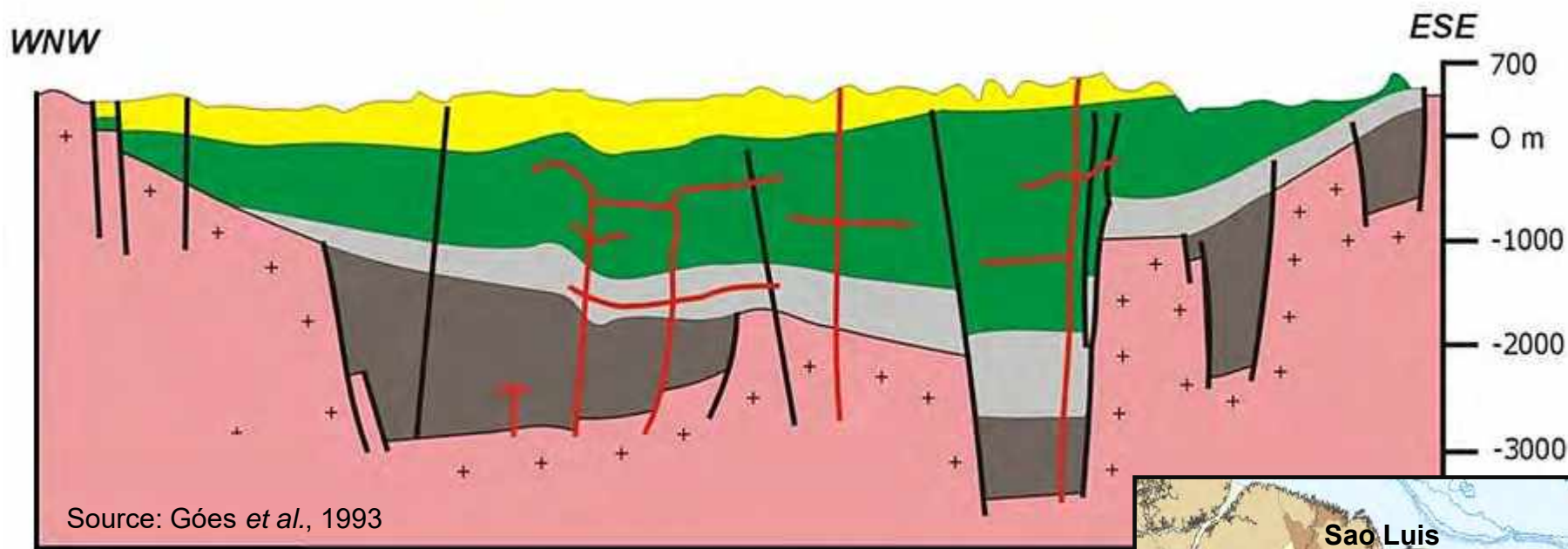


Structural Geology



Source: Milani & Zalan, 1998

Schematic Geological Section



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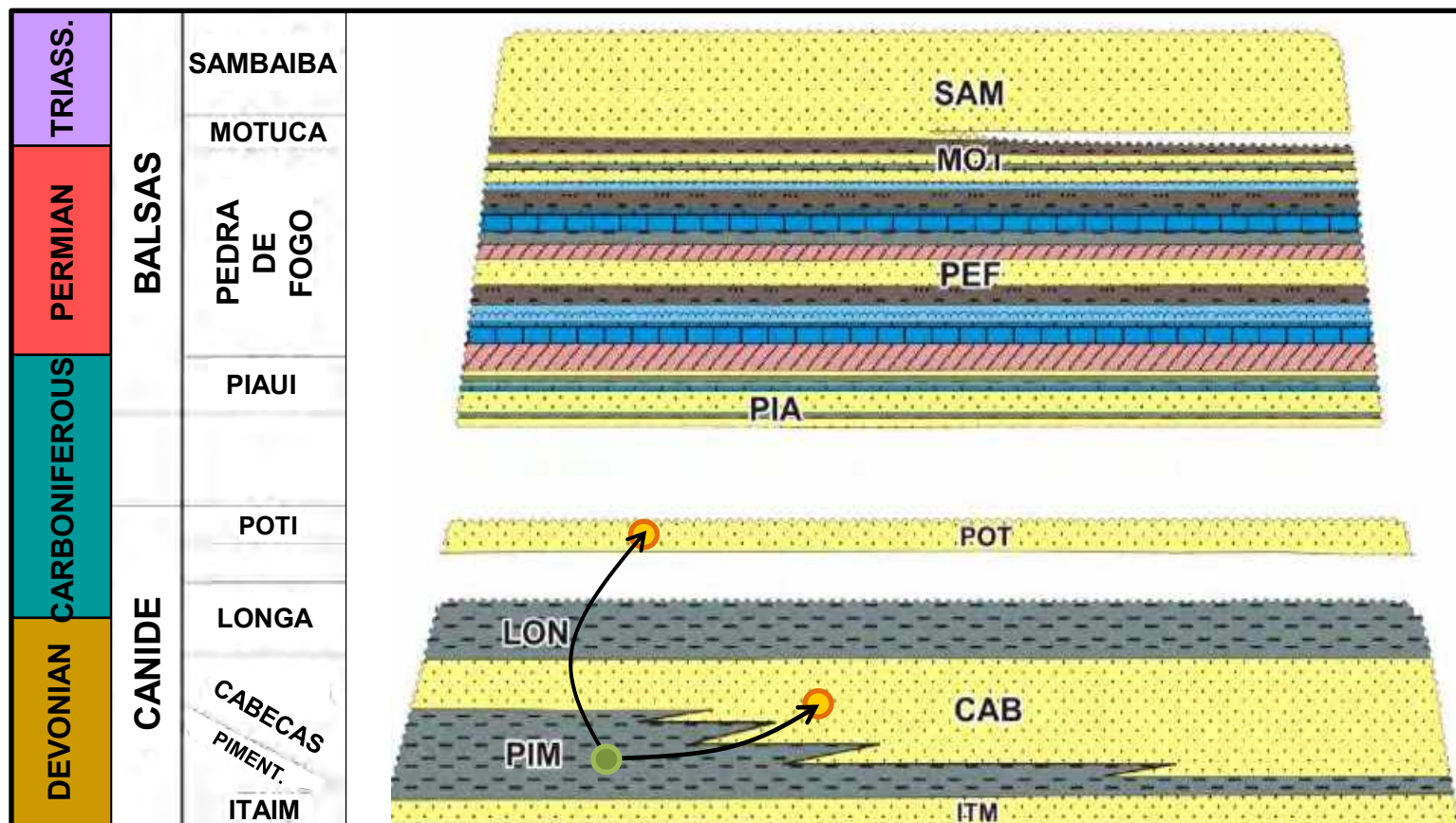
Area on Offer

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Petroleum Systems

Main Petroleum Systems

Pimenteiras - Cabecas (!) Pimenteiras - Poti (!)

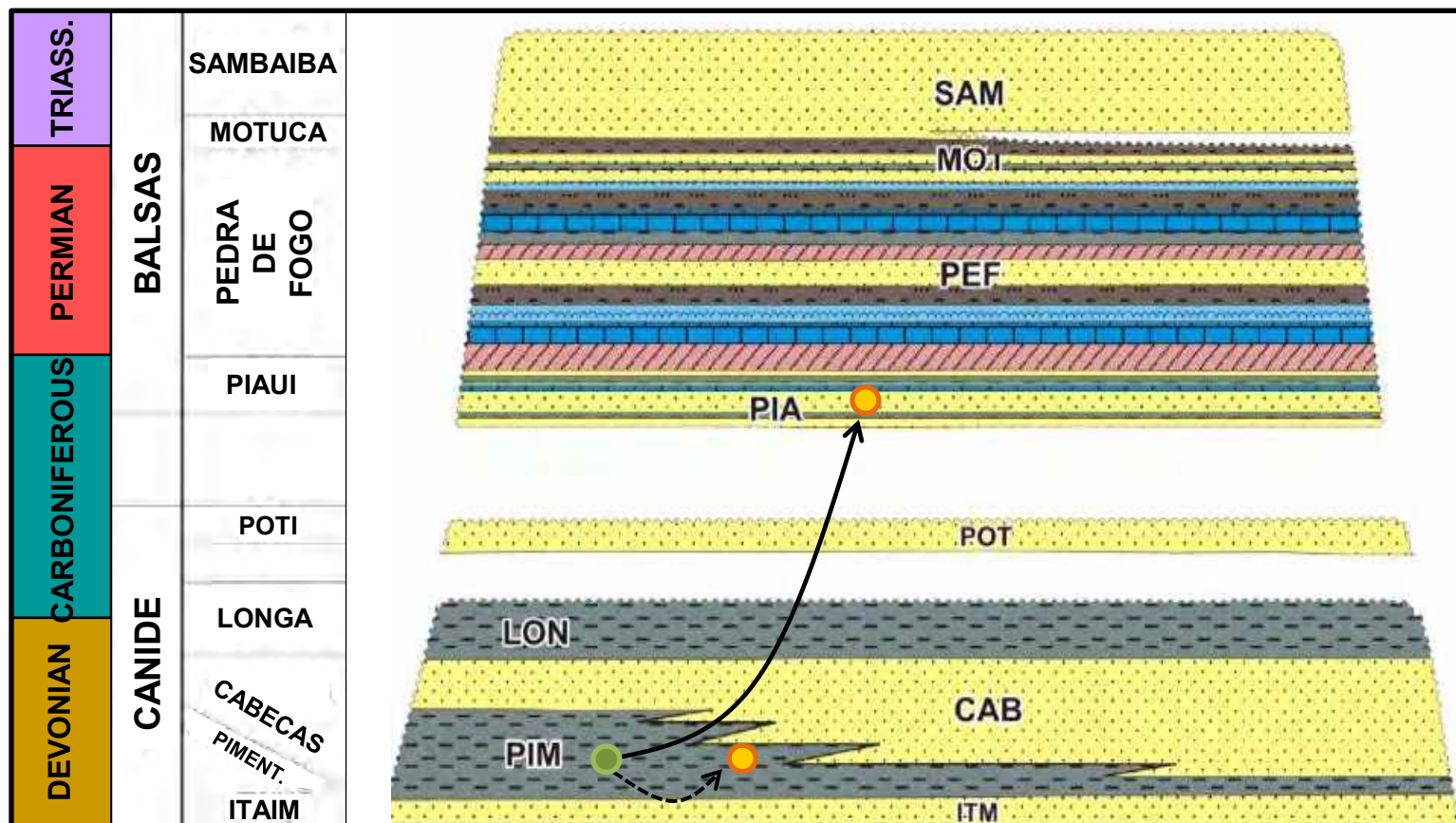


Stratigraphic Chart: Vaz *et al.*, 2007

Petroleum Systems

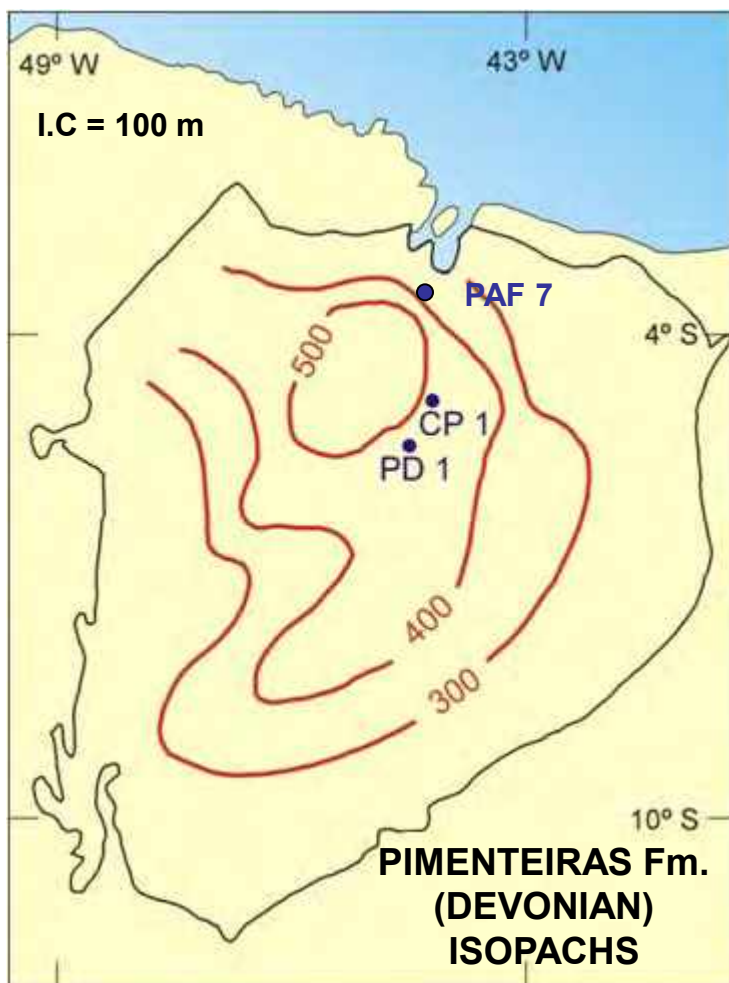
Secondary Petroleum Systems

Pimenteiras - Piauí (!) Pimenteiras - Pimenteiras (?)

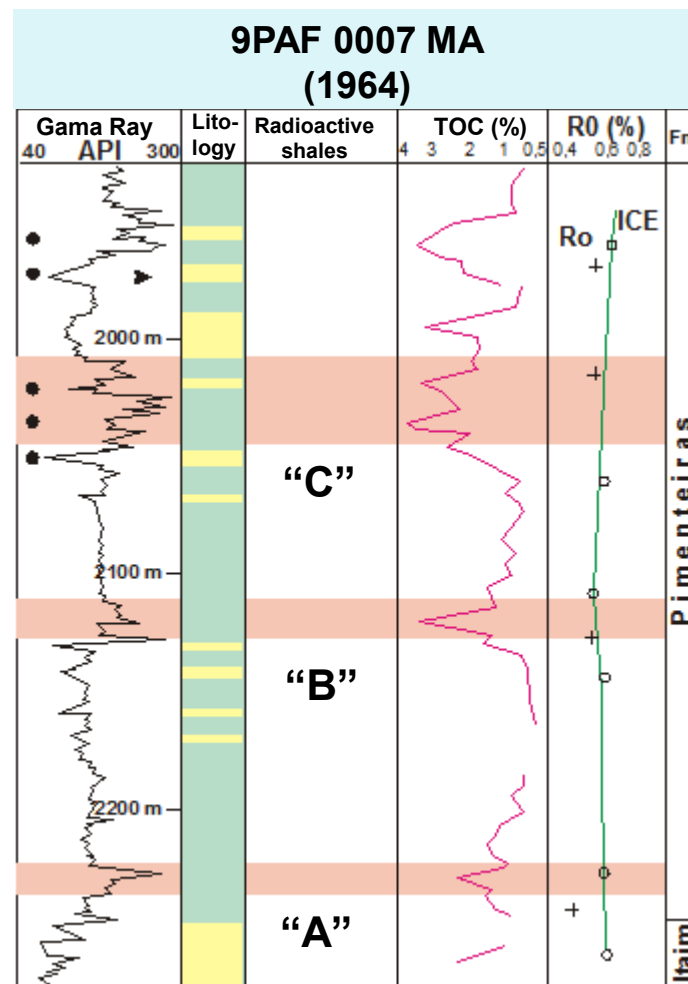


Stratigraphic Chart: Vaz *et al.*, 2007

Source Rock



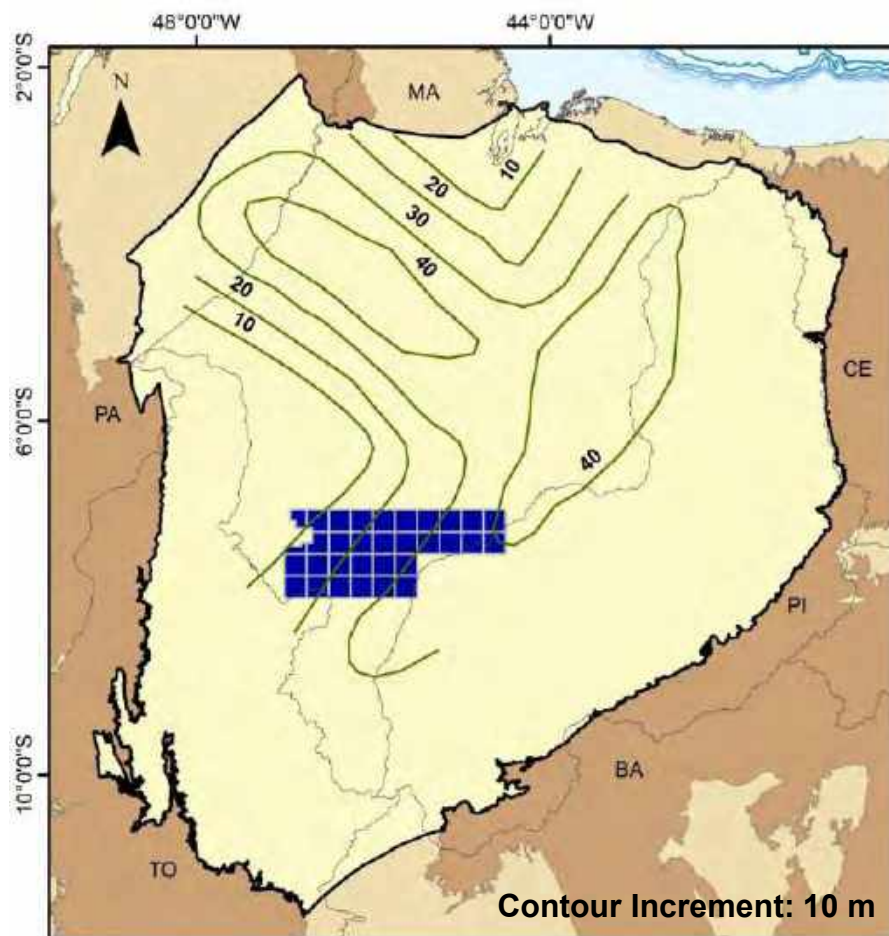
Source: Cunha, 1986



Source: Rodrigues, 1995

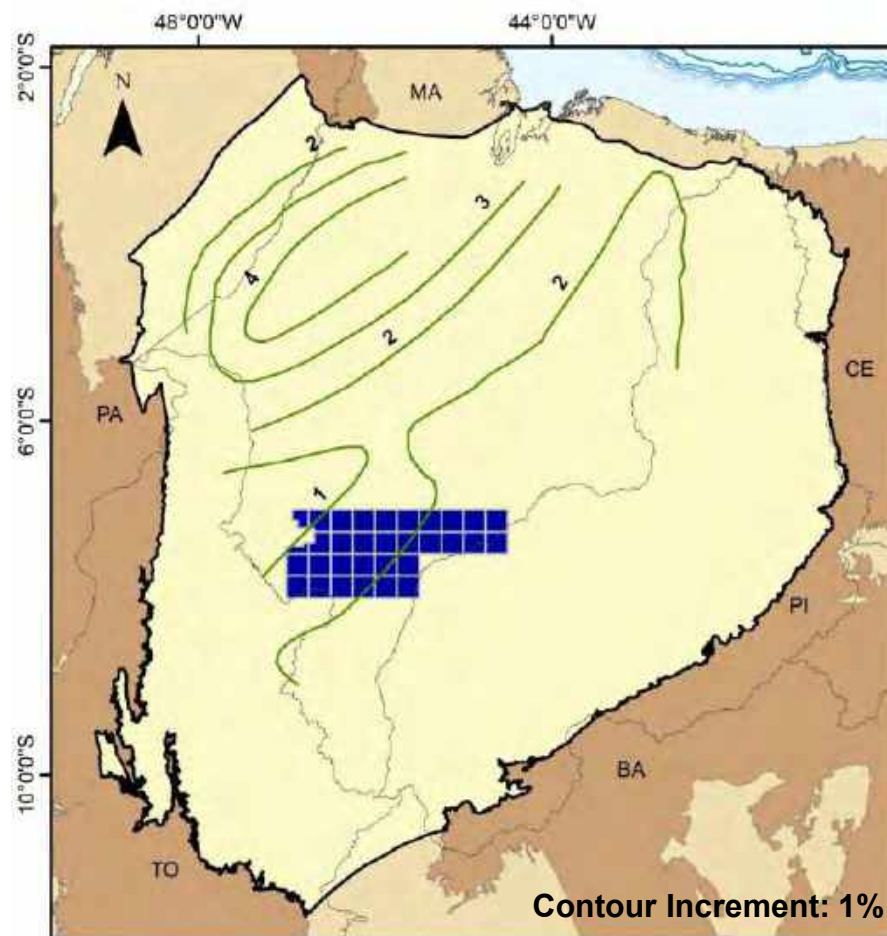
Source Rock

Radioactive “C” Shale Isolith Map



Contour Increment: 10 m

**Radioactive “C” Shale's
TOC Average Values**



Contour Increment: 1%

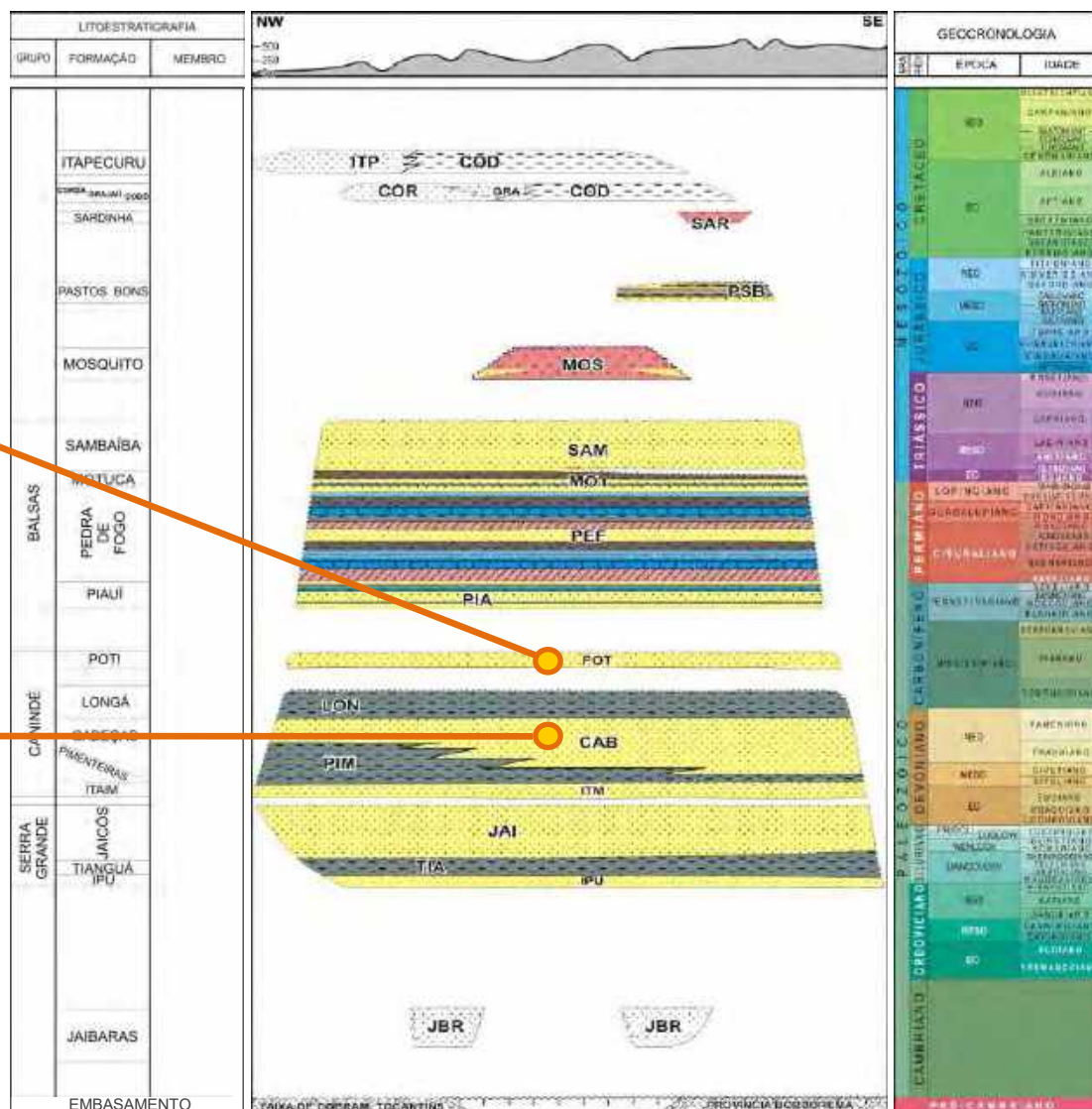
0 135 270 540 km

Reservoir Rocks

Main Reservoir Rocks

Early Carboniferous
(Poti Fm.)

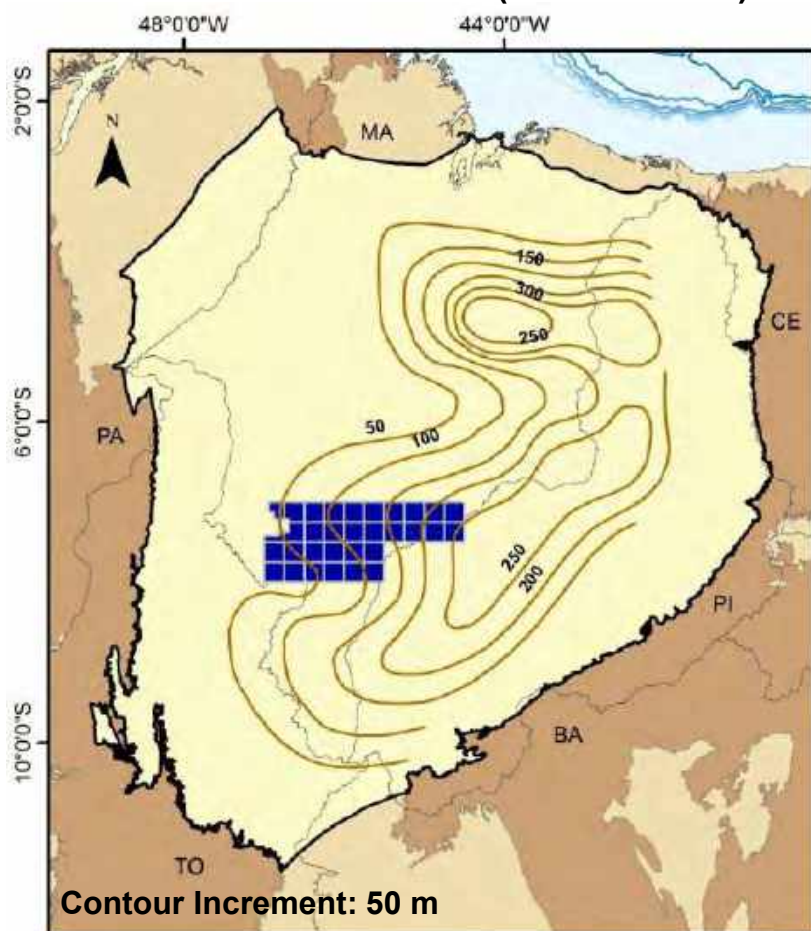
Devonian
(Cabecas Fm.)



Reservoir Rocks

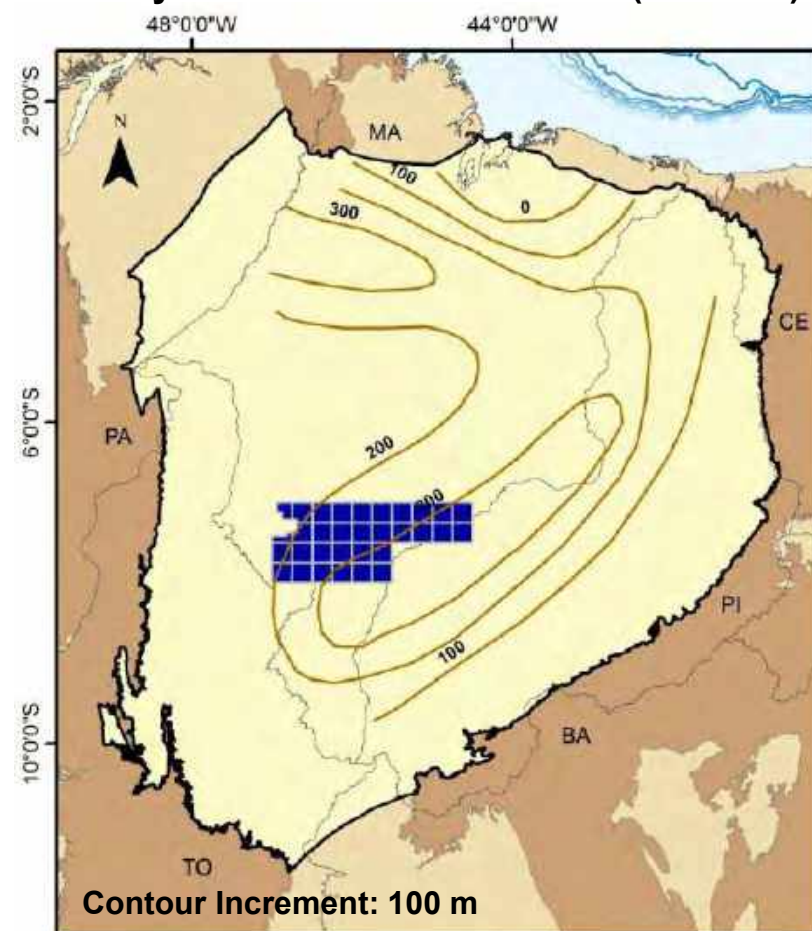
Isopach Maps

Devonian Reservoir (Cabecas Fm.)

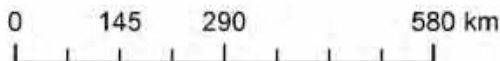


Source: Lima, 1990 in Góes *et al.*, 1993

Early Carboniferous Reservoir (Poti Fm.)



Source: Cunha, 1986

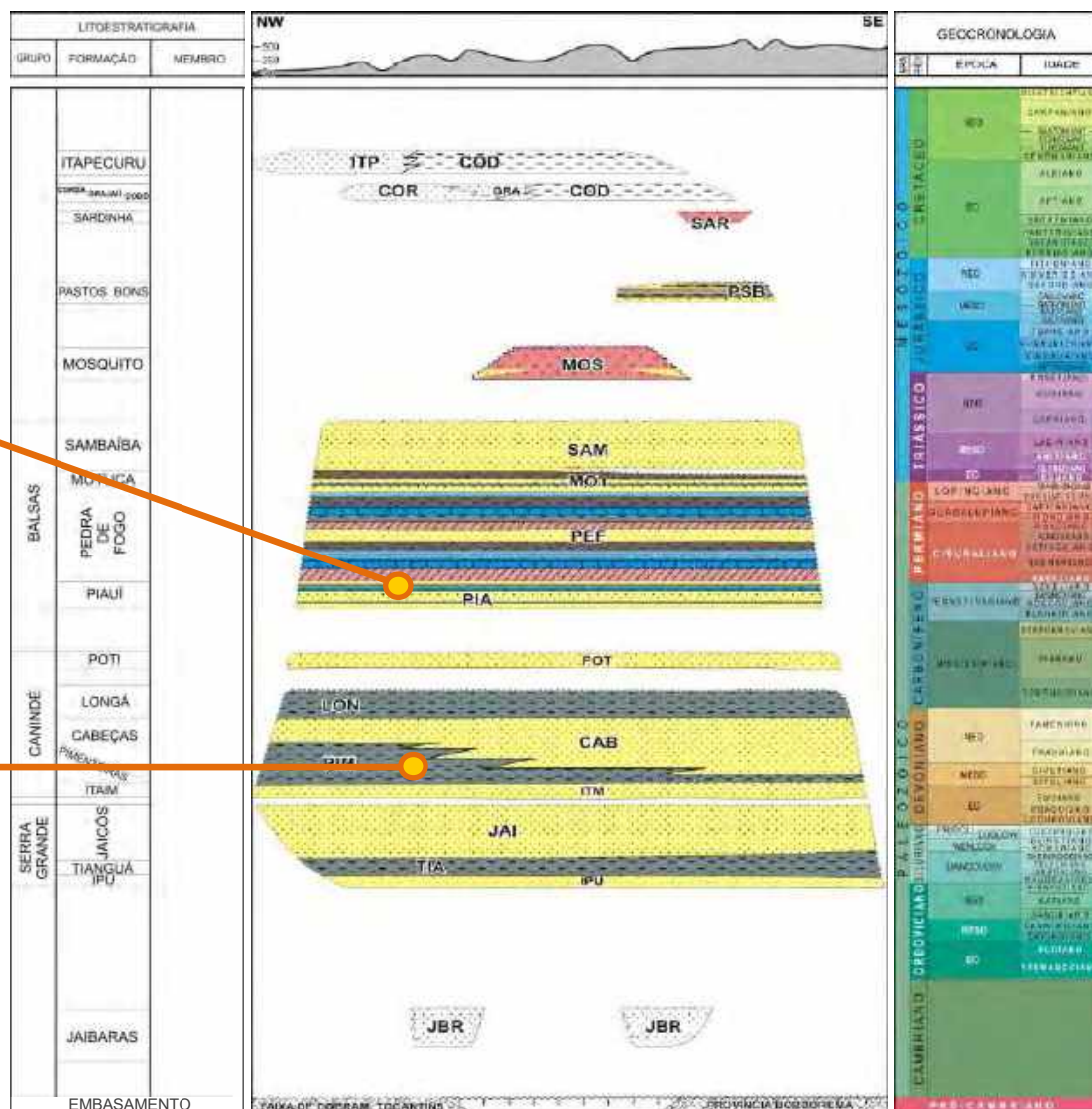


Reservoir Rocks

Secondary Reservoirs

Late Carboniferous
(Piauí Fm.)

Devonian (?)
(Pimenteiras Fm.)

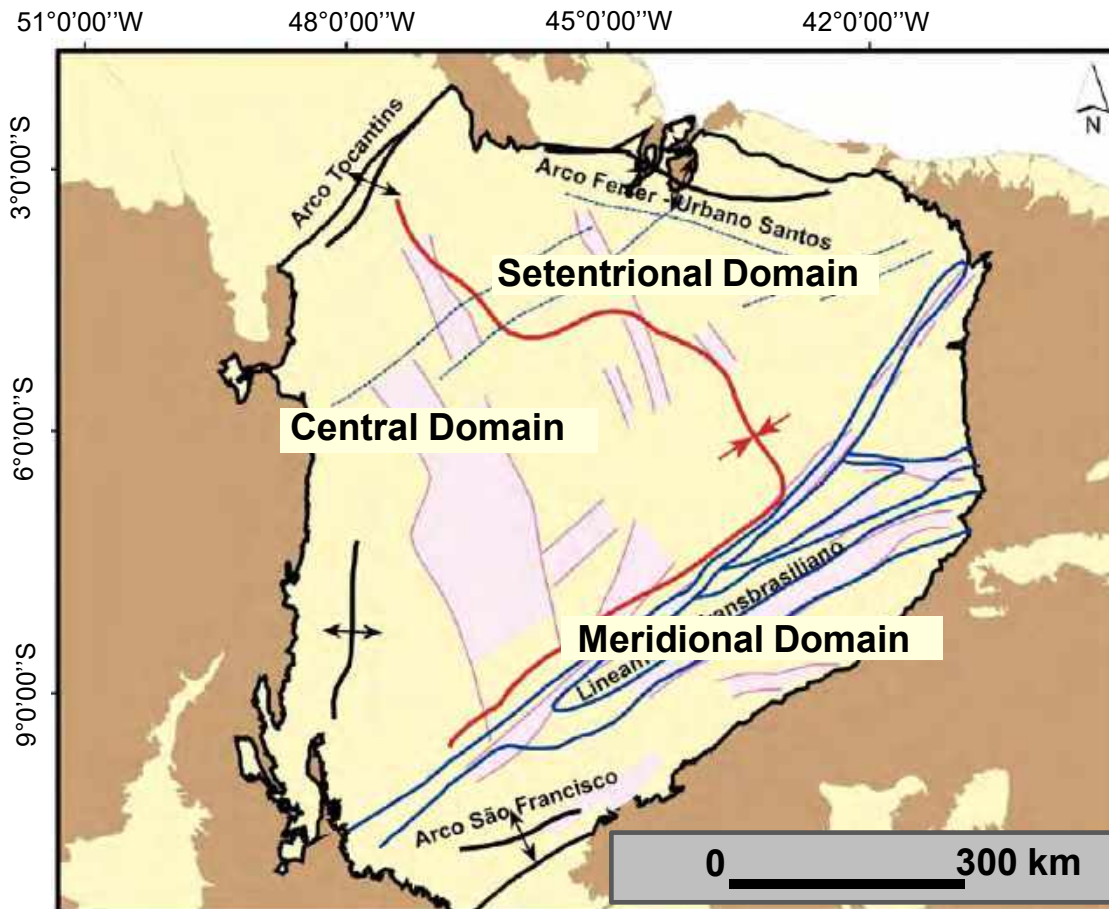




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Traps



Setentrional Domain

Regional Arches

Normal Faults

Central Domain

Igneous Intrusion Related
Structures

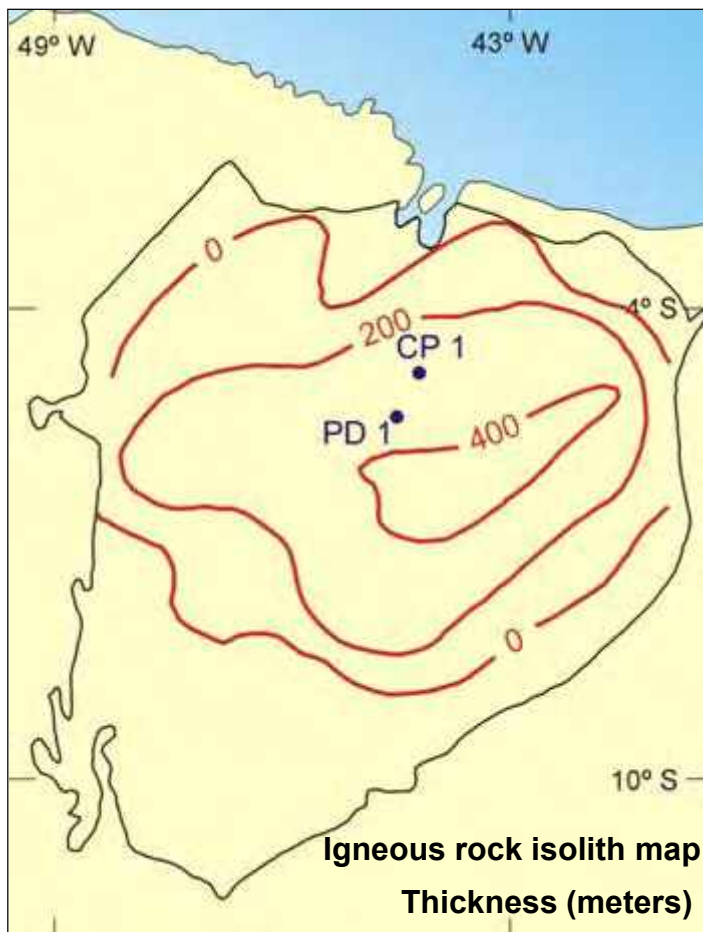
Meridional Domain

Transcurrent Structures

Source: Milani & Zalan, 1998

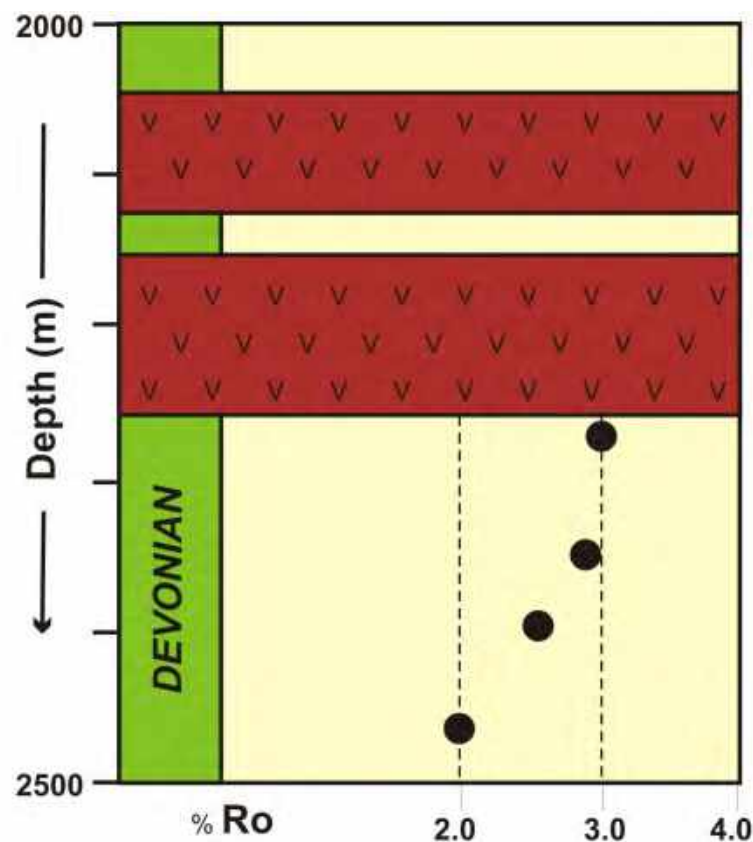
Intrusive Rocks

Seal and Maturation



Source: Lima, 1990 in Góes *et al.*, 1993

Diabase intrusion effect in the maturation of the Pimenteiras Formation rocks



Source: Modified from Gonzaga & Gonçalves, 1998,
by DPC & Assoc., 2000

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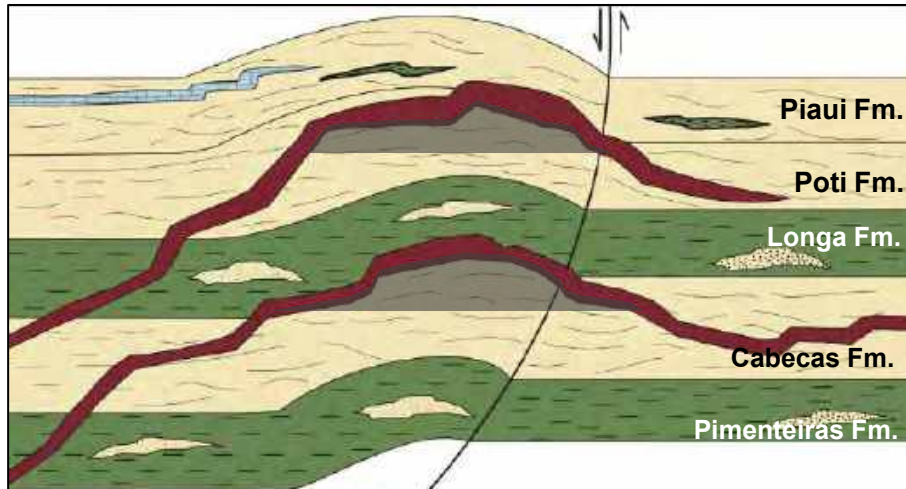
Final Remarks



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Brasil
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Main Plays



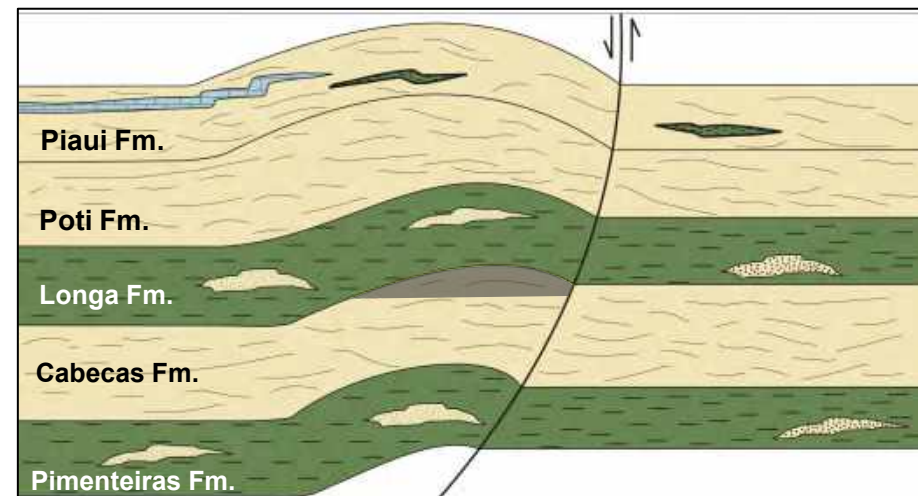
Structural Plays

Devonian Sandstones
(Cabeças Fm.)
Regional Structural Traps

Igneous Rocks Plays

Devonian Sandstones (Cabeças Fm.)
Trapped by Igneous Intrusions

Early Carboniferous Sandstones (Poti Fm.)
Trapped by Igneous Intrusions



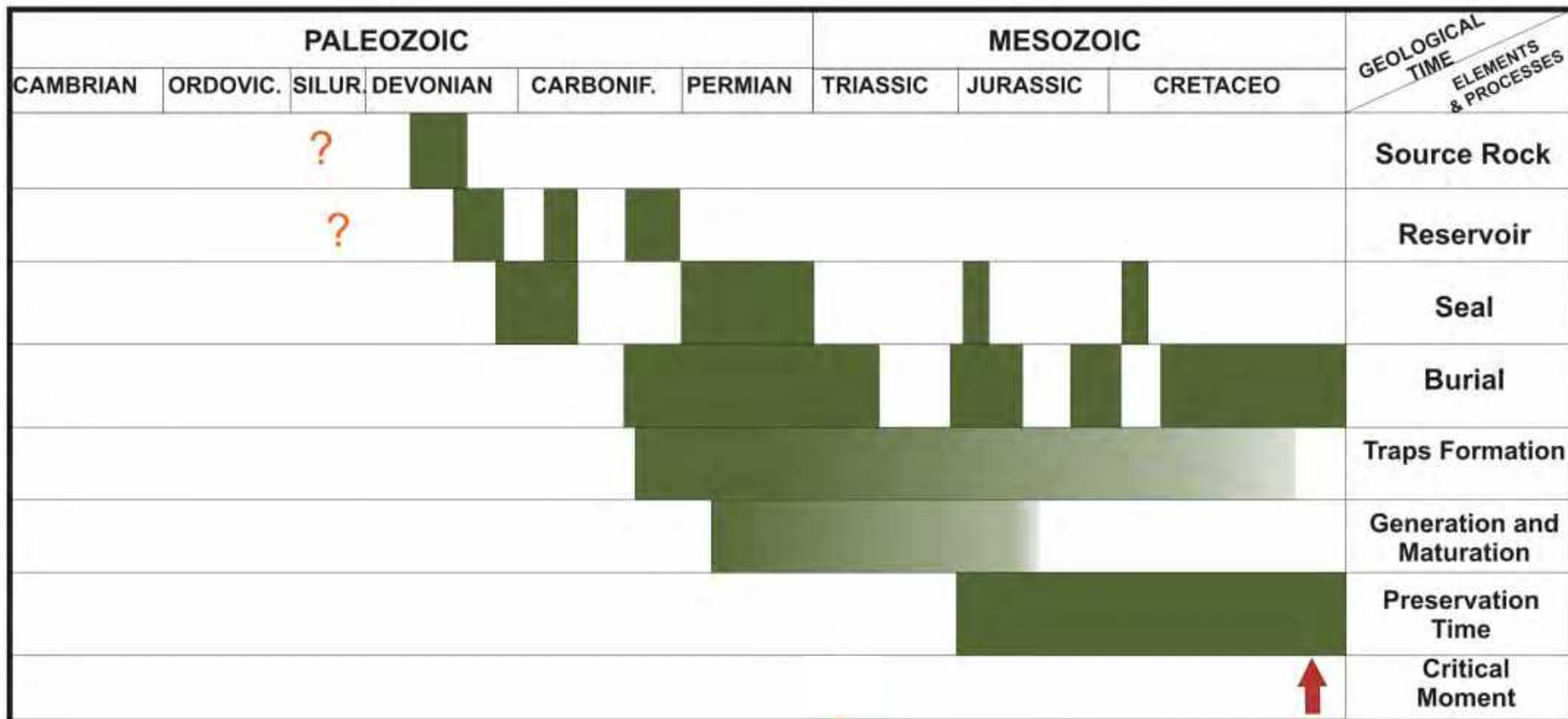
Secondary Plays

Secondary Expected Plays

Late Carboniferous Sandstones (Piauí Fm.) Trapped by
Igneous Intrusions

Forced Regression Devonian Sandstones
(Pimenteiras Fm.) in Mixed Traps

Event Chart



Source: DPC & ASSOC., 2000

Agenda

Location

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

Petroleum Systems

Plays

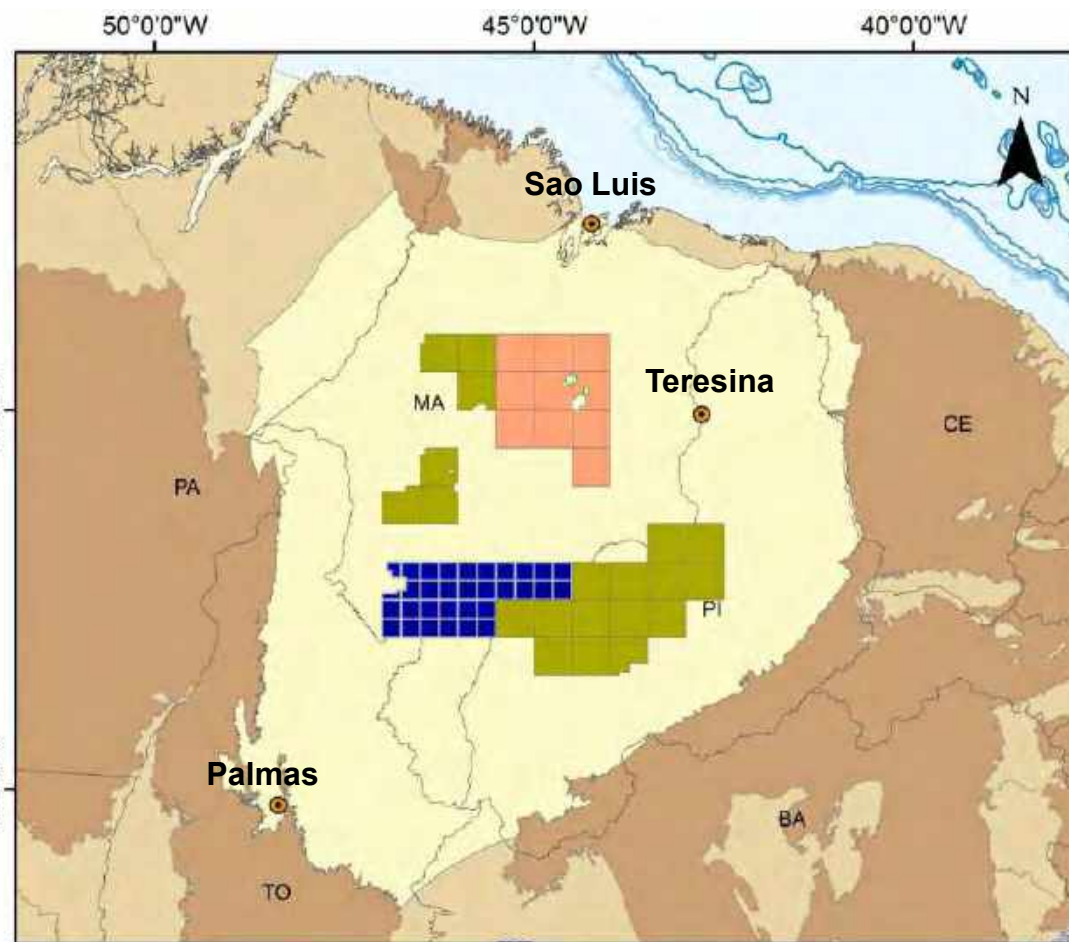
Exploration Successes

Area on Offer

Final Remarks

Exploration Successes

Gavioes Cluster



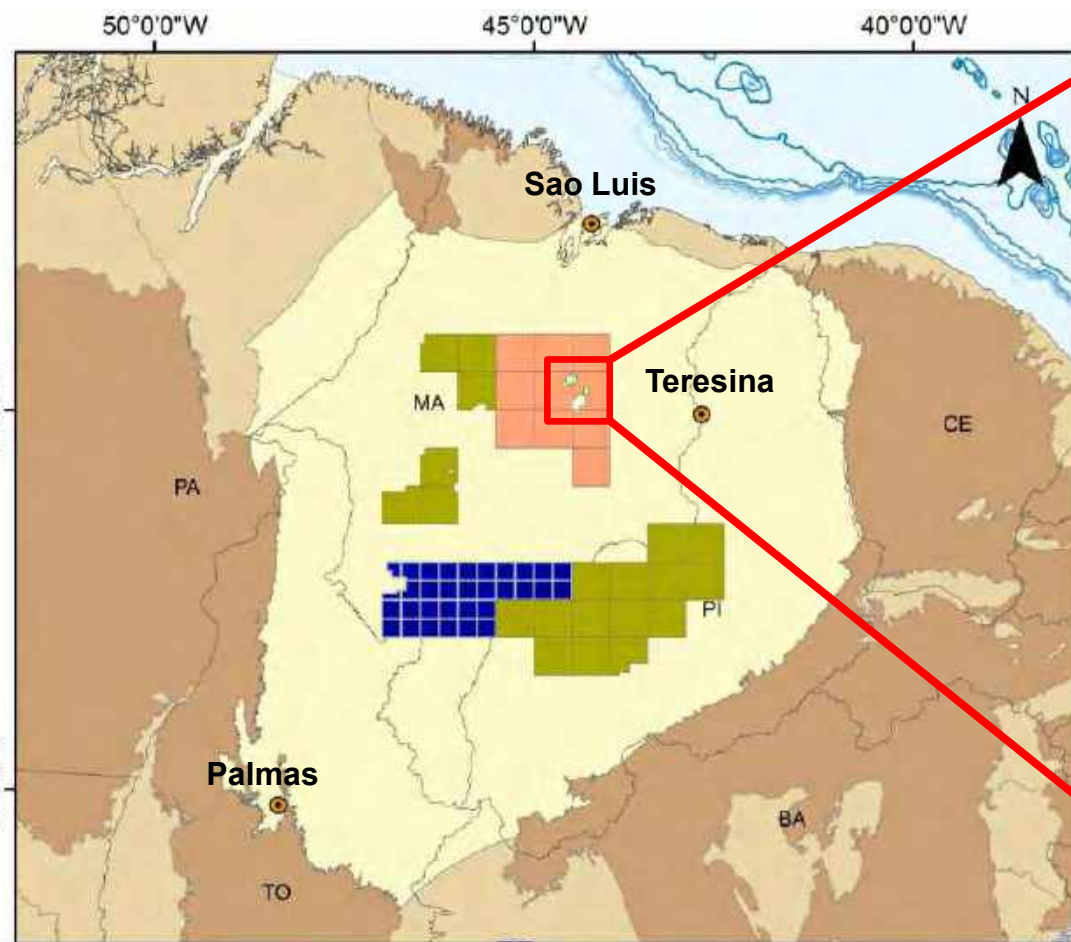
Legend

-  R12 Blocks
-  R11 Auctioned Blocks
-  Blocks Under Concession (R9)
-  Gas Fields
-  Sedimentary Basins
-  Basement

0 140 280 560 km

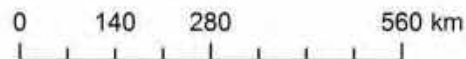
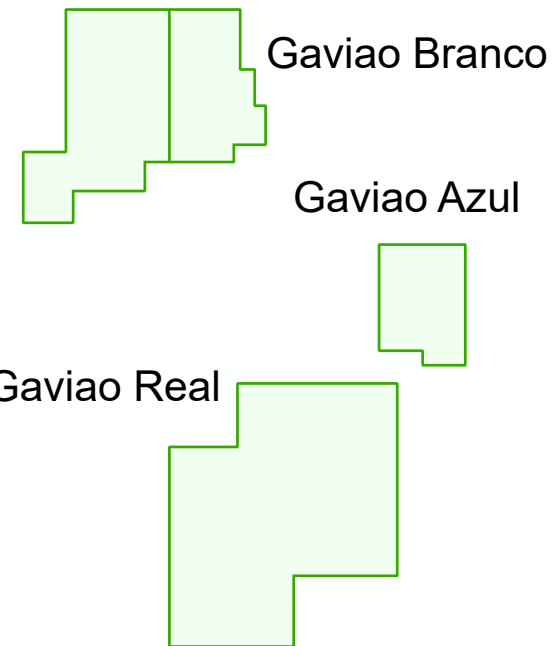
Exploration Successes

Gavioes Cluster



Commerciality Declaration

West of Gaviao Branco



Exploration Successes

Gaviao Real Field



Gaviao Azul Field



	Proved Reserves Natural Gas (billions m³)	Total Reserves Natural Gas (billions m³)
Gavioes Cluster	6.99	29.1

* Updated at 09/02/2013

Agenda

Location

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

Petroleum Systems

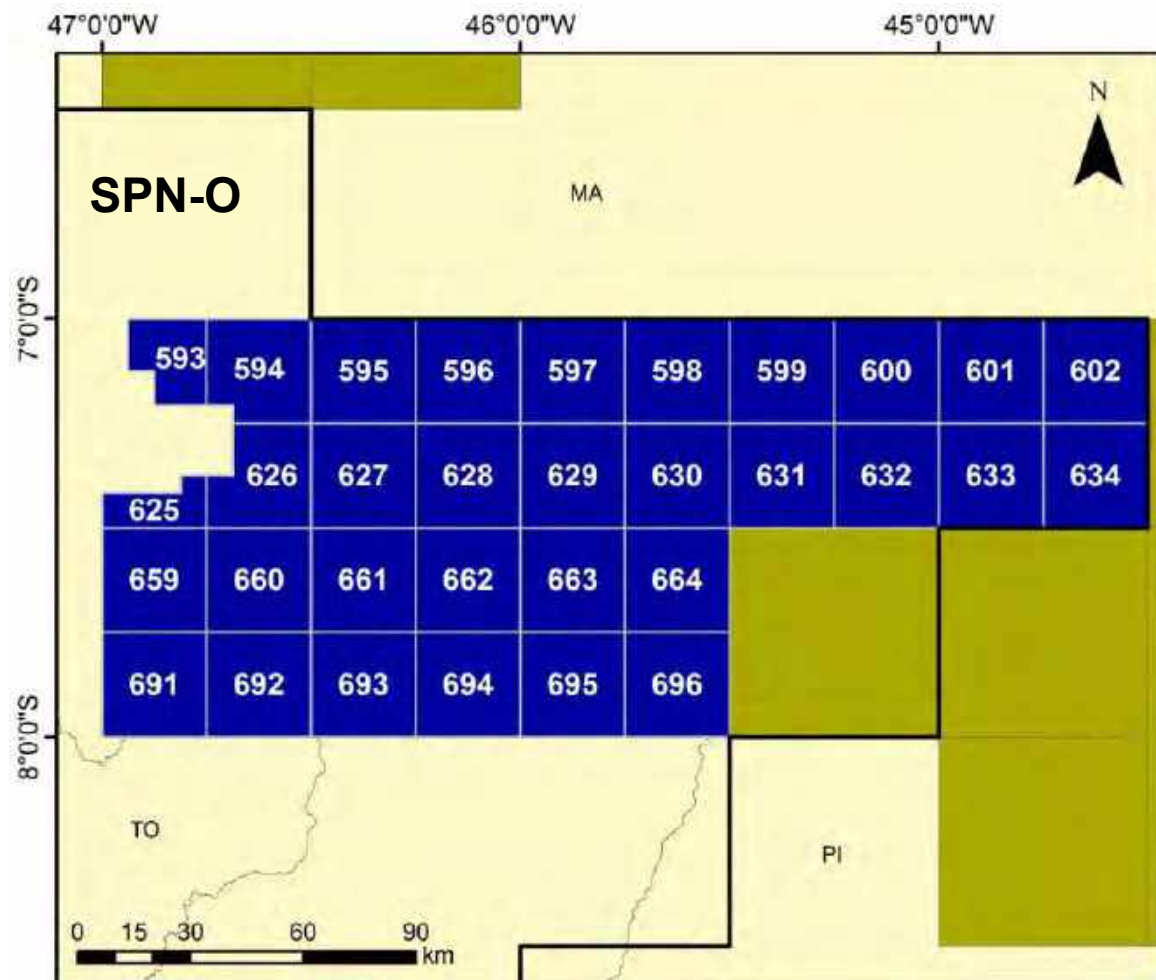
Plays

Exploration Successes

Area on Offer

Final Remarks

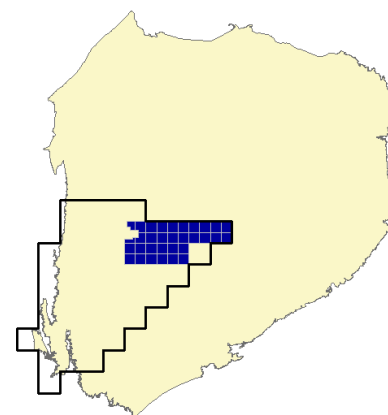
Area on Offer



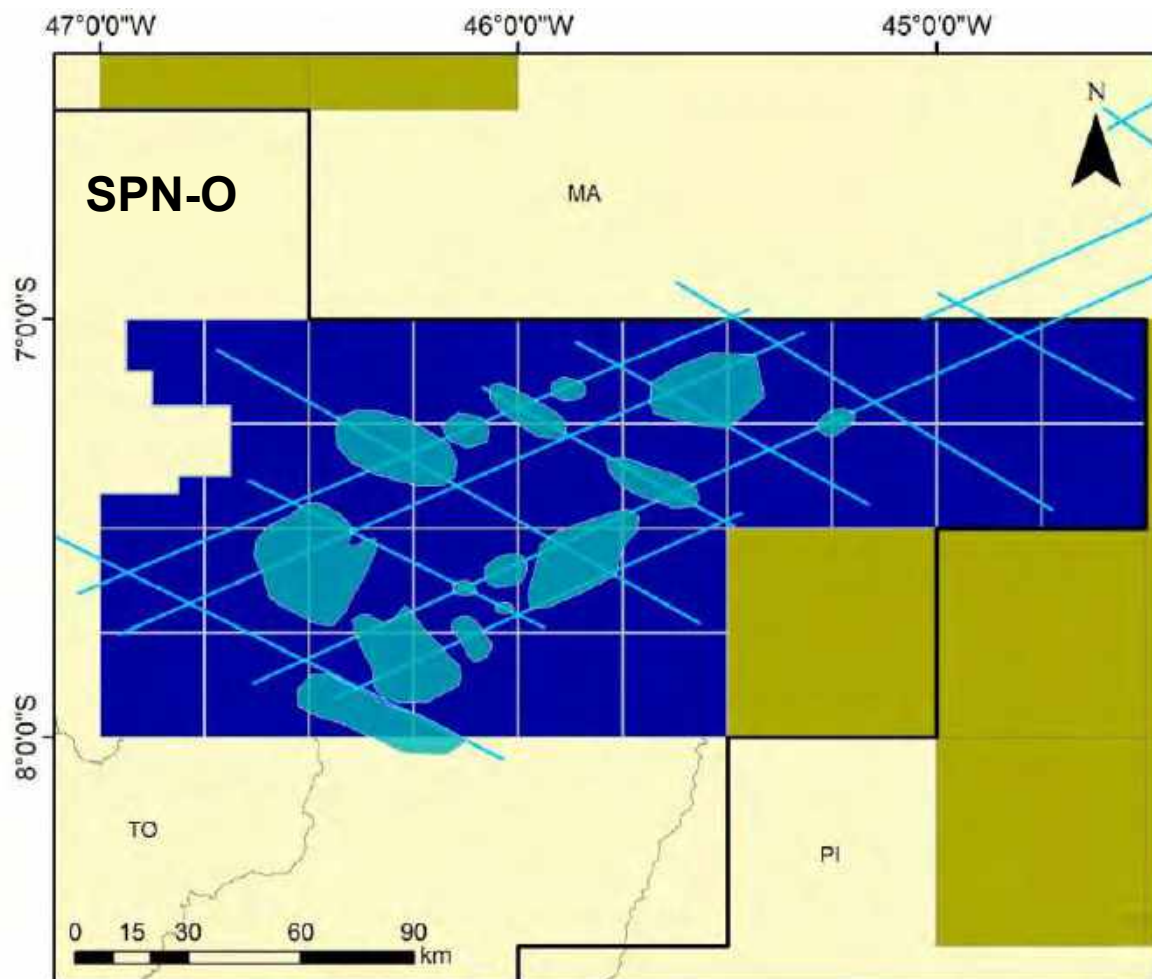
32 Blocks on Offer

~ 23,500 km²

Sector SPN-O



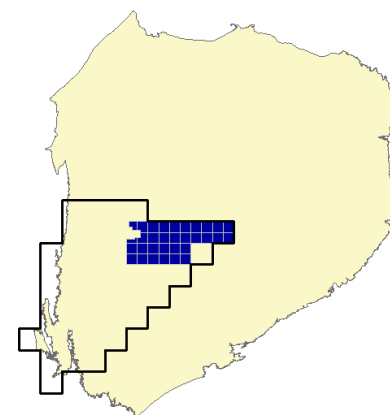
Area on Offer



Identified Leads

~ 3,600 km²

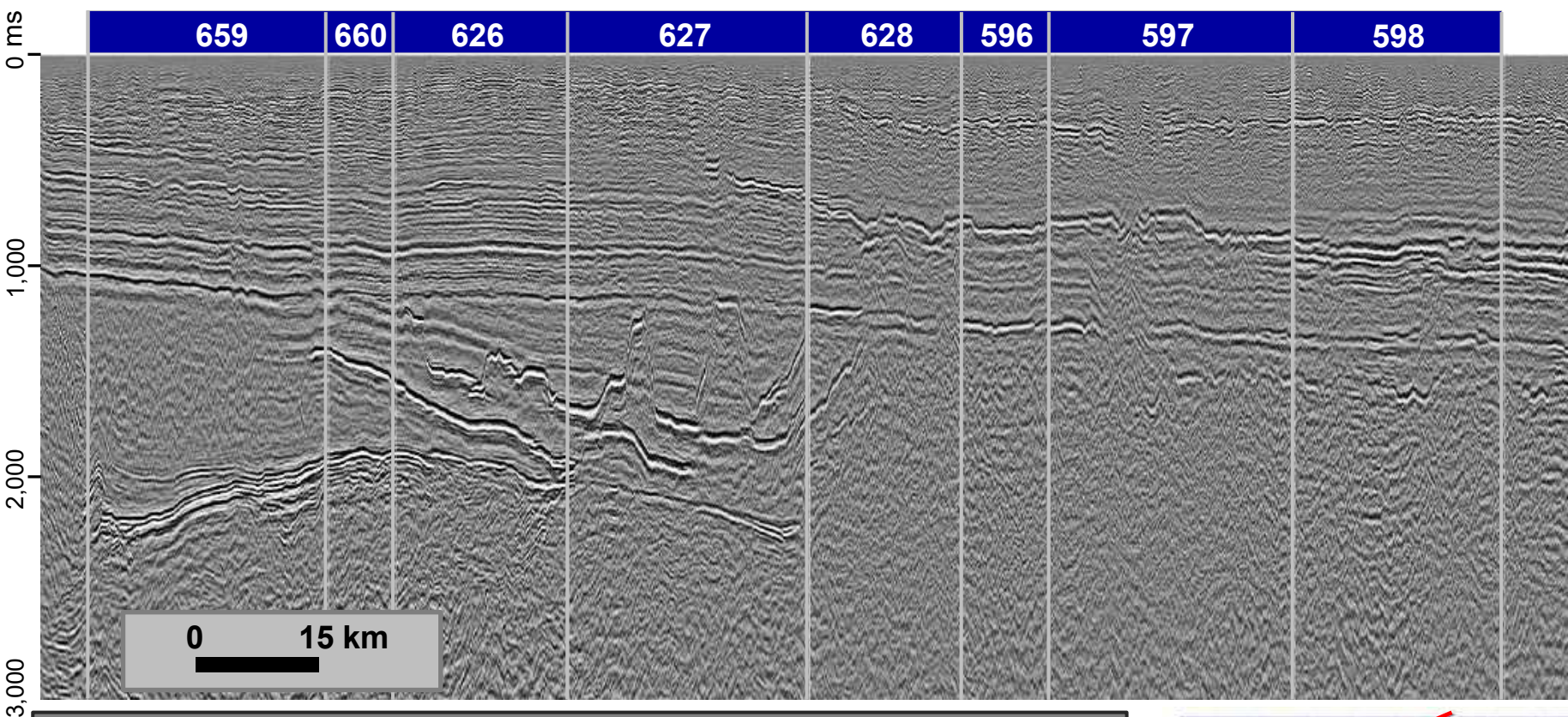
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-115

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

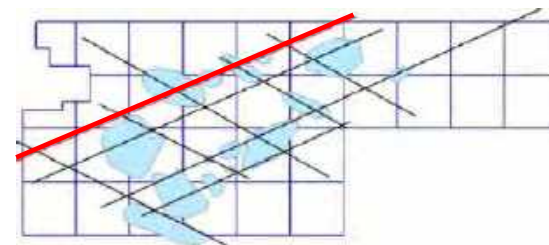
— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

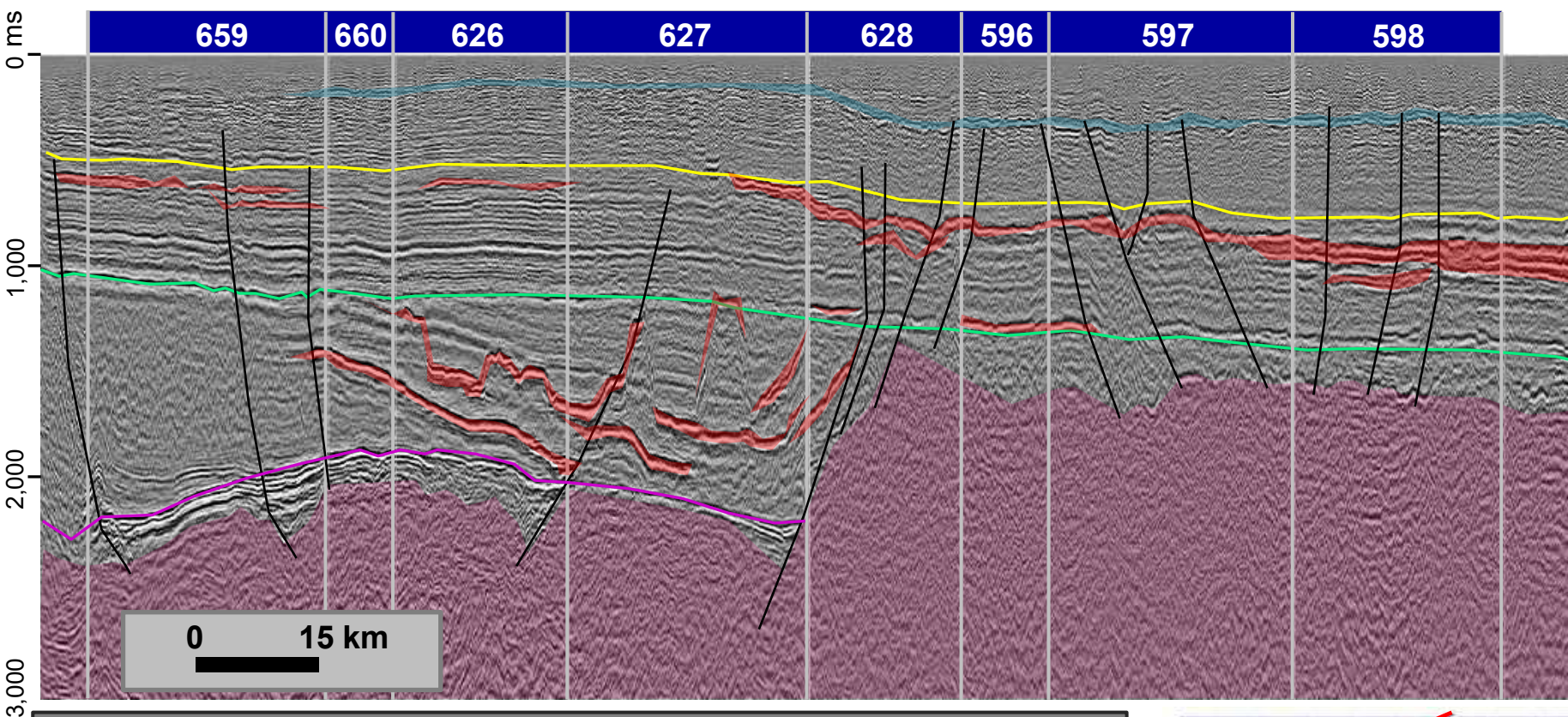
— Faults



Leads

Line LR-115

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

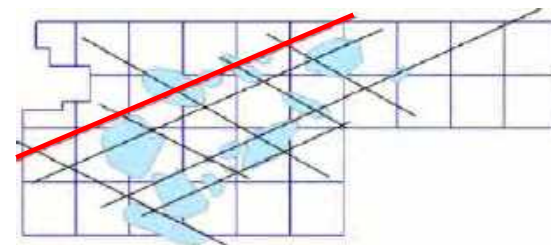
— Pre-rift (?)

— Anhydrite

— Sills

— Basement

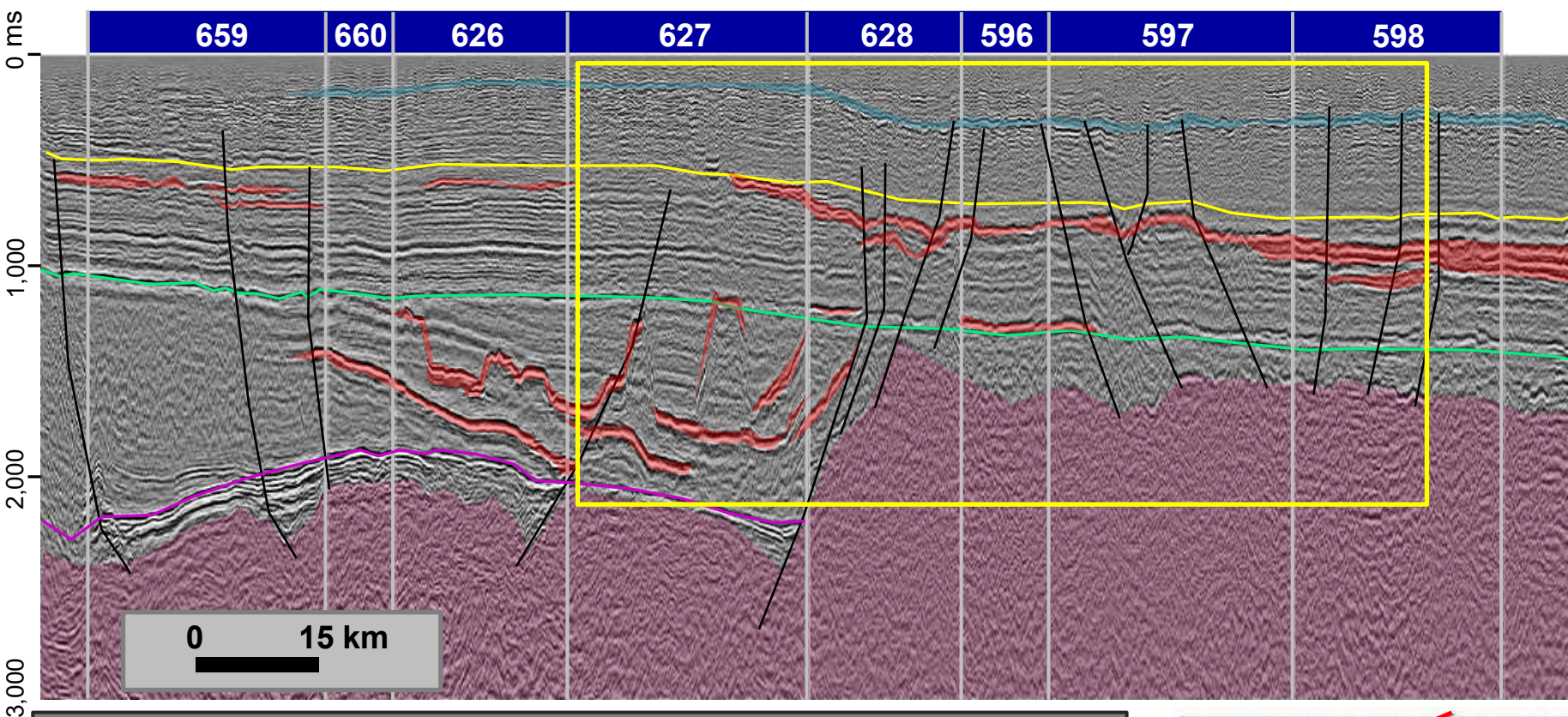
— Faults



Leads

Line LR-115

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

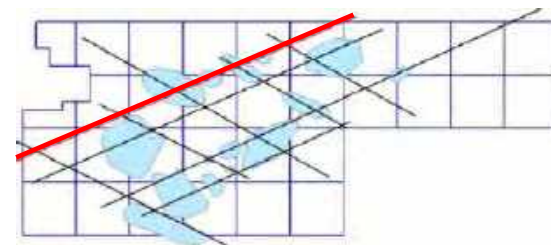
— Pre-rift (?)

— Anhydrite

— Sills

— Basement

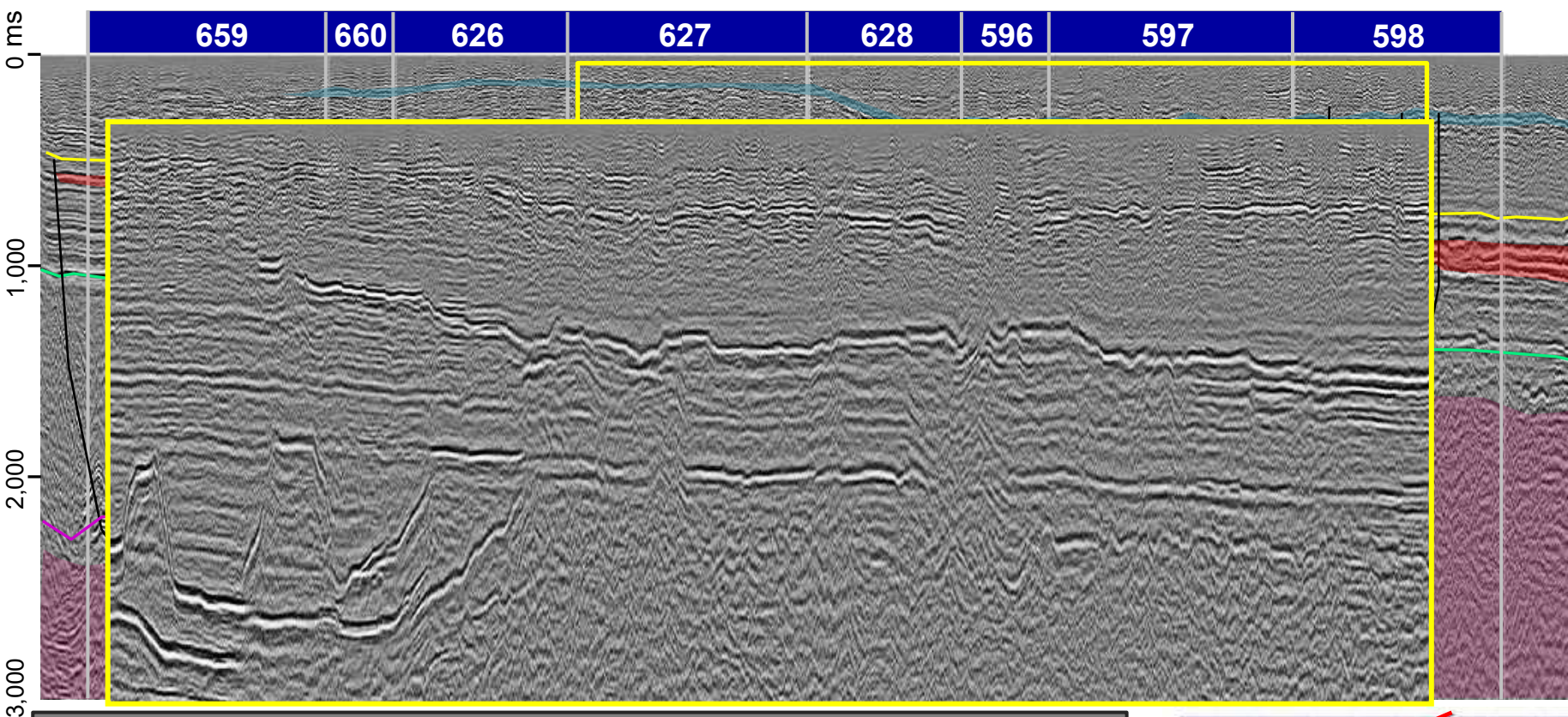
— Faults



Leads

Line LR-115

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

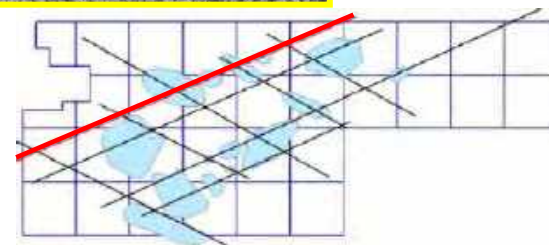
— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

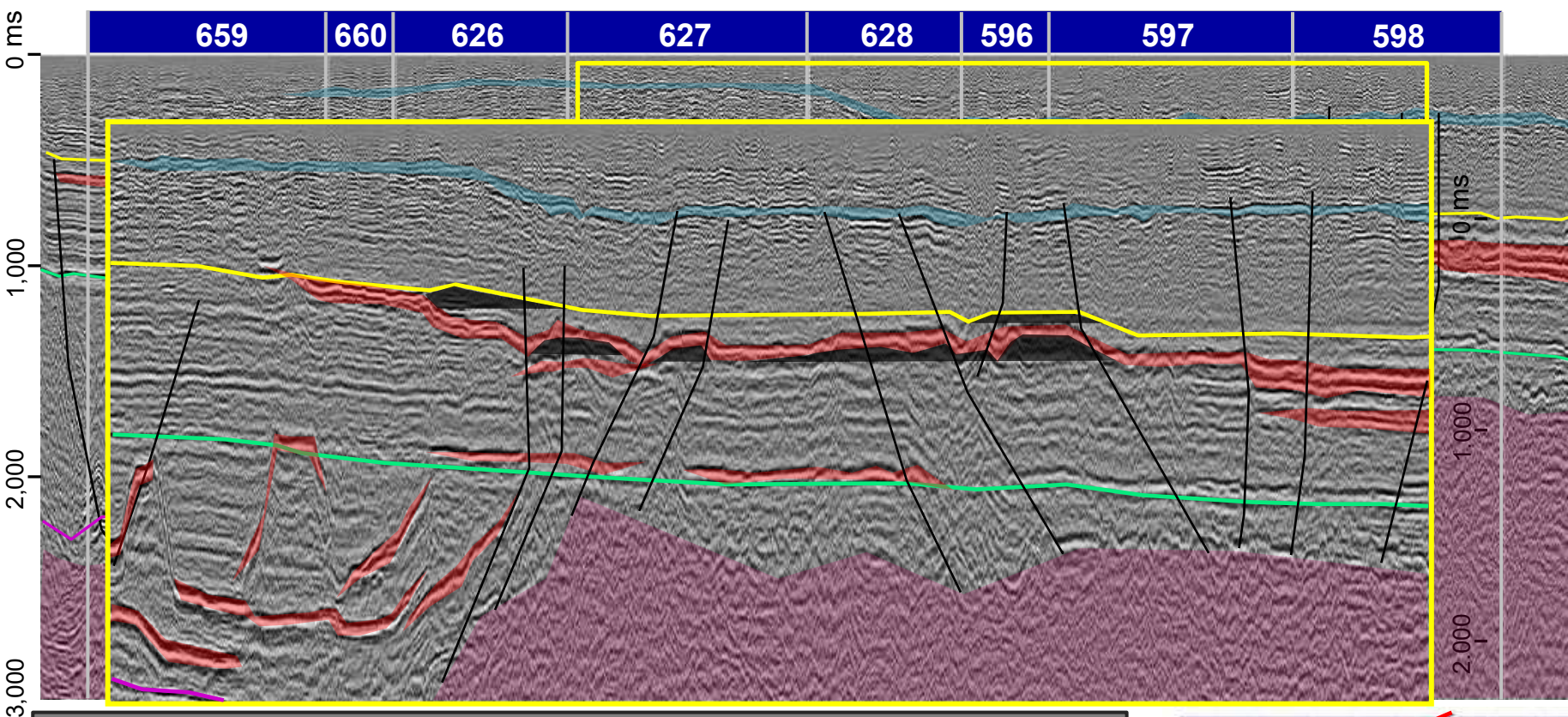
— Faults



Leads

Line LR-115

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

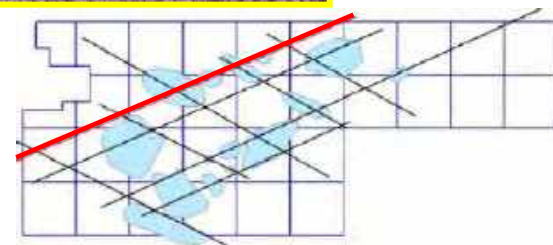
— Pre-rift (?)

— Anhydrite

— Sills

— Basement

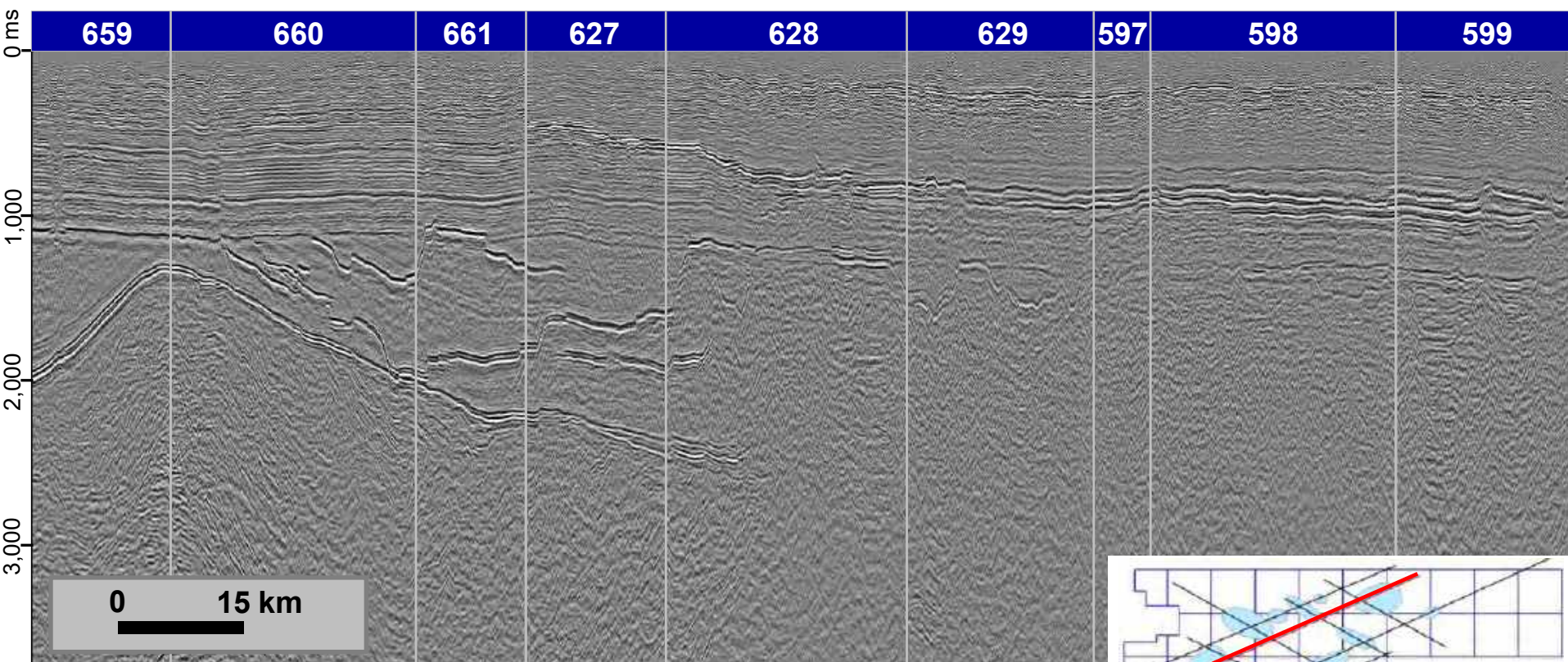
— Faults



Leads

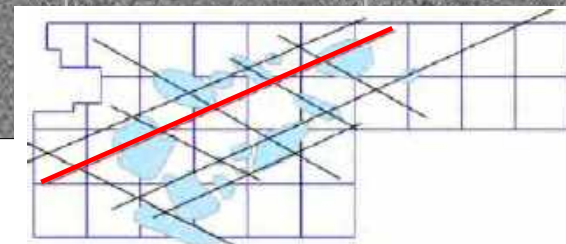
Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

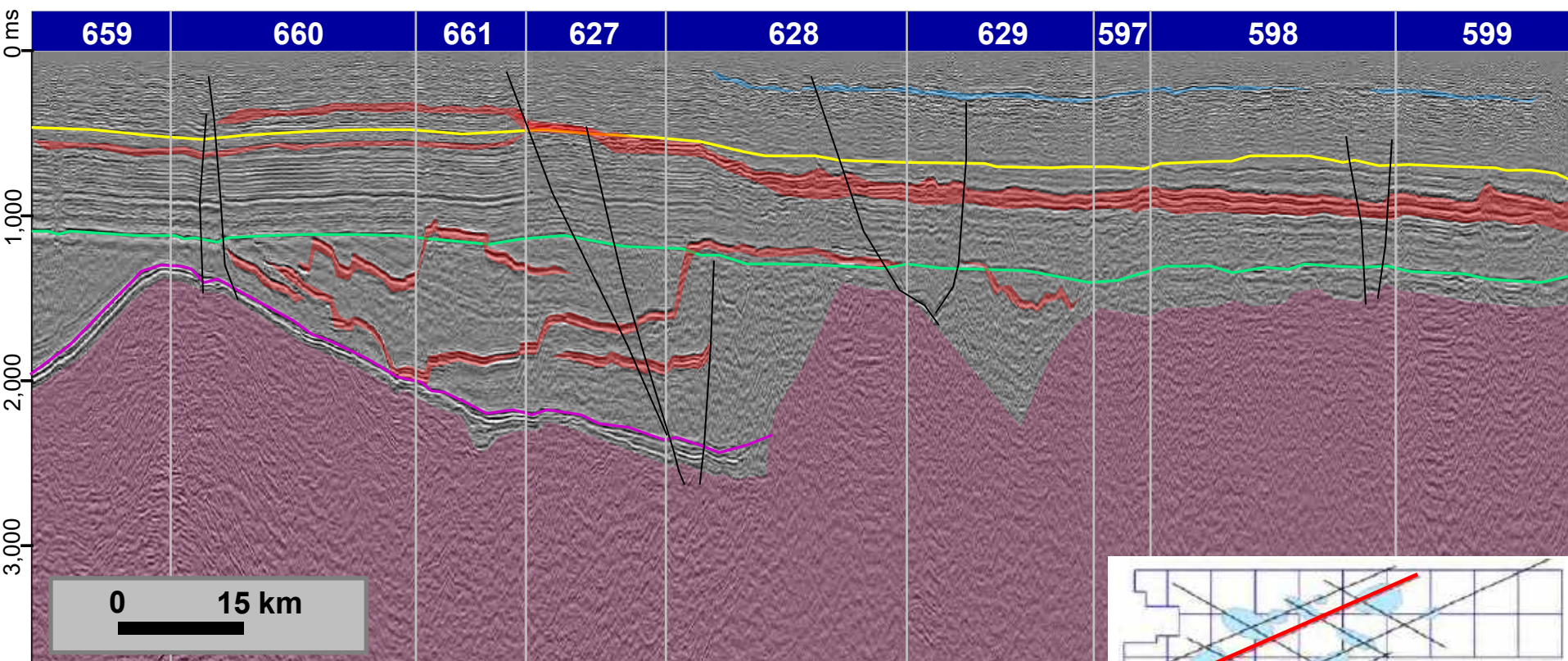
- Cabecas Fm. Top
- Cambrian Unconformity
- Pre-rift (?)
- Anhydrite
- Sills
- Basement
- / Faults



Leads

Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

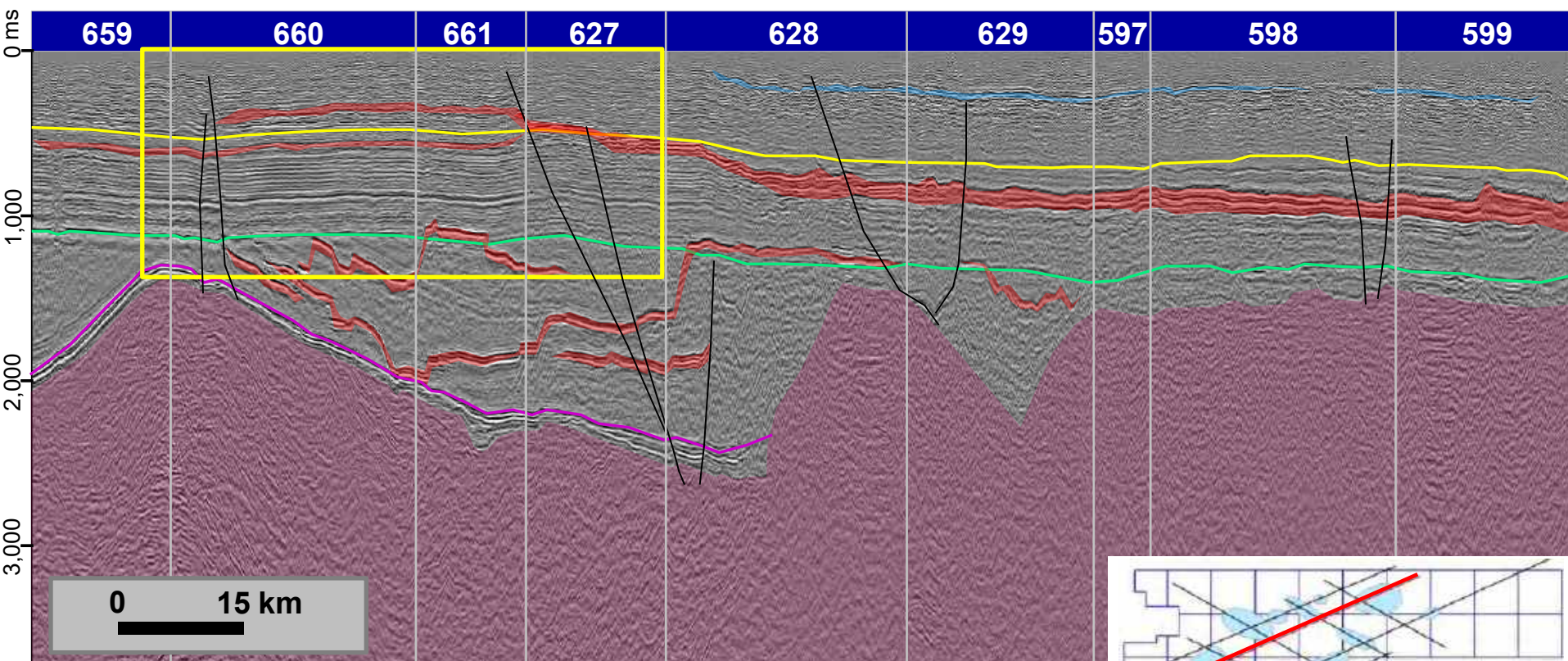
■ Basement

— Faults

Leads

Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

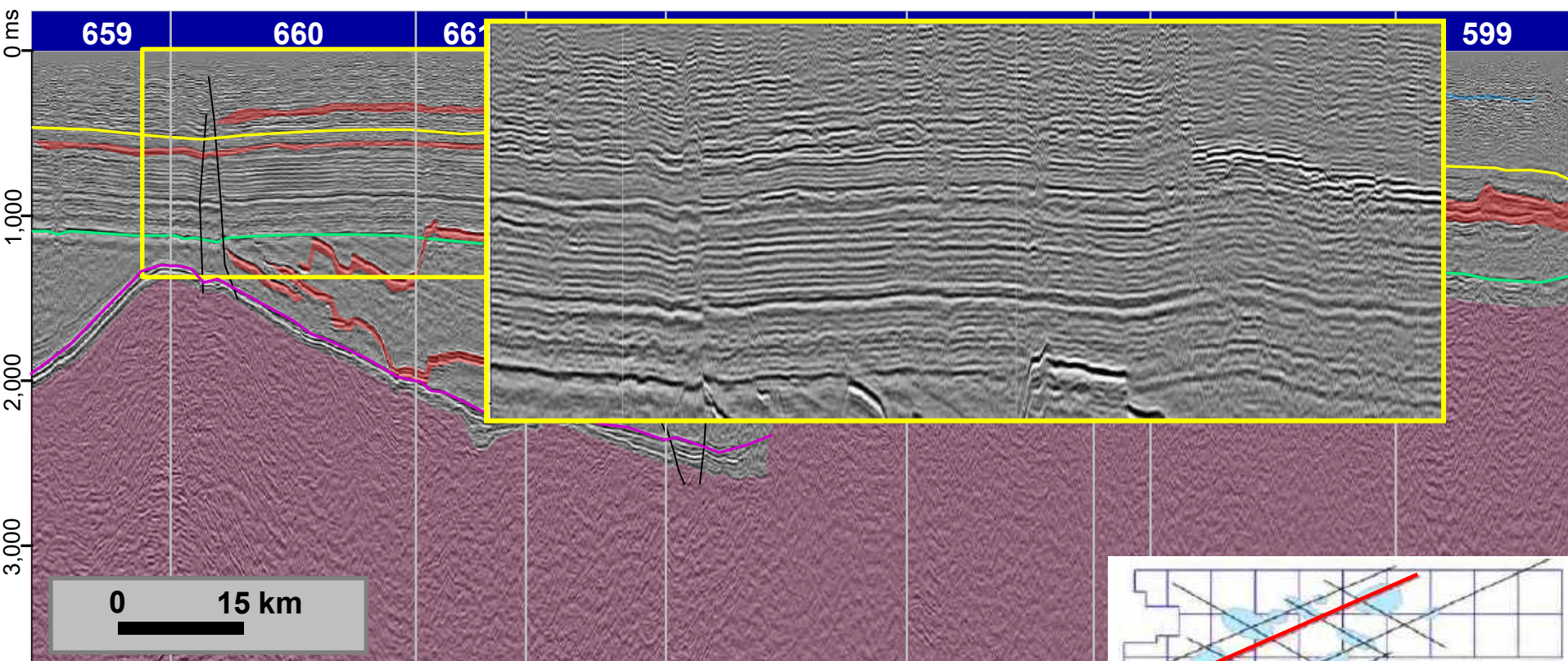
■ Basement

— Faults

Leads

Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

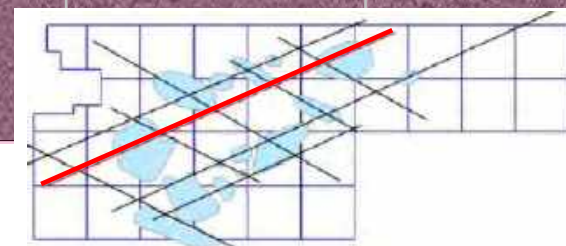
— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

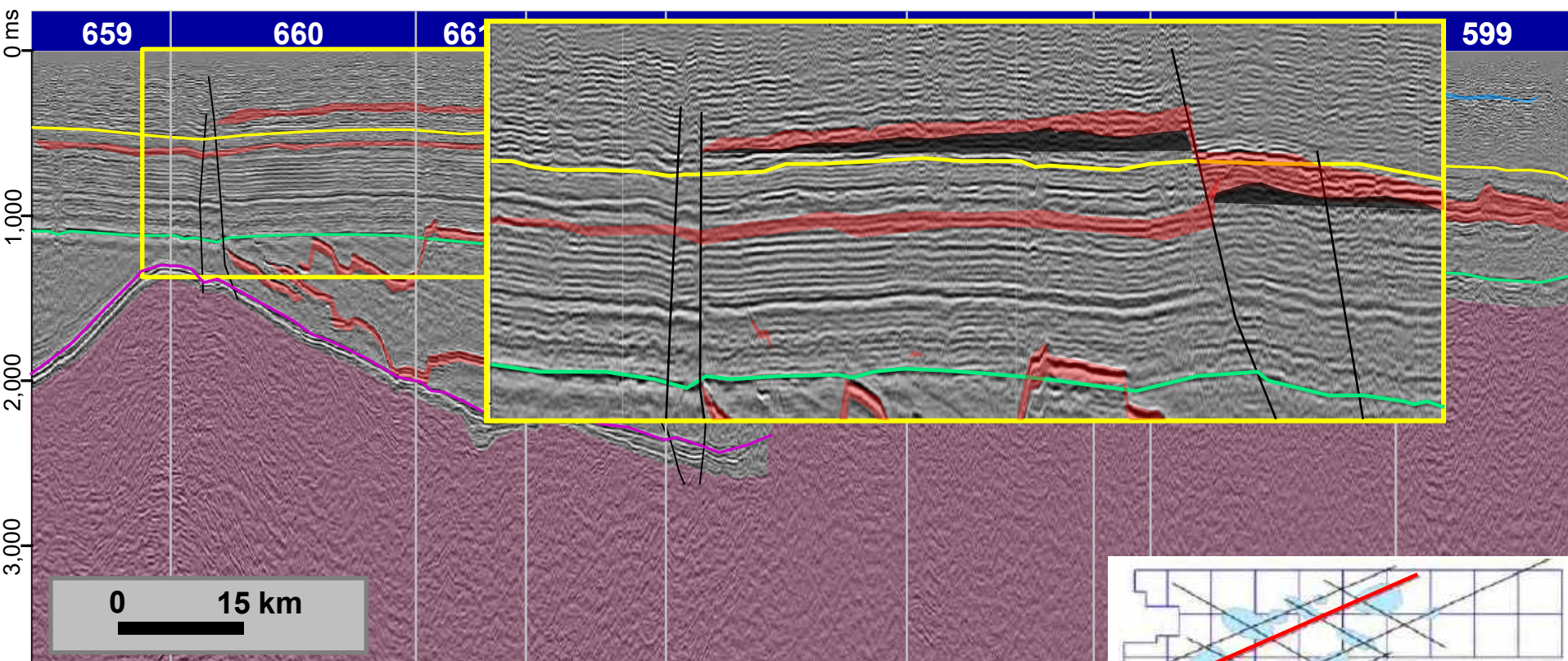
— Faults



Leads

Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

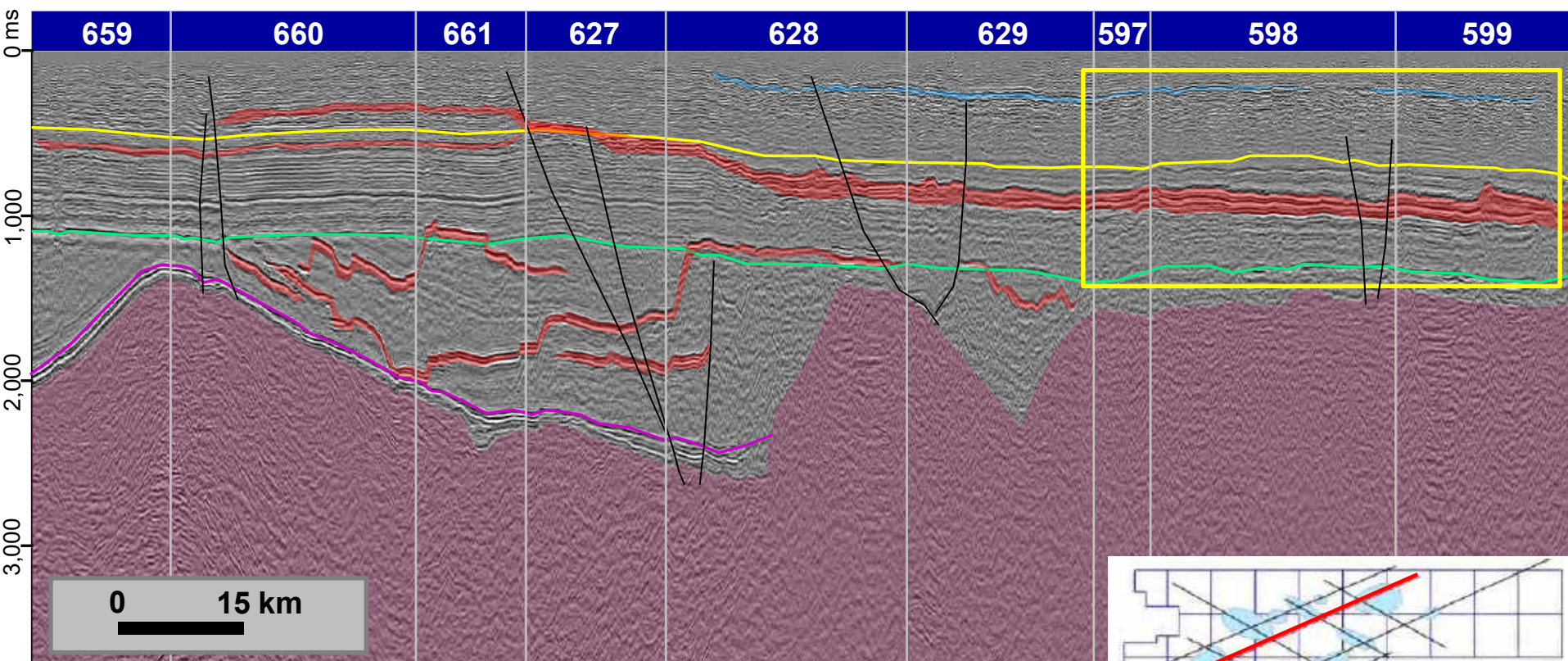
■ Basement

— Faults

Leads

Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

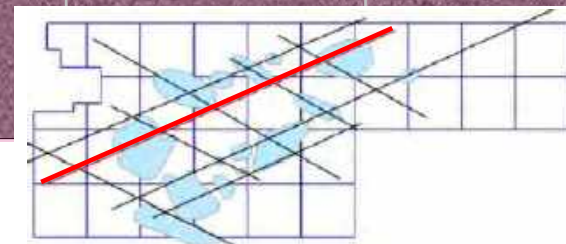
— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

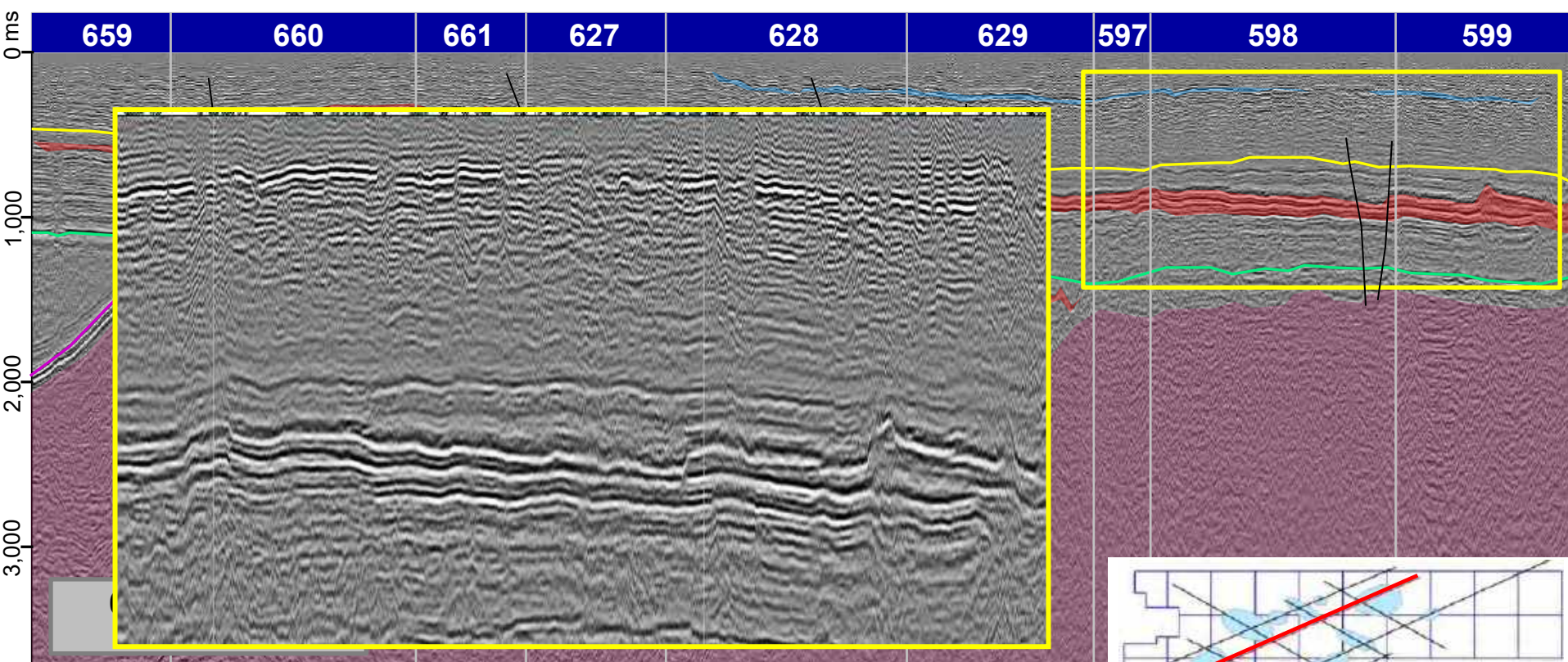
— Faults



Leads

Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

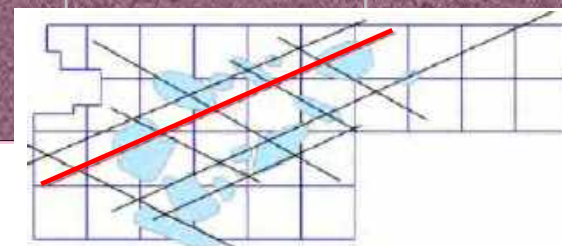
— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

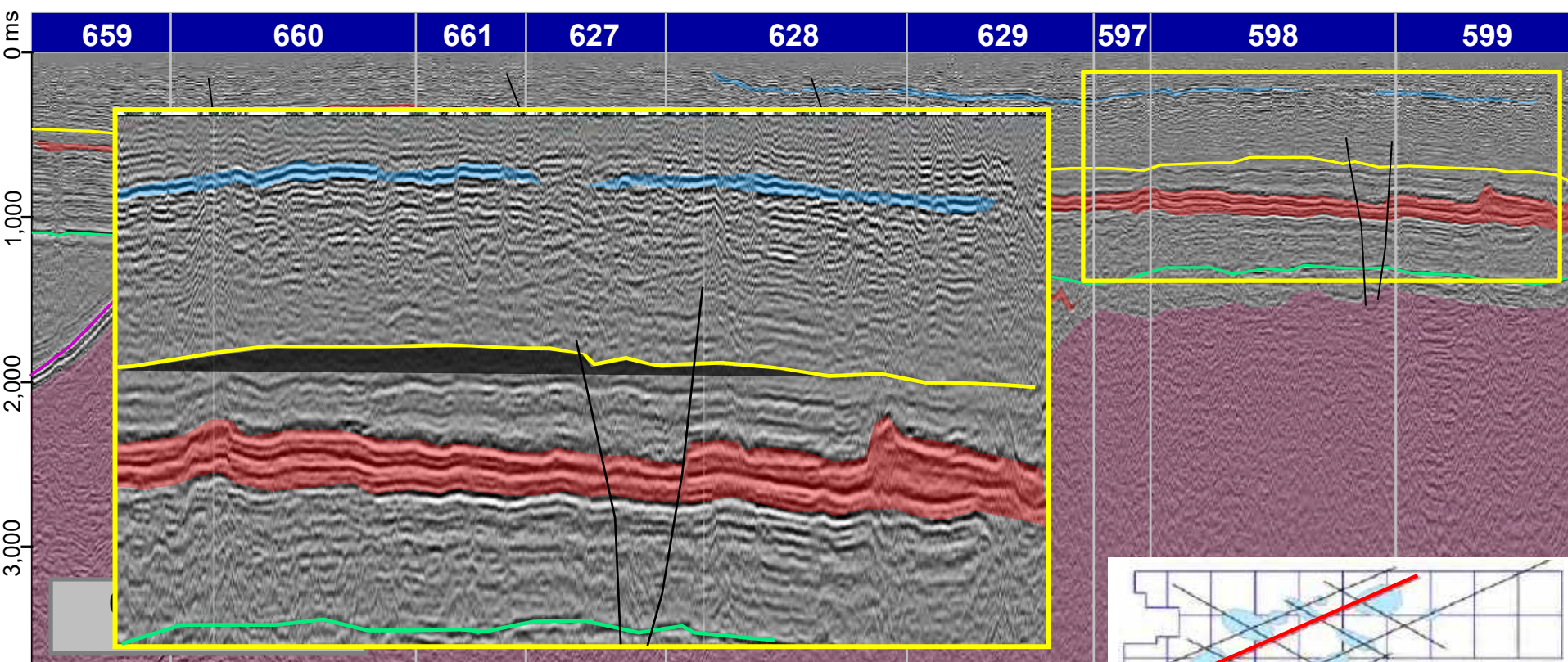
— Faults



Leads

Line LR-101

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

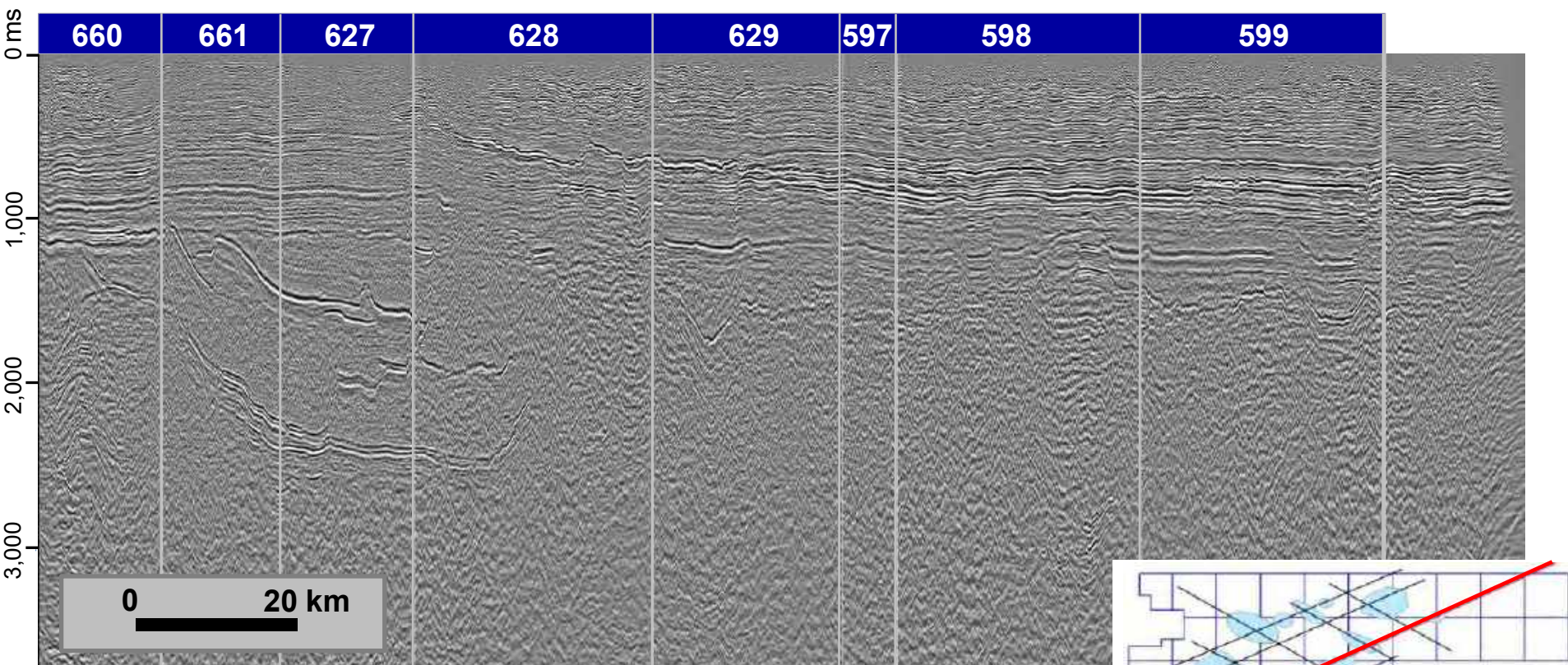
■ Basement

— Faults

Leads

Line LR-103

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

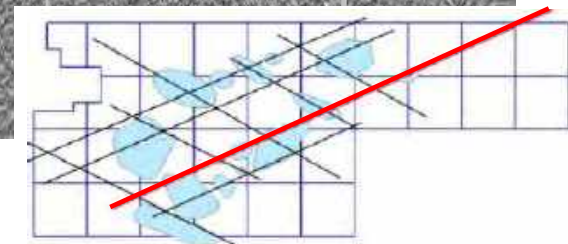
— Pre-rift (?)

Anhydrite

Sills

Basement

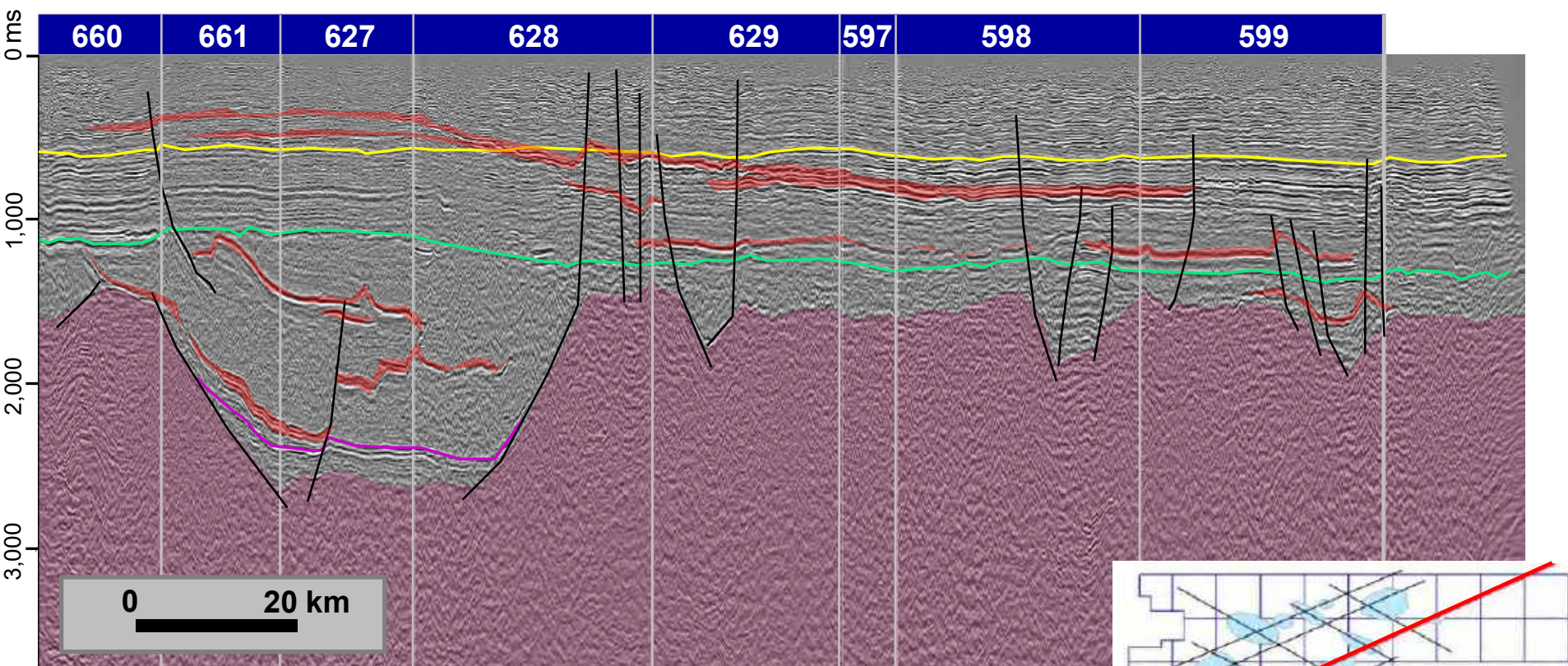
Faults



Leads

Line LR-103

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

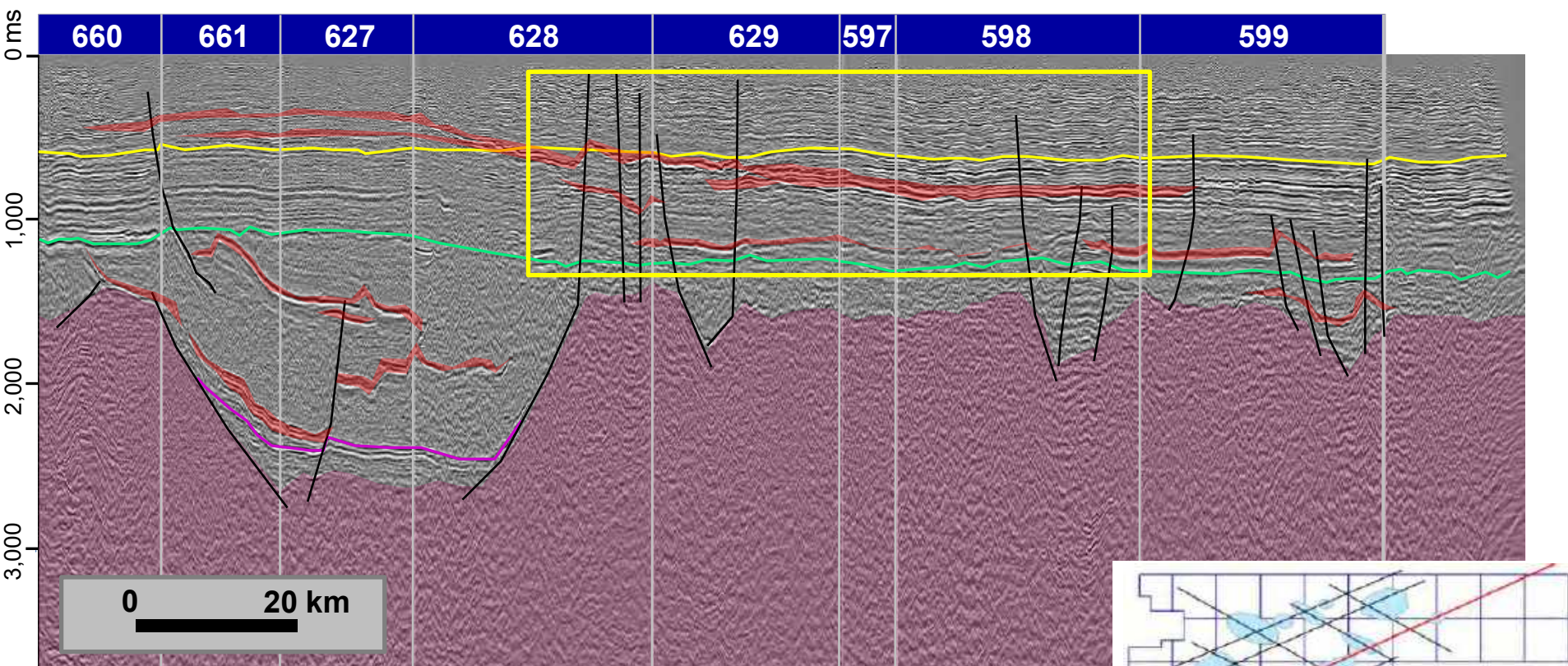
■ Basement

— Faults

Leads

Line LR-103

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

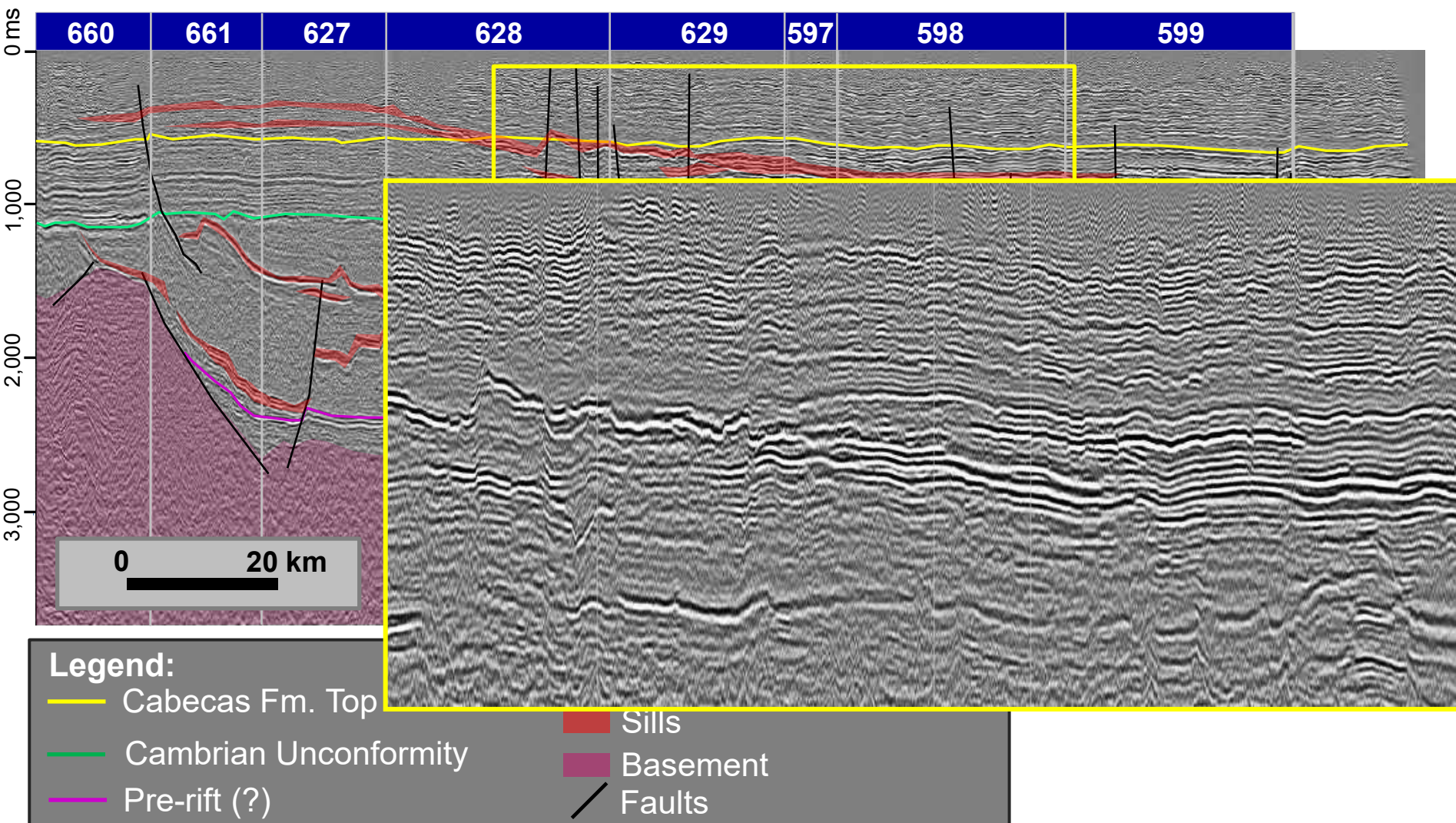
■ Basement

— Faults

Leads

Line LR-103

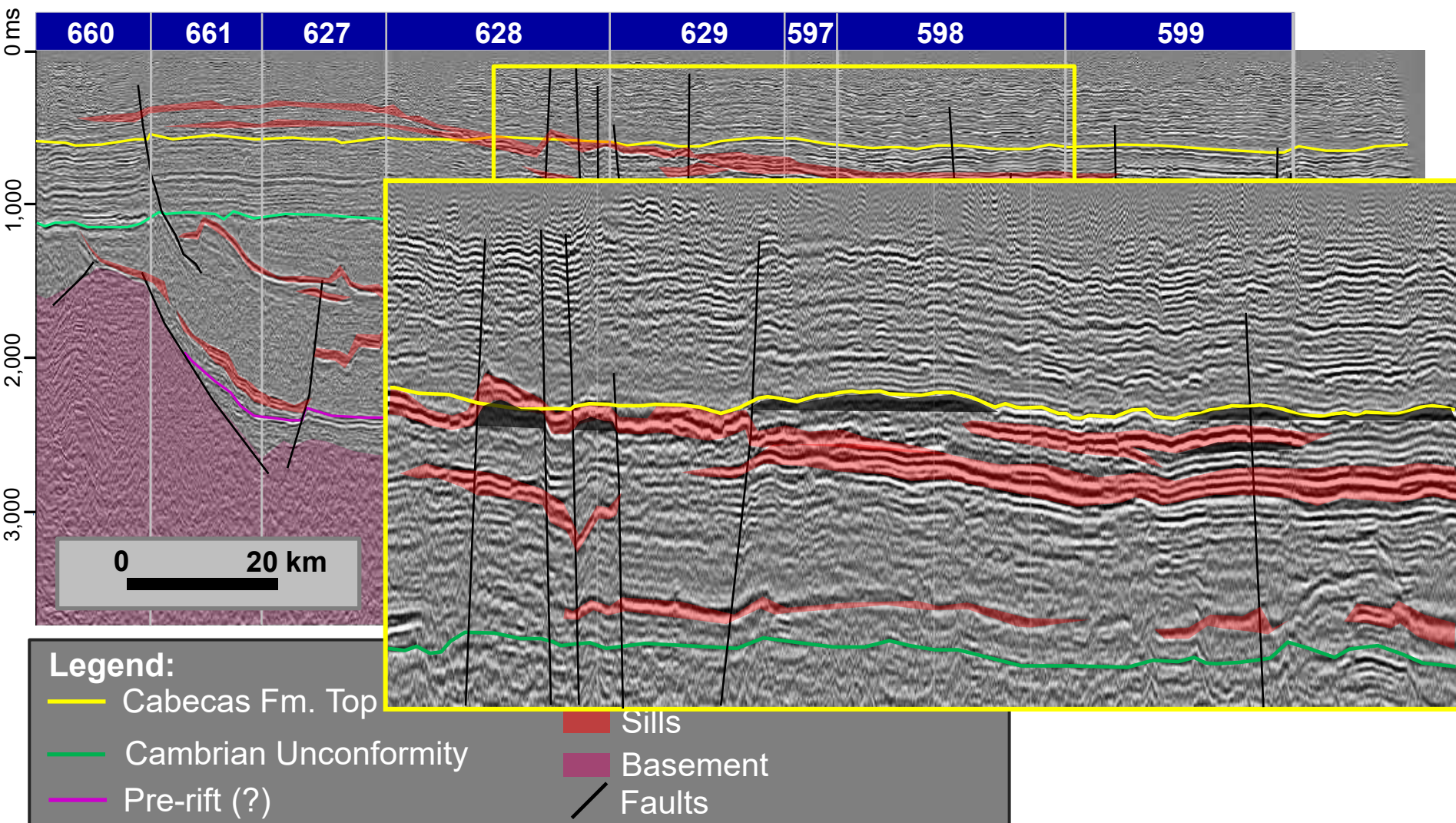
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-103

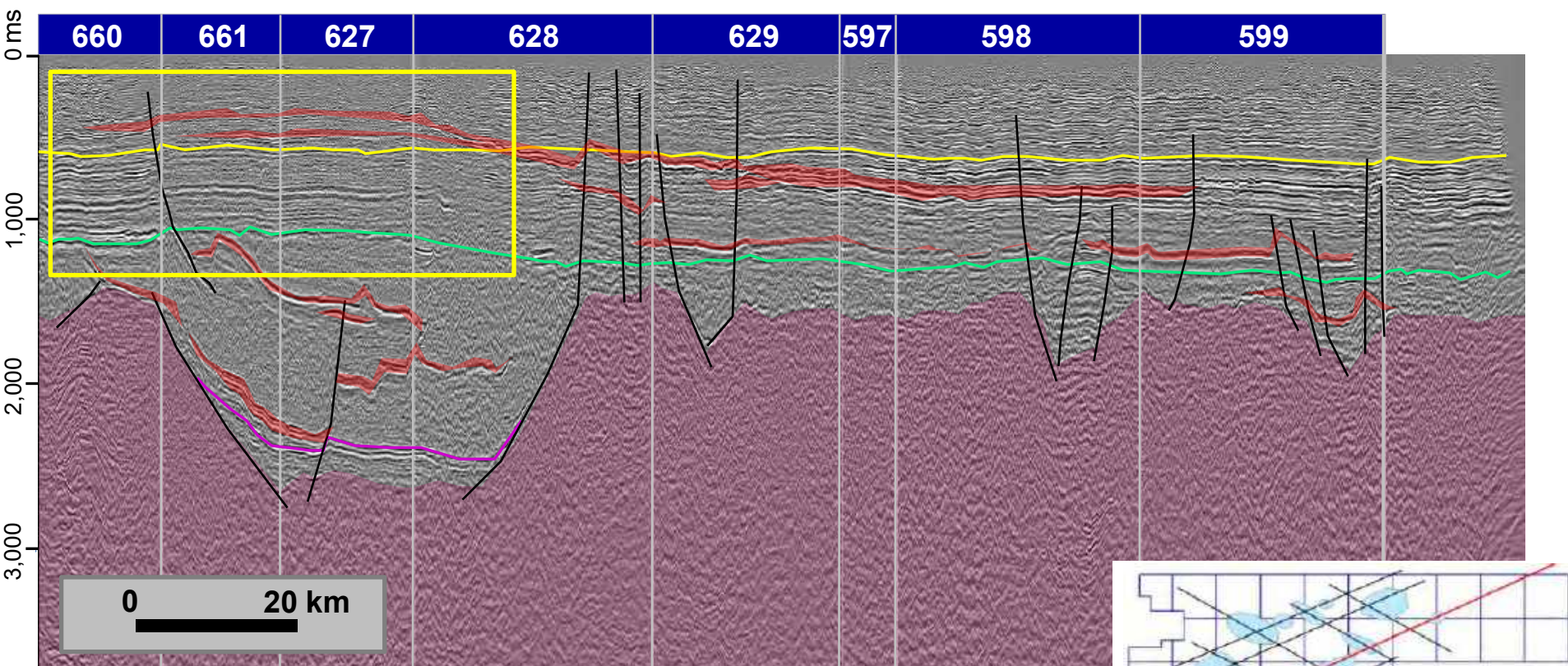
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-103

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

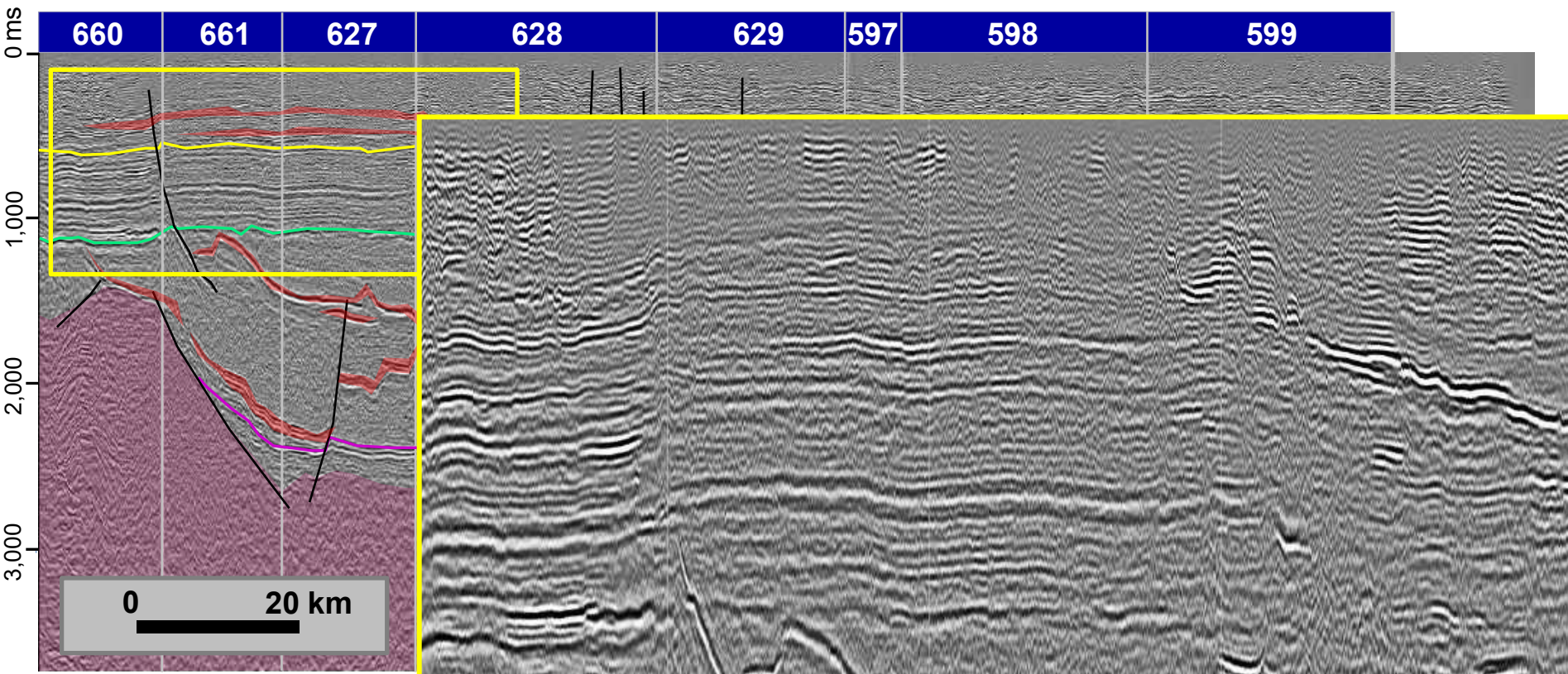
■ Basement

— Faults

Leads

Line LR-103

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

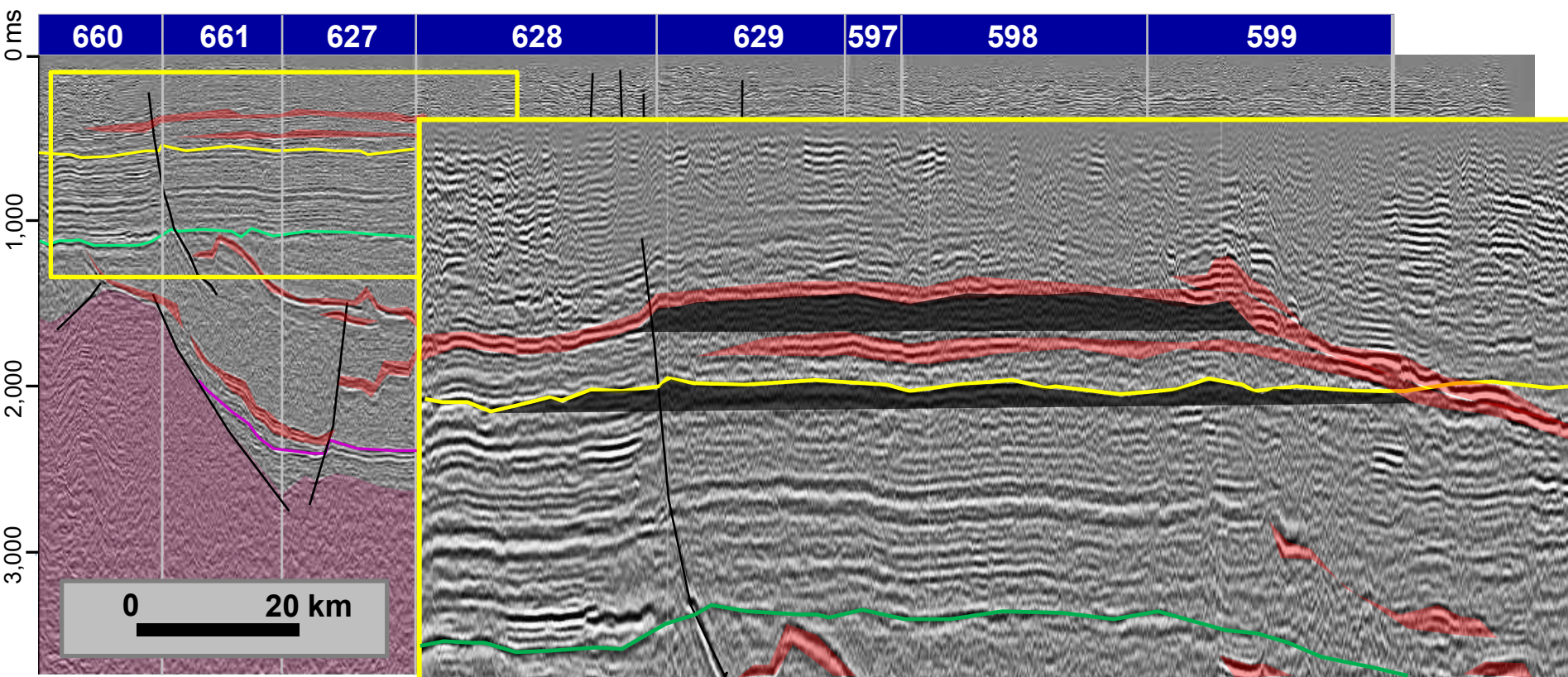
— Faults



Leads

Line LR-103

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

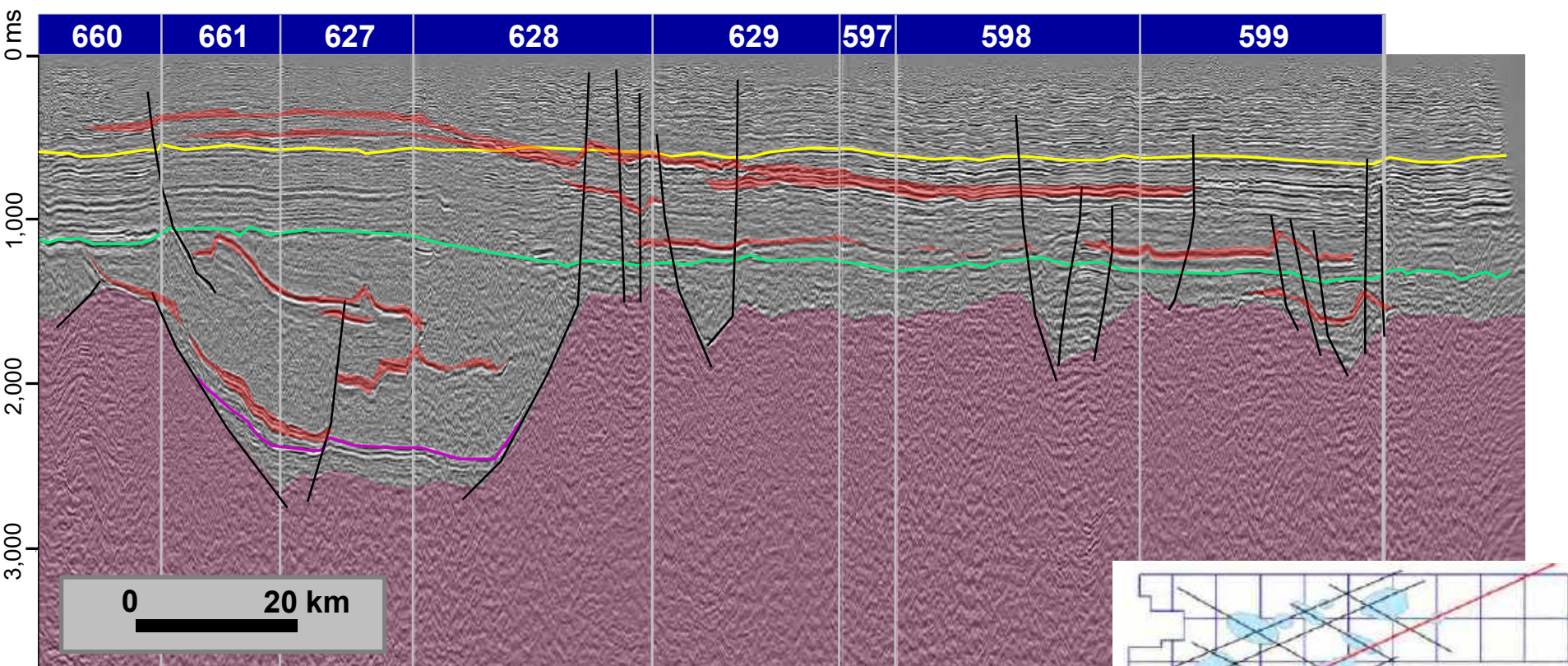
— Faults



Leads

Line LR-103

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

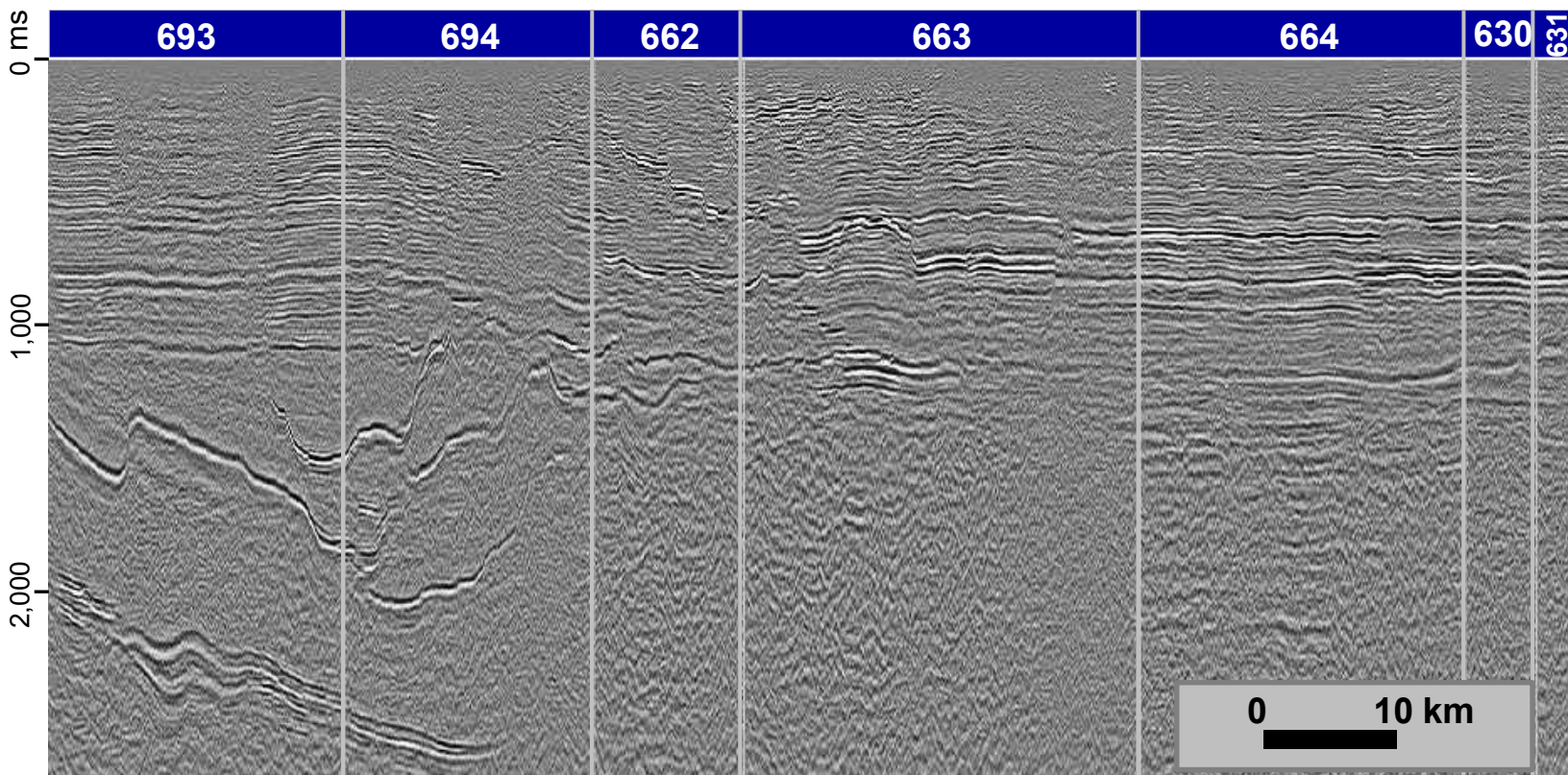
■ Basement

— Faults







Leads

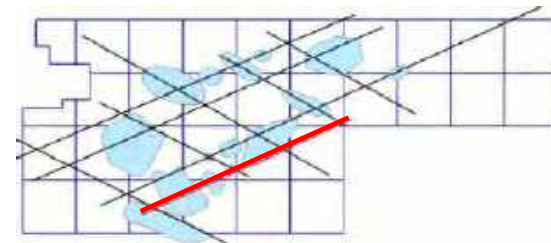
Line LR-118

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

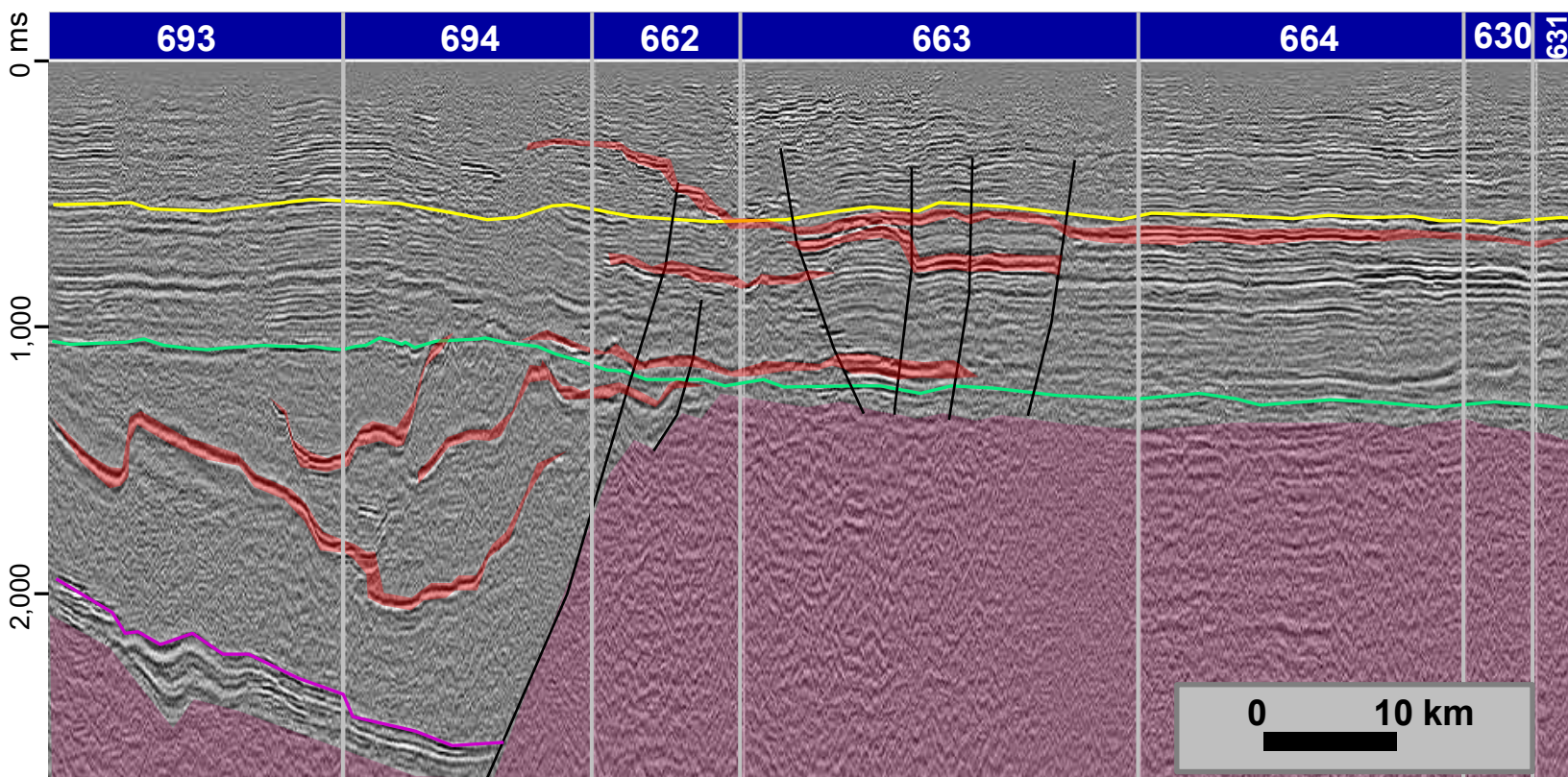
- | | |
|--|---|
|  Cabecas Fm. Top |  Anhydrite |
|  Cambrian Unconformity |  Sills |
|  Pre-rift (?) |  Basement |
| |  Faults |










Leads

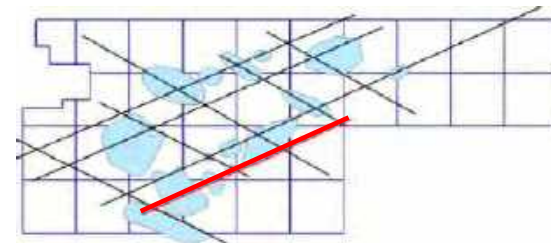
Line LR-118

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

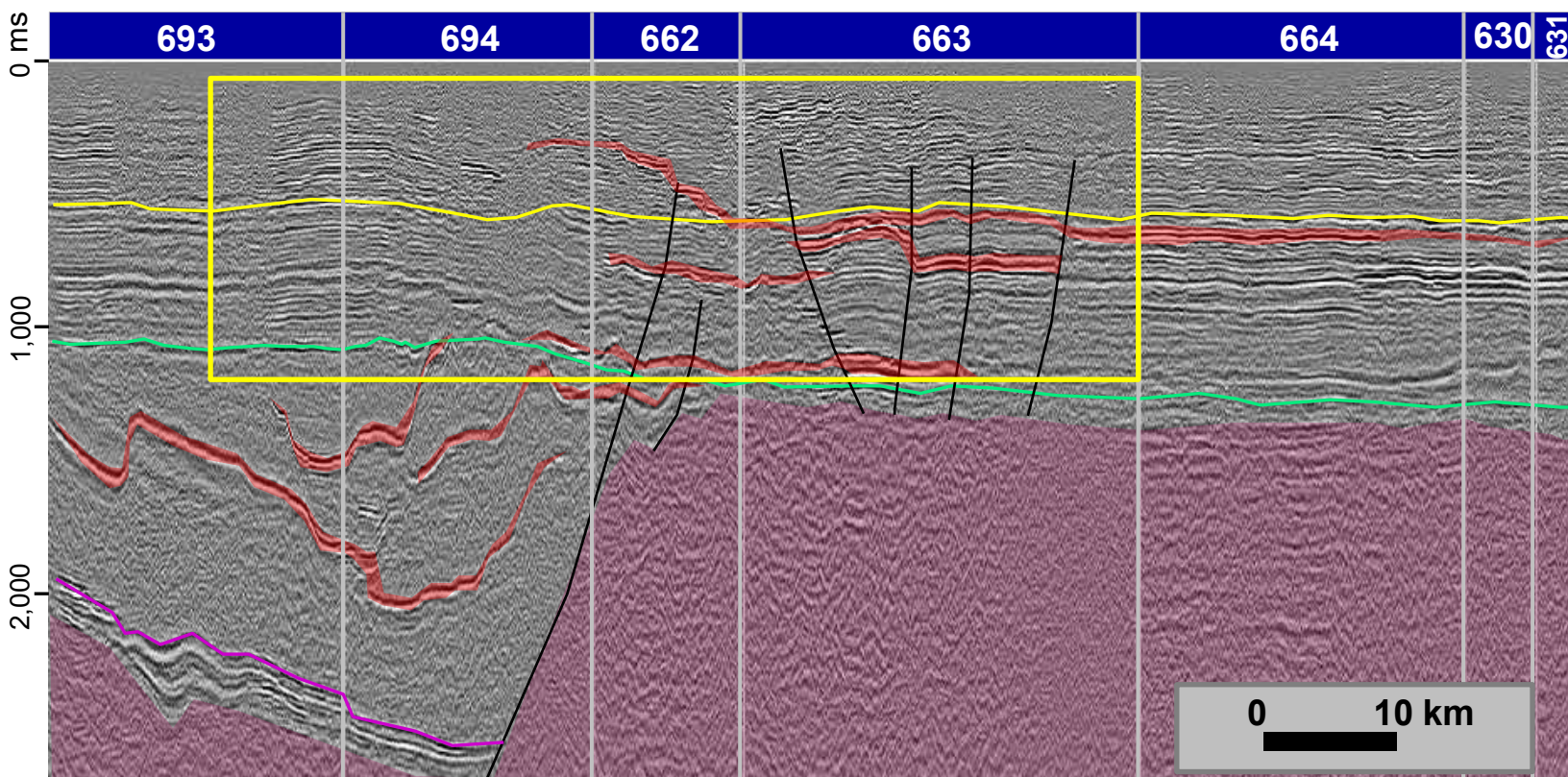
- | | |
|--|---|
|  Cabecas Fm. Top |  Anhydrite |
|  Cambrian Unconformity |  Sills |
|  Pre-rift (?) |  Basement |
| |  Faults |



Leads

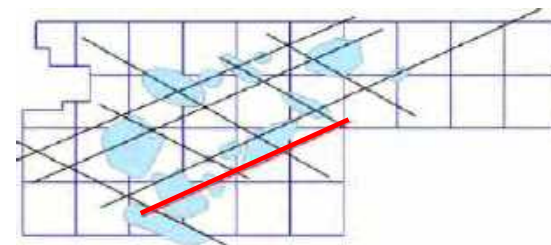
Line LR-118

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

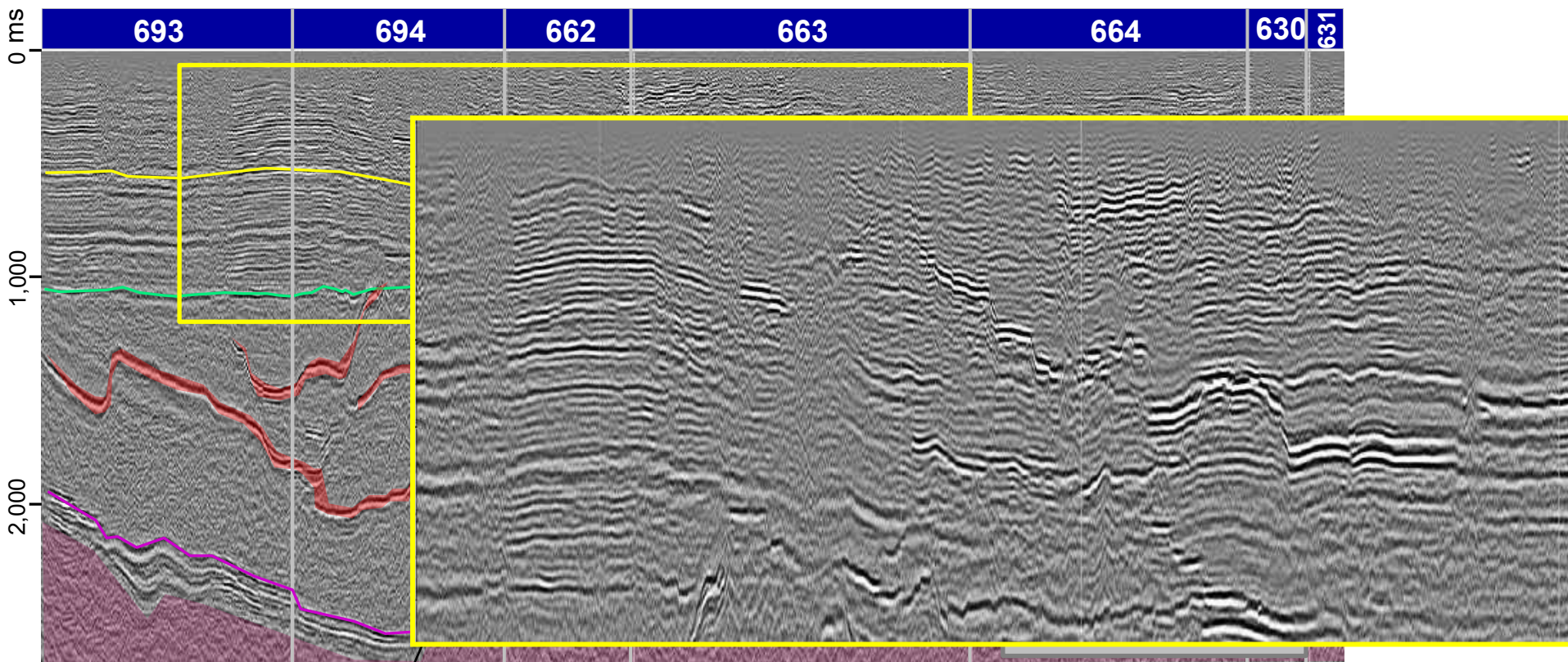
- Cabecas Fm. Top
- Cambrian Unconformity
- Pre-rift (?)
- Anhydrite
- Sills
- Basement
- / Faults



Leads

Line LR-118

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

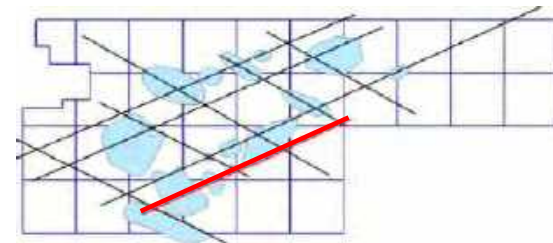
— Pre-rift (?)

— Anhydrite

— Sills

— Basement

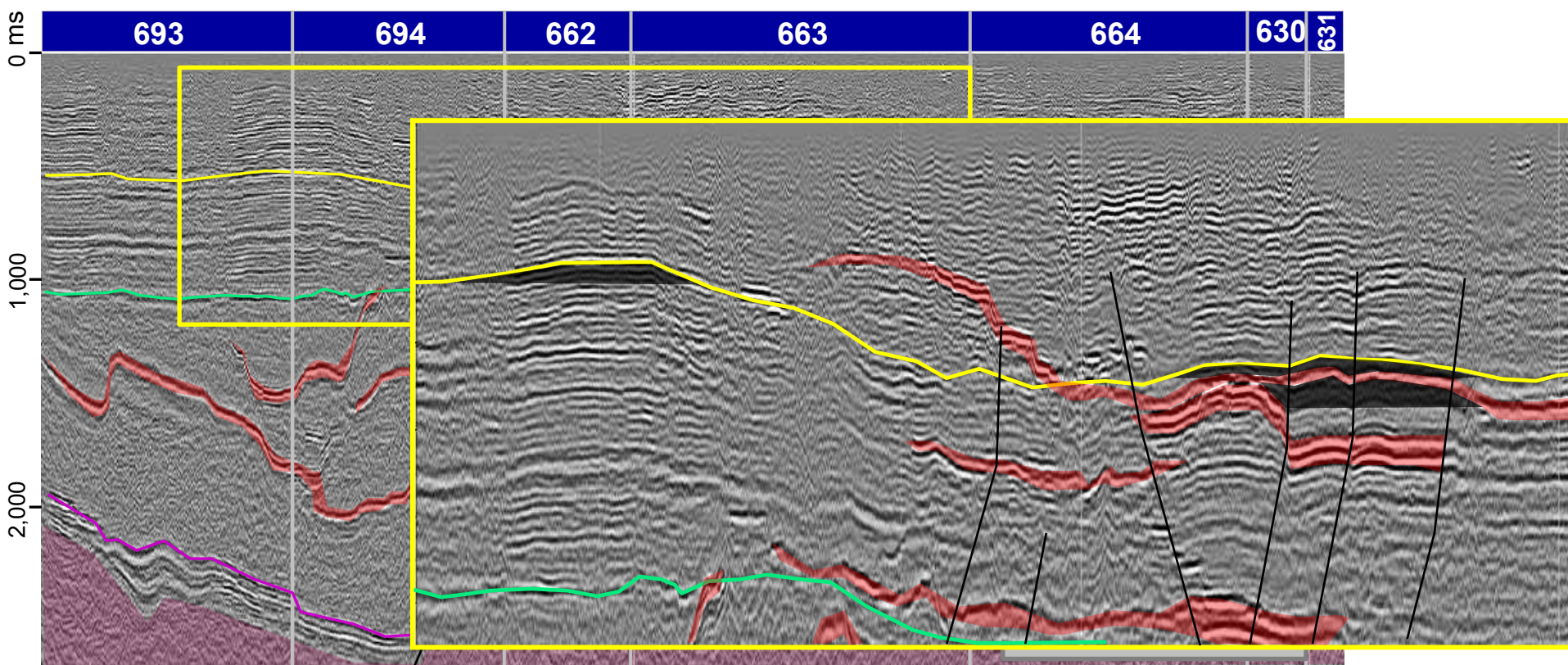
— Faults



Leads

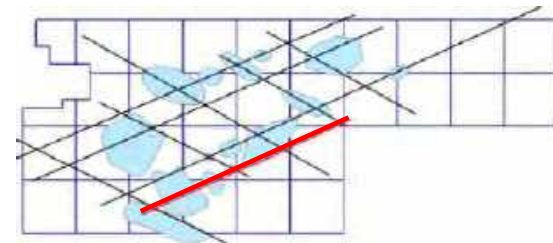
Line LR-118

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

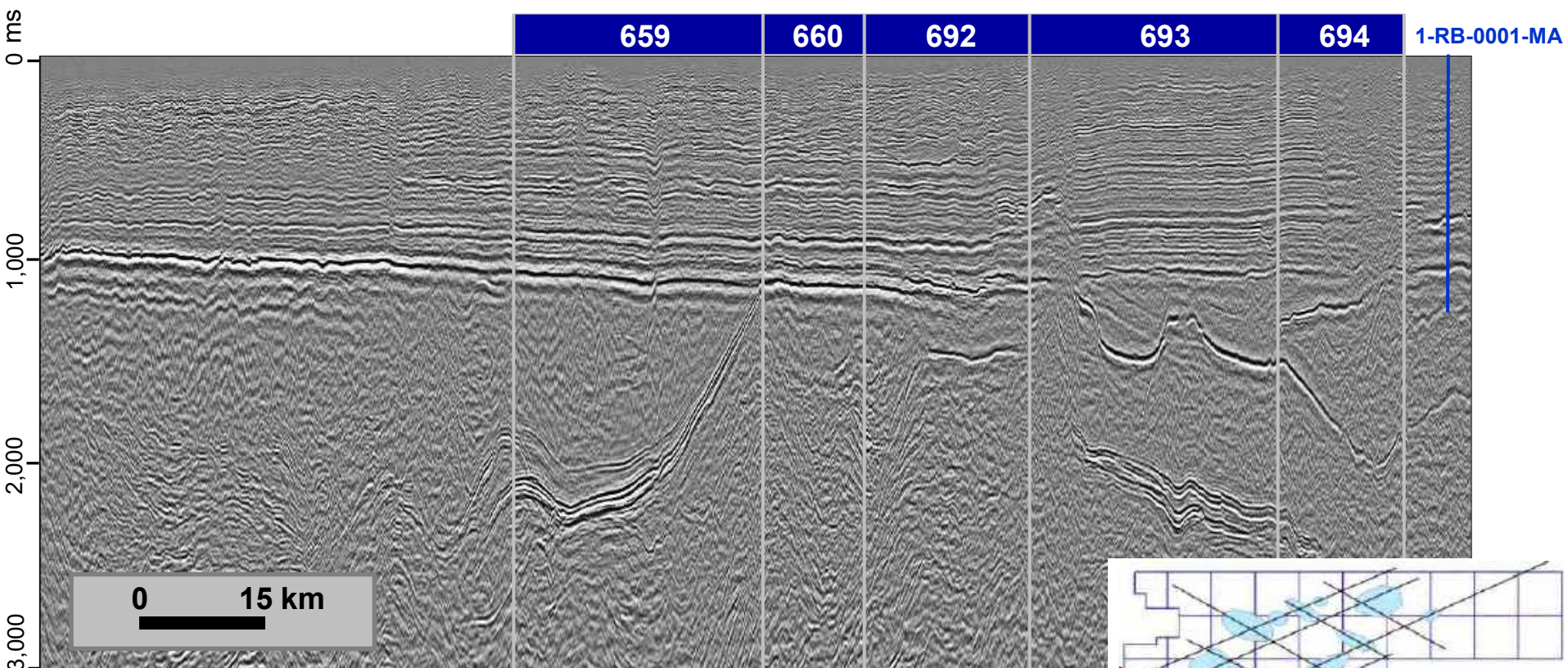
- Cabecas Fm. Top
- Cambrian Unconformity
- Pre-rift (?)
- Anhydrite
- Sills
- Basement
- / Faults



Leads

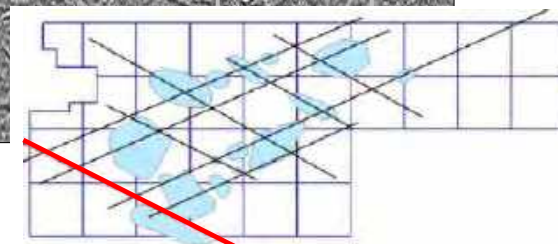
Line LR-104

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

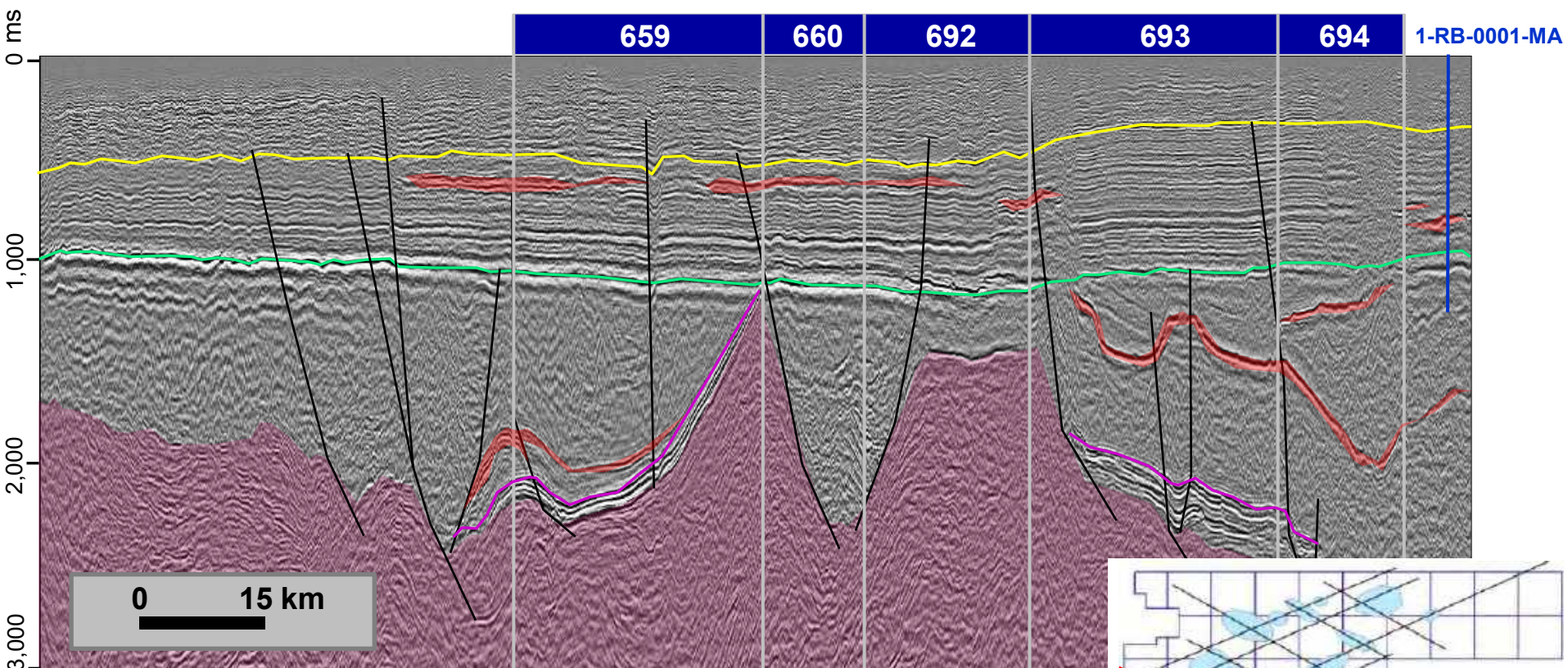
- Cabecas Fm. Top
- Cambrian Unconformity
- Pre-rift (?)
- Anhydrite
- Sills
- Basement
- / Faults



Leads

Line LR-104

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

— Anhydrite

— Sills

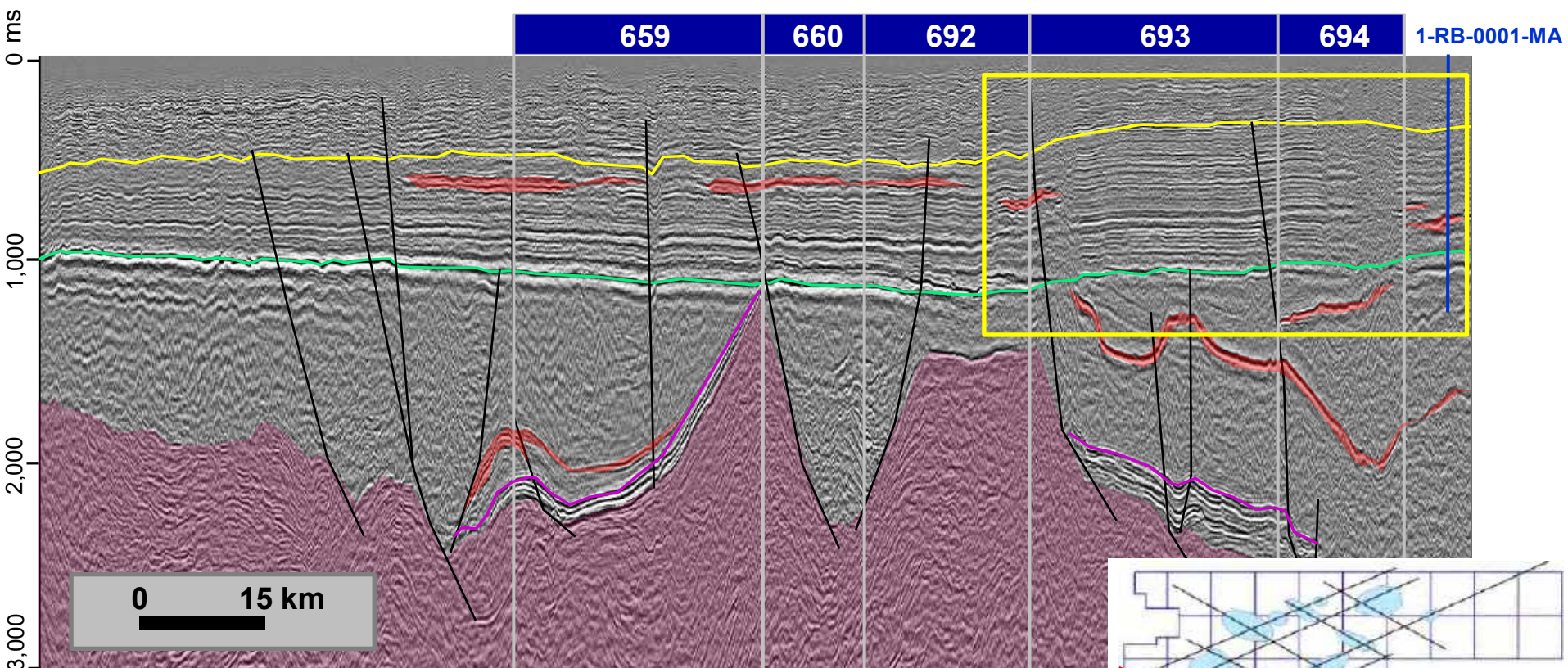
— Basement

— Faults

Leads

Line LR-104

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

— Anhydrite

— Sills

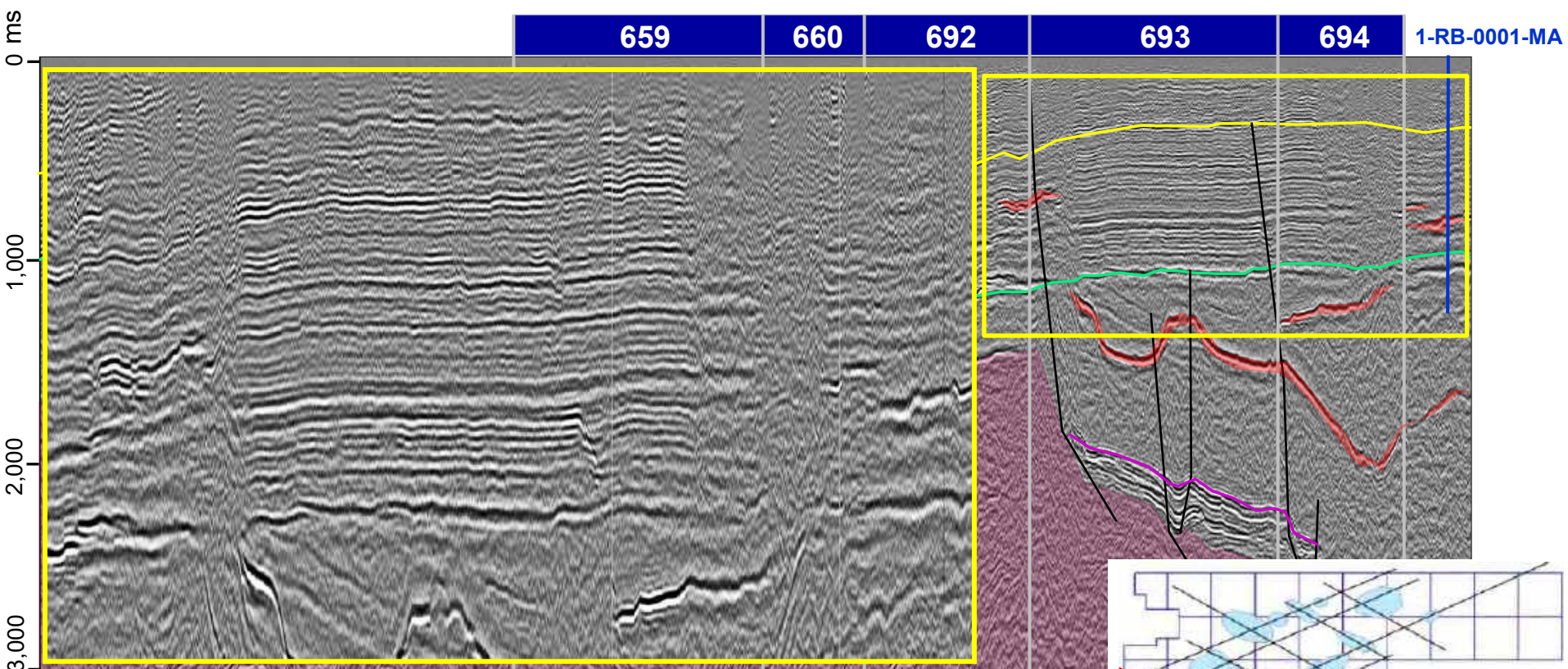
— Basement

— Faults

Leads

Line LR-104

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

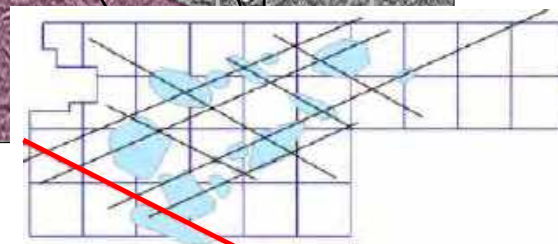
— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

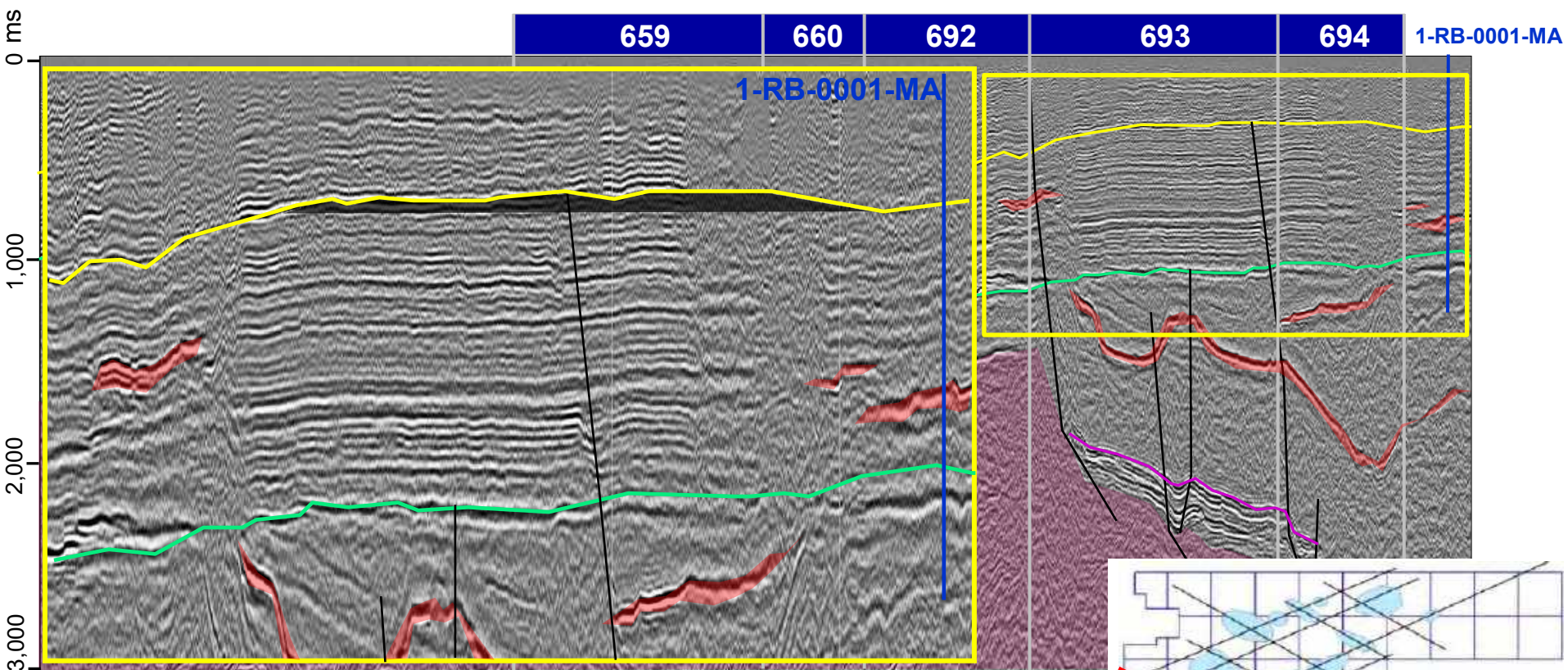
— Faults



Leads

Line LR-104

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

— Pre-rift (?)

■ Anhydrite

■ Sills

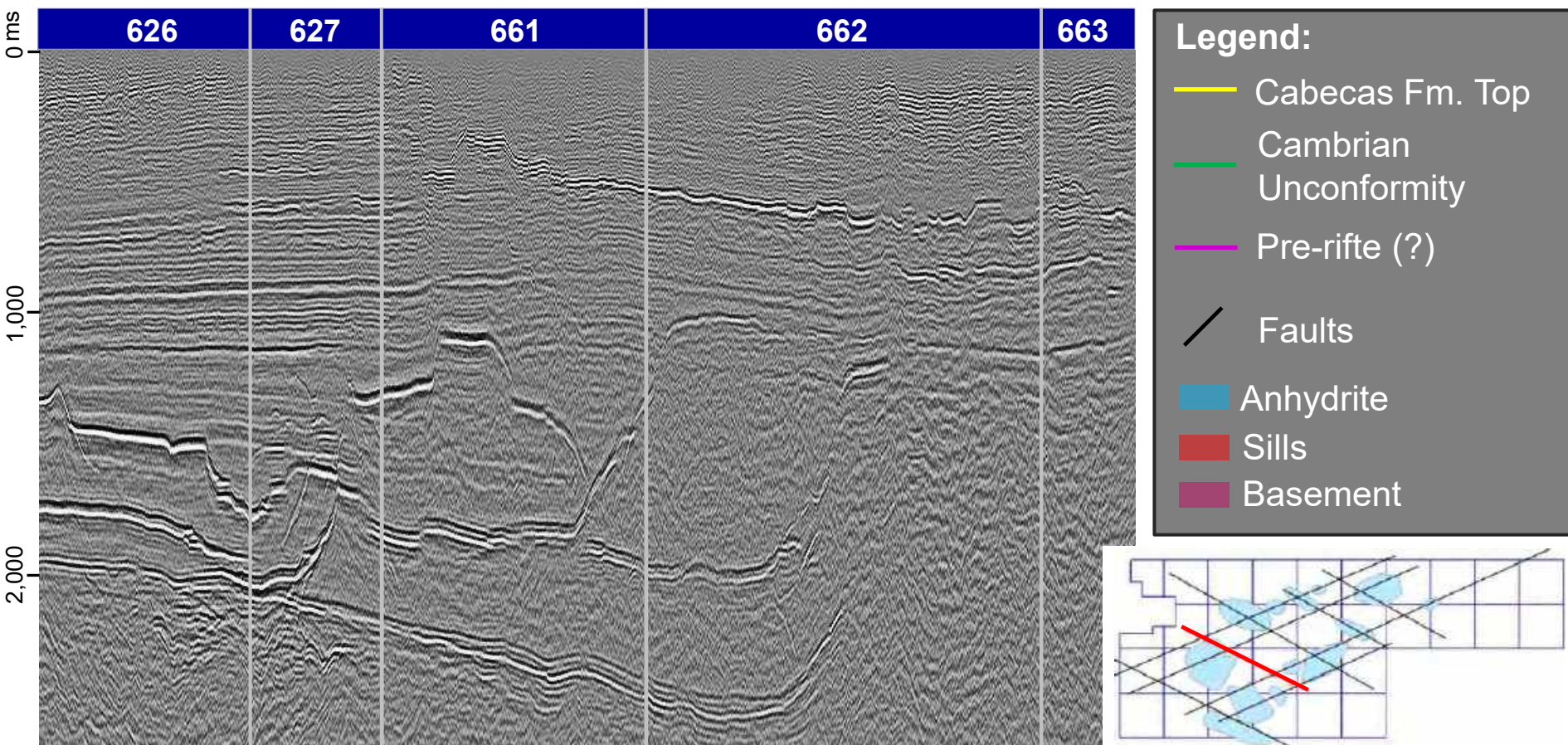
■ Basement

— Faults

Leads

Line LR-105

0317_2D_ANP_BACIA_DO_PARNAIBA

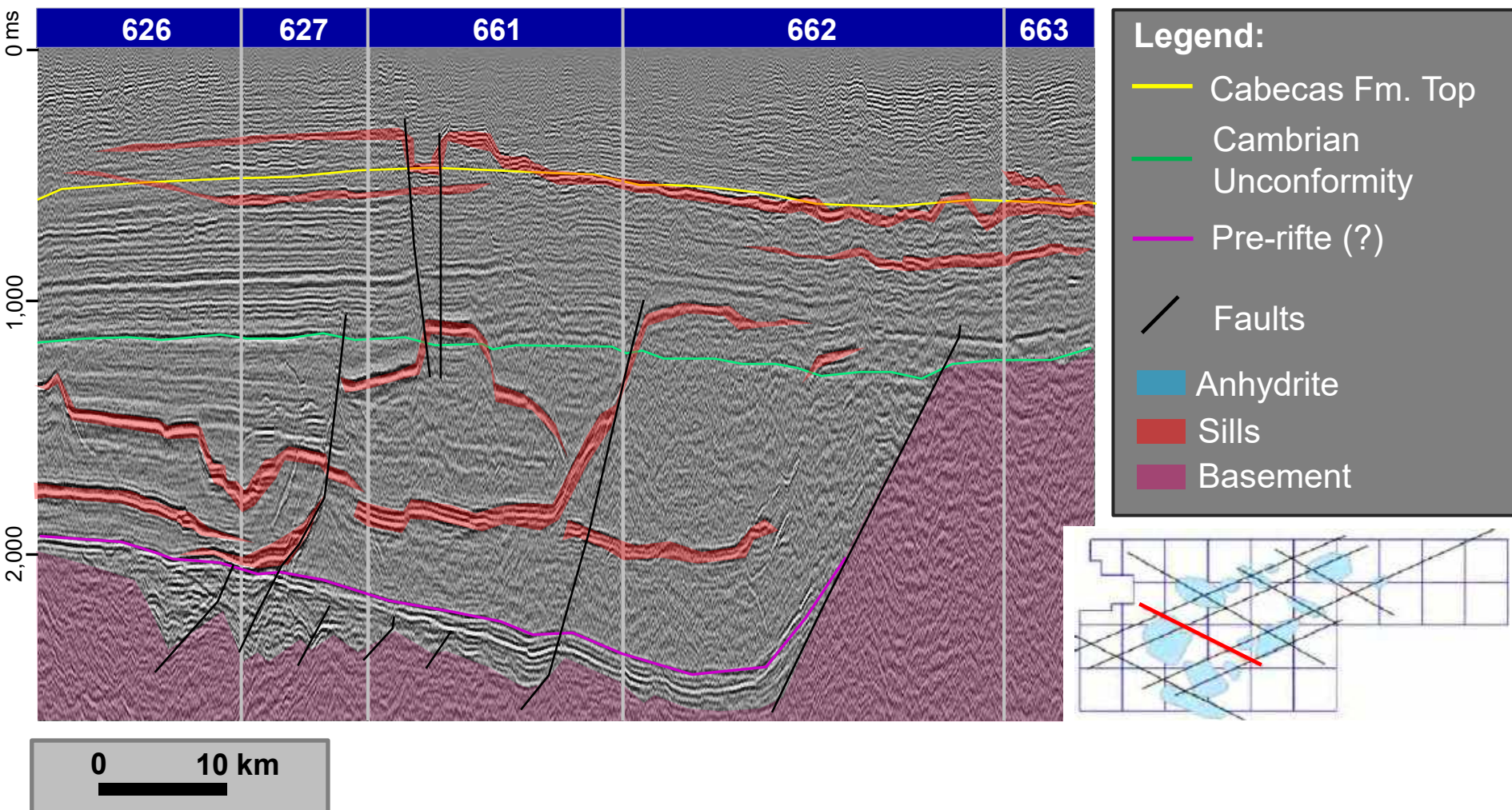


0 10 km

Leads

Line LR-105

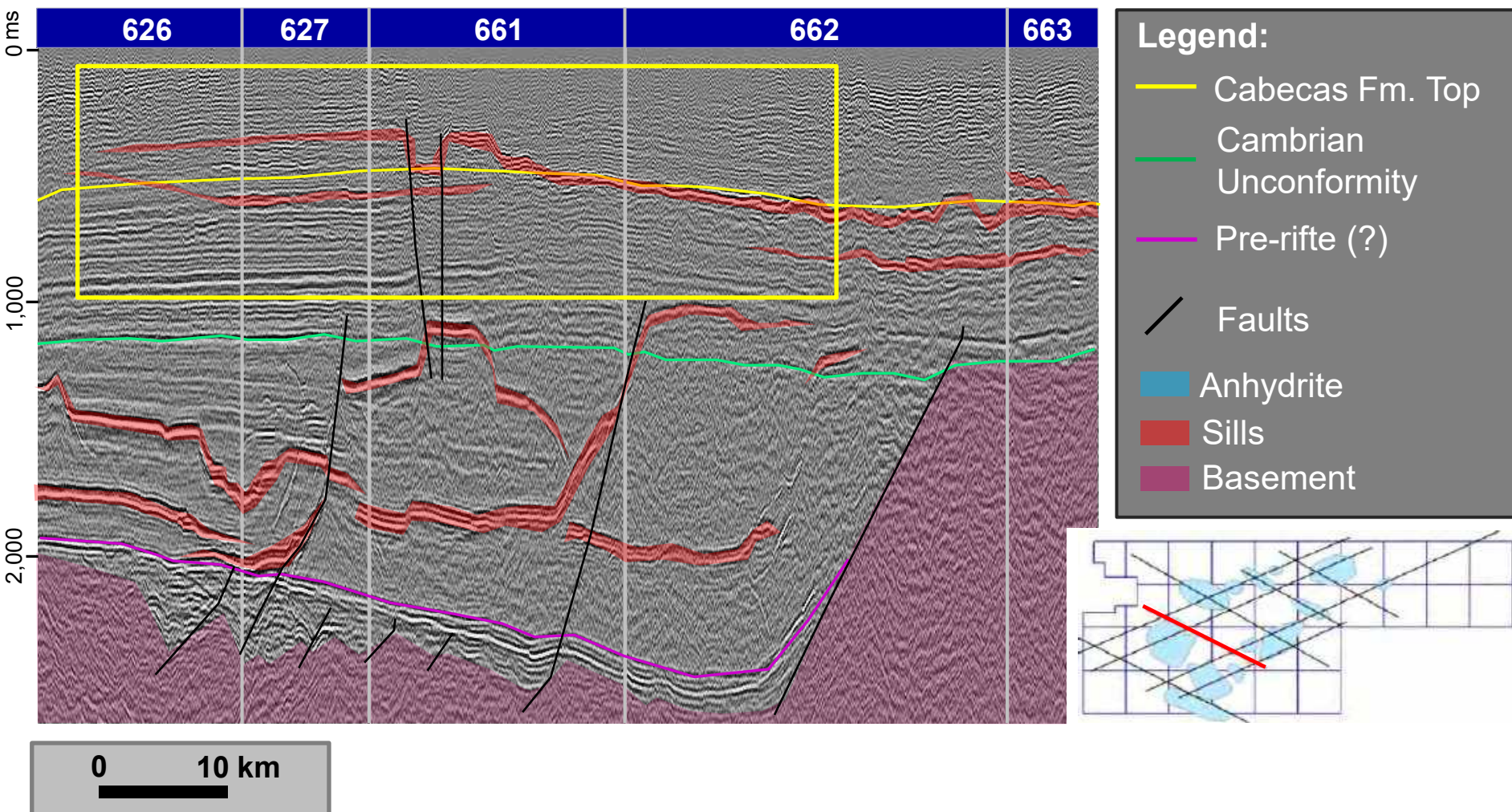
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-105

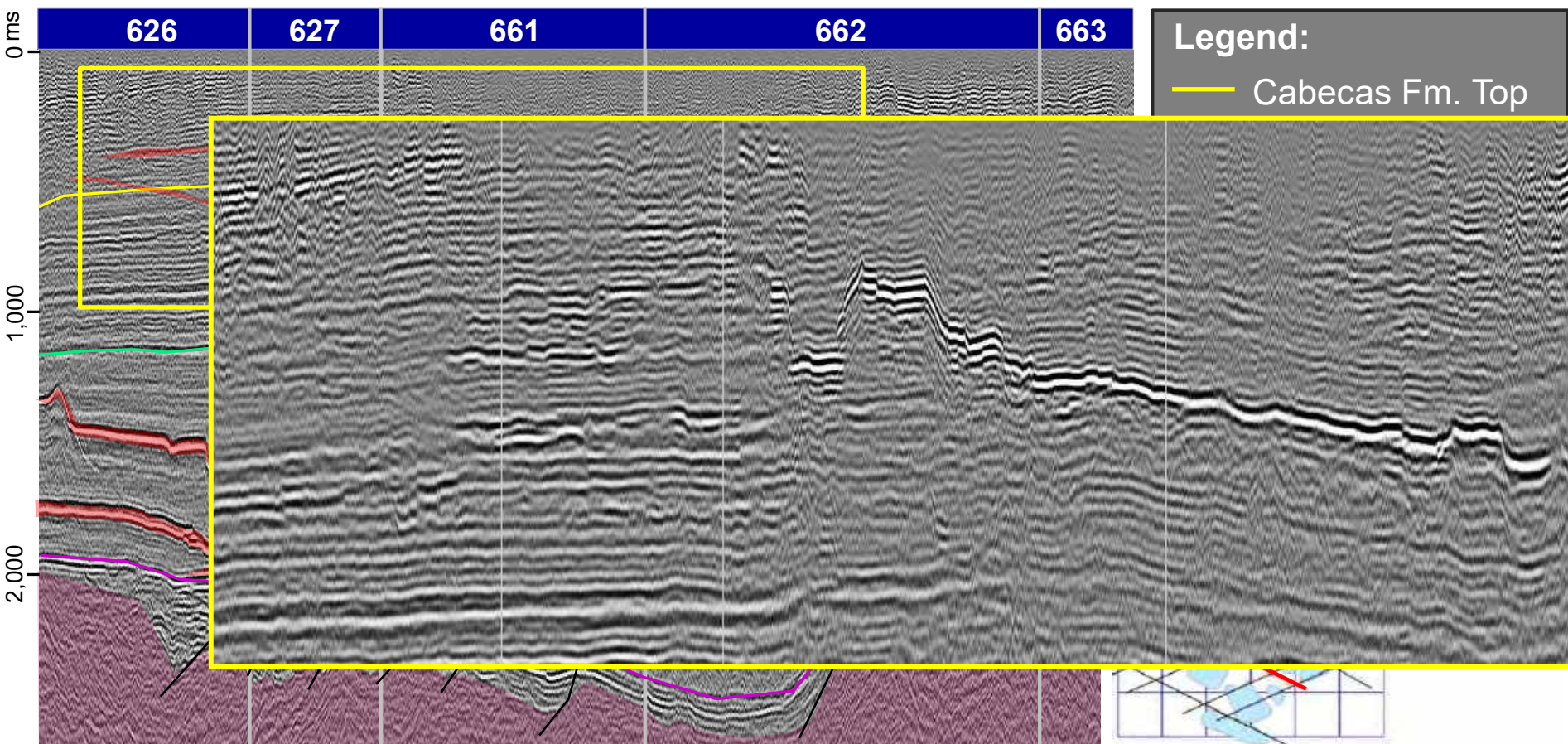
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-105

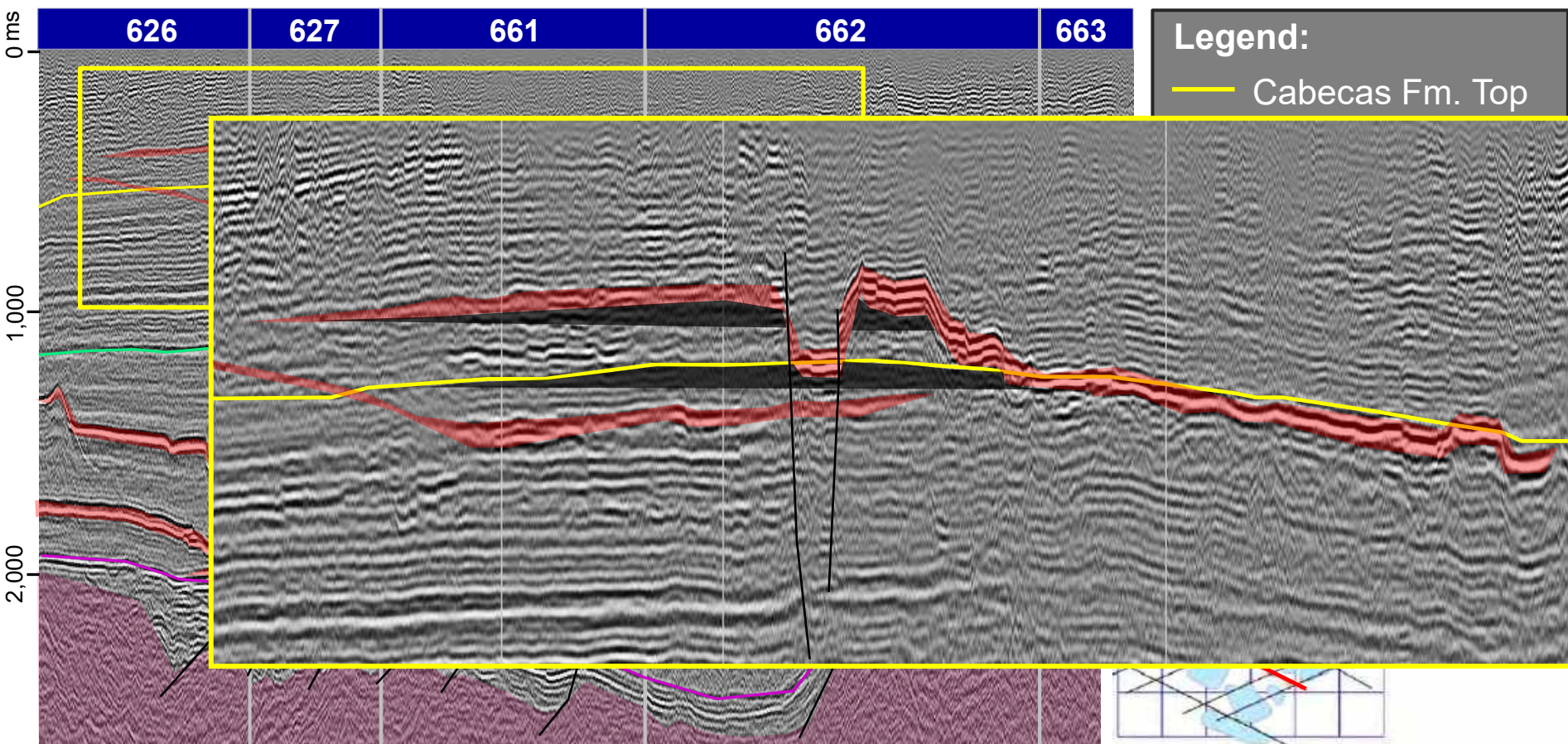
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-105

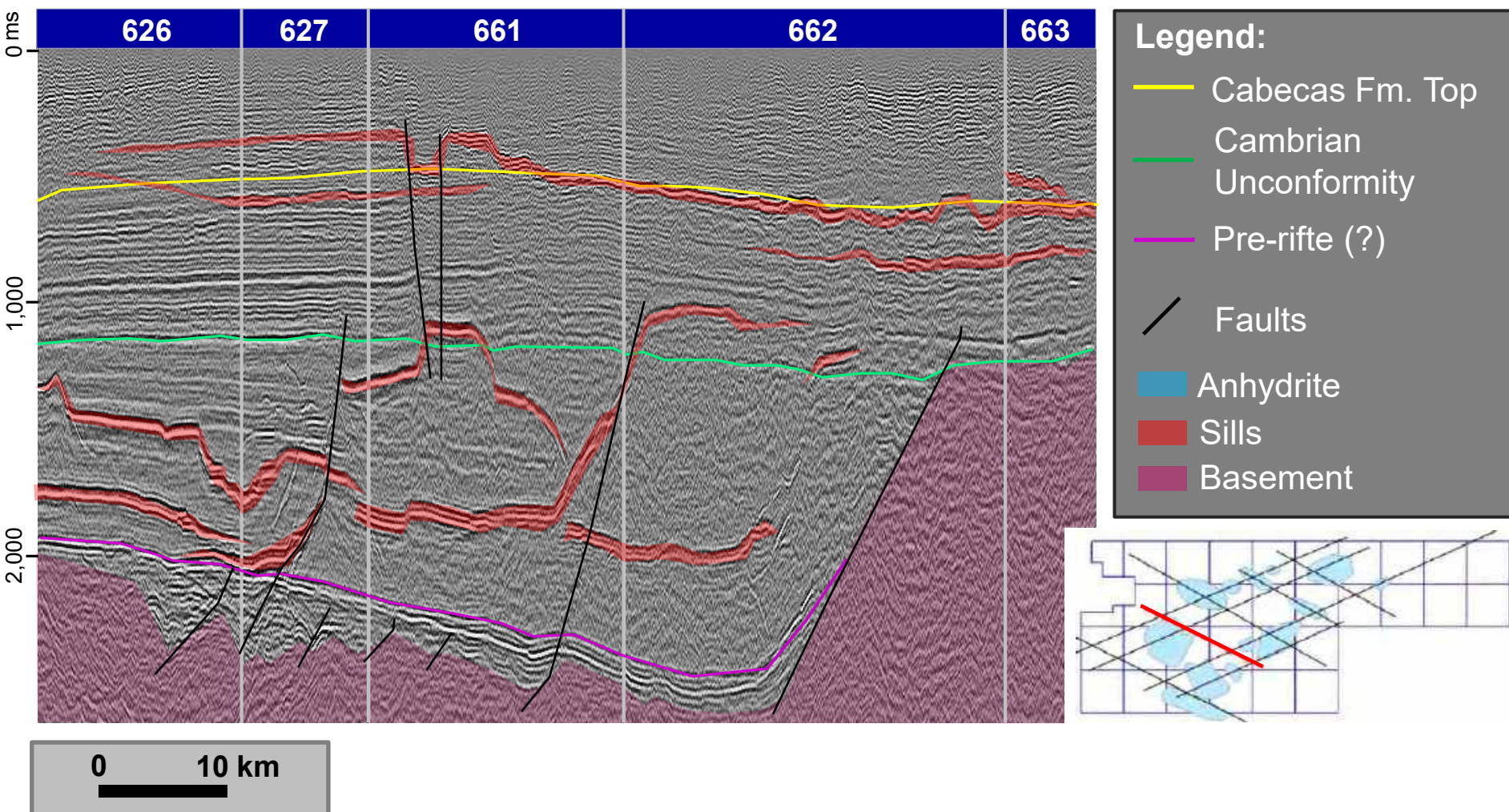
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-105

0317_2D_ANP_BACIA_DO_PARNAIBA

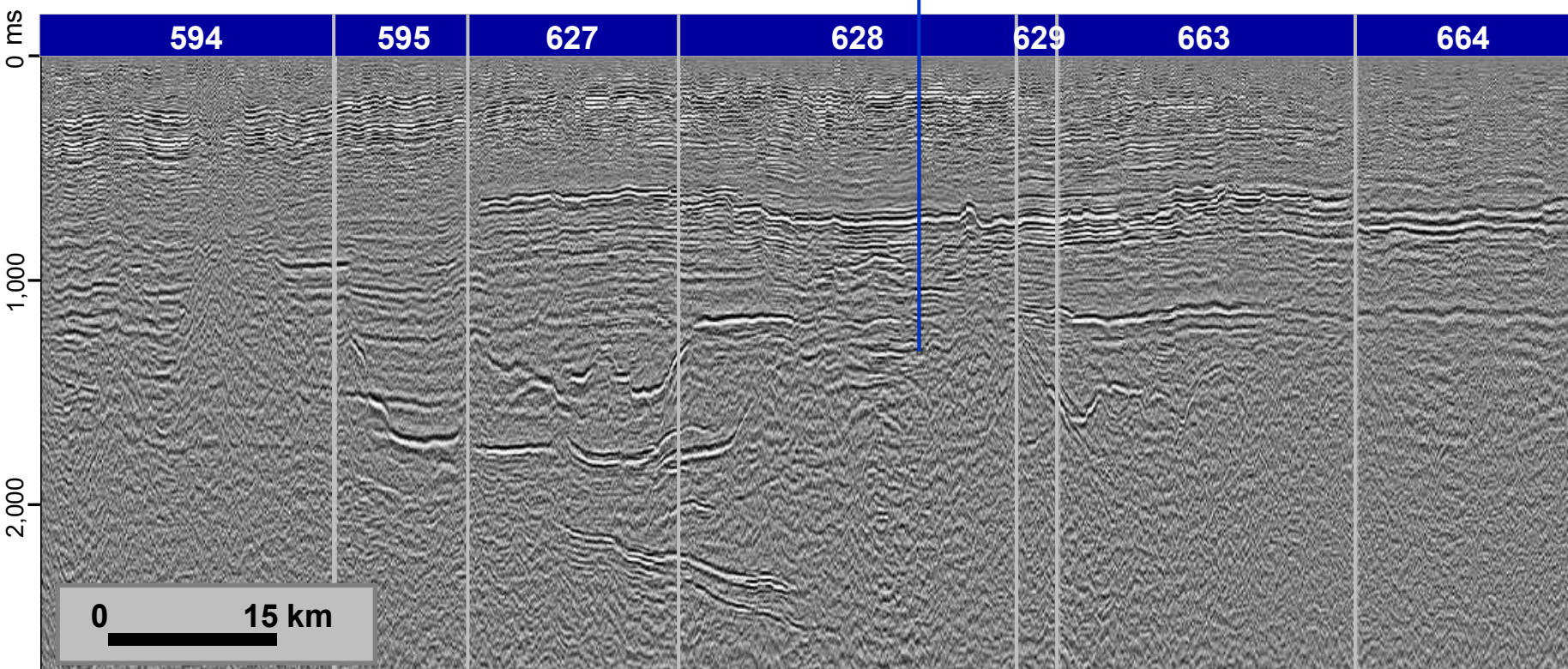


Leads

Line LR-106

1-TB-0002-MA

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

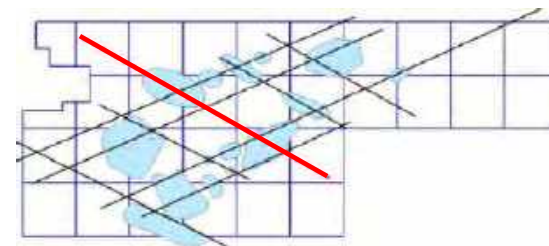
— Pre-rift (?)

■ Anhydrite

■ Sills

■ Basement

— Faults

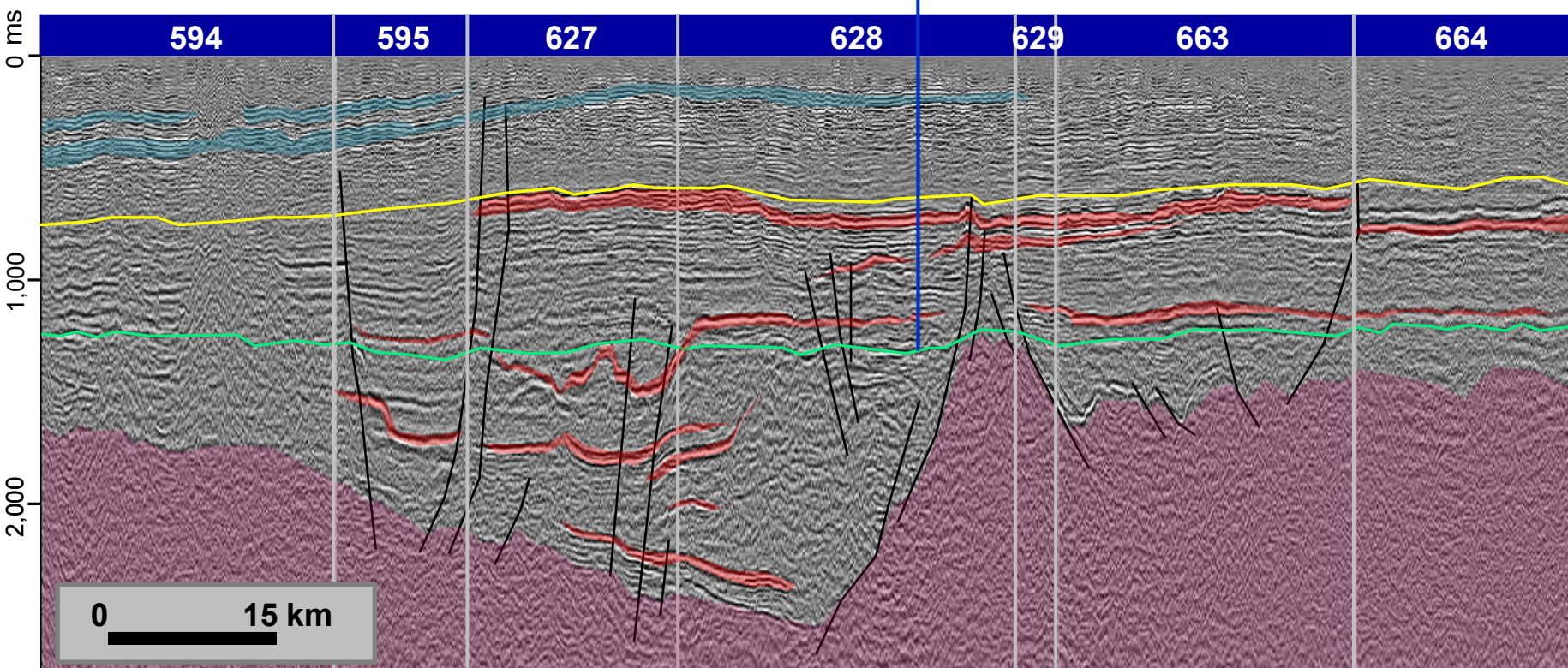


Leads

Line LR-106

1-TB-0002-MA

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

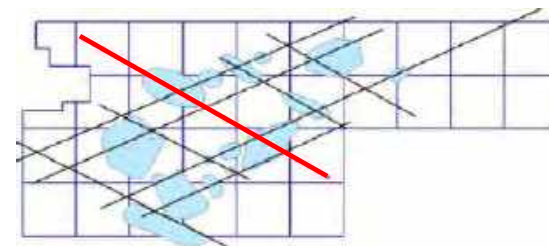
— Pre-rift (?)

Anhydrite

Sills

Basement

Faults

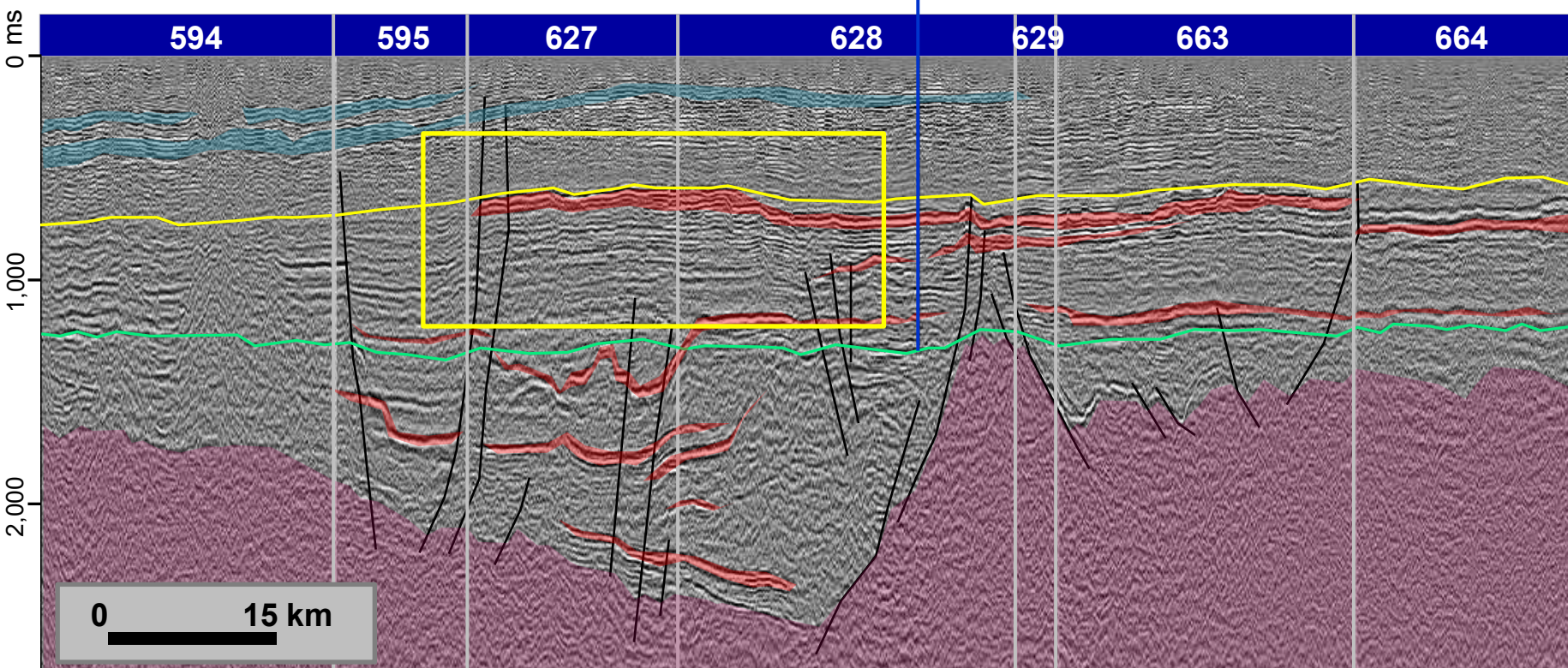


Leads

Line LR-106

1-TB-0002-MA

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

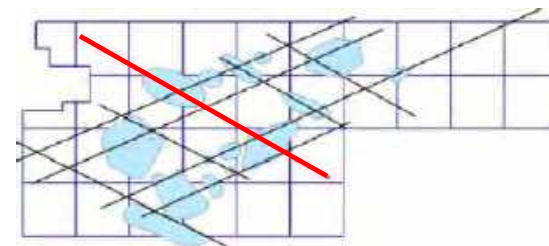
— Pre-rift (?)

Anhydrite

Sills

Basement

Faults

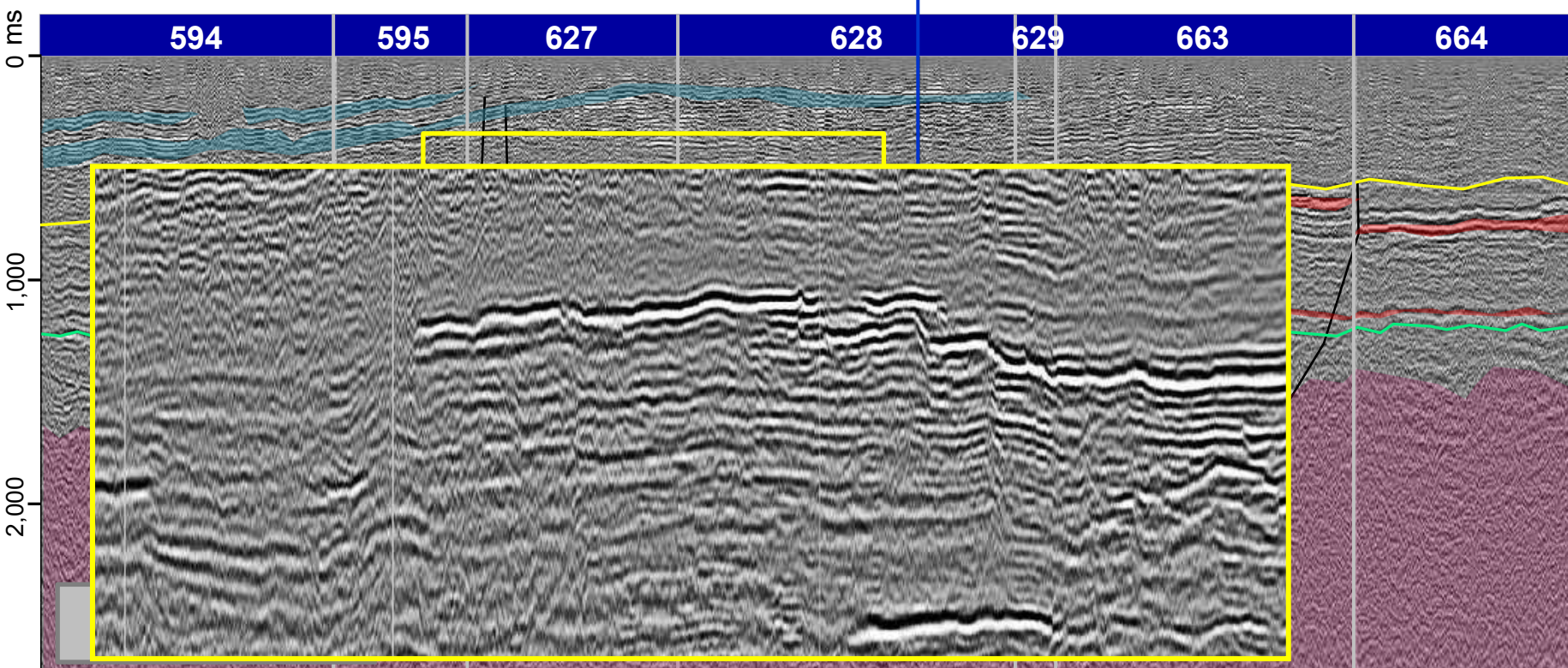


Leads

Line LR-106

1-TB-0002-MA

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

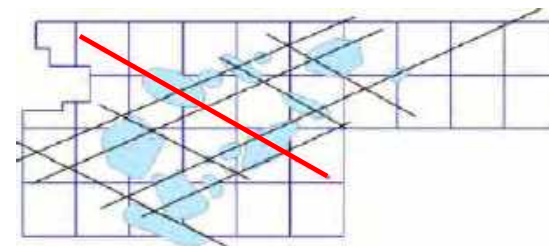
— Pre-rift (?)

— Anhydrite

— Sills

— Basement

— Faults

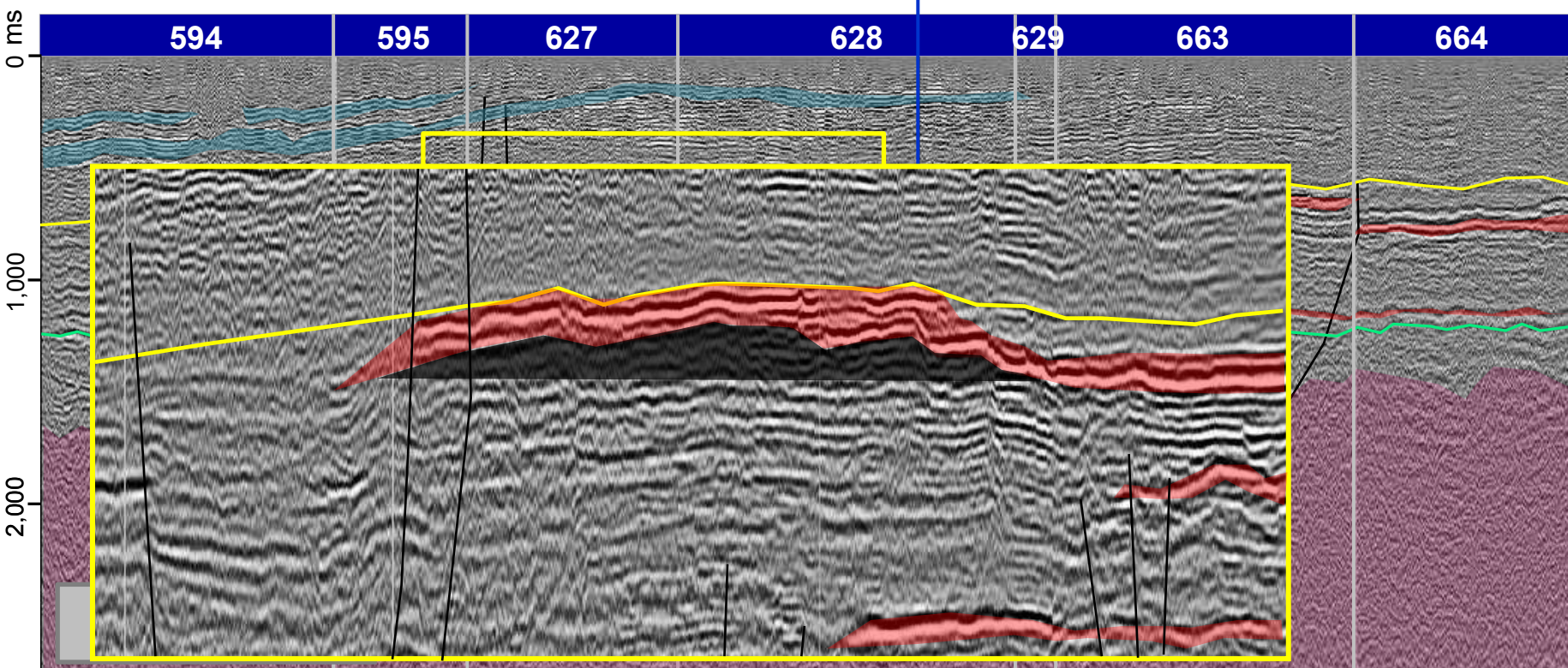


Leads

Line LR-106

1-TB-0002-MA

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

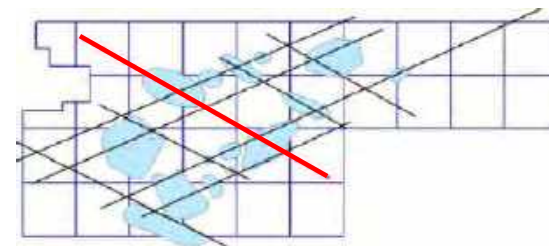
— Pre-rift (?)

— Anhydrite

— Sills

— Basement

— Faults

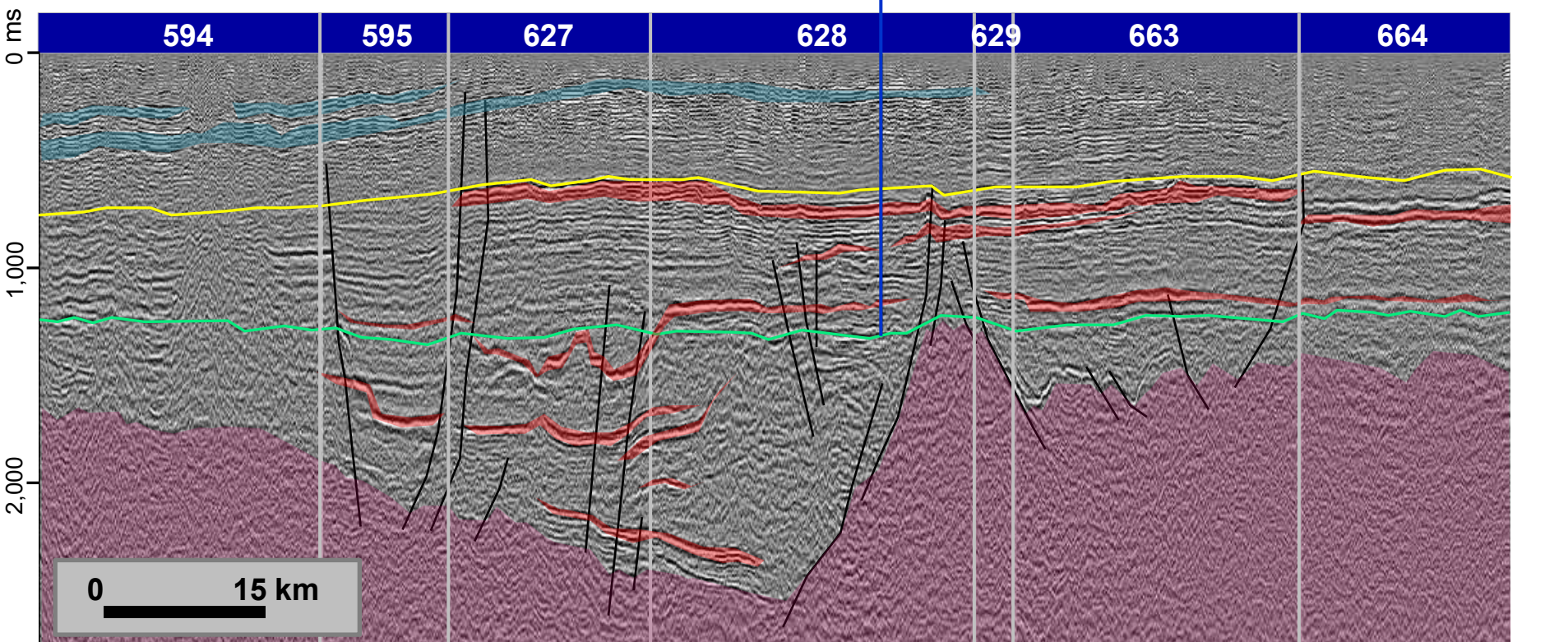


Leads

Line LR-106

1-TB-0002-MA

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

— Cambrian Unconformity

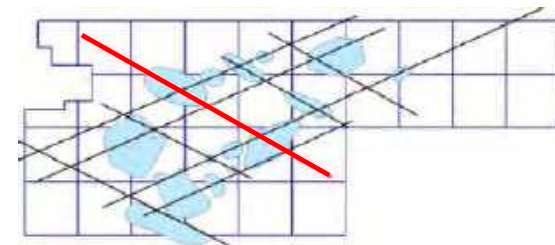
— Pre-rift (?)

Anhydrite

Sills

Basement

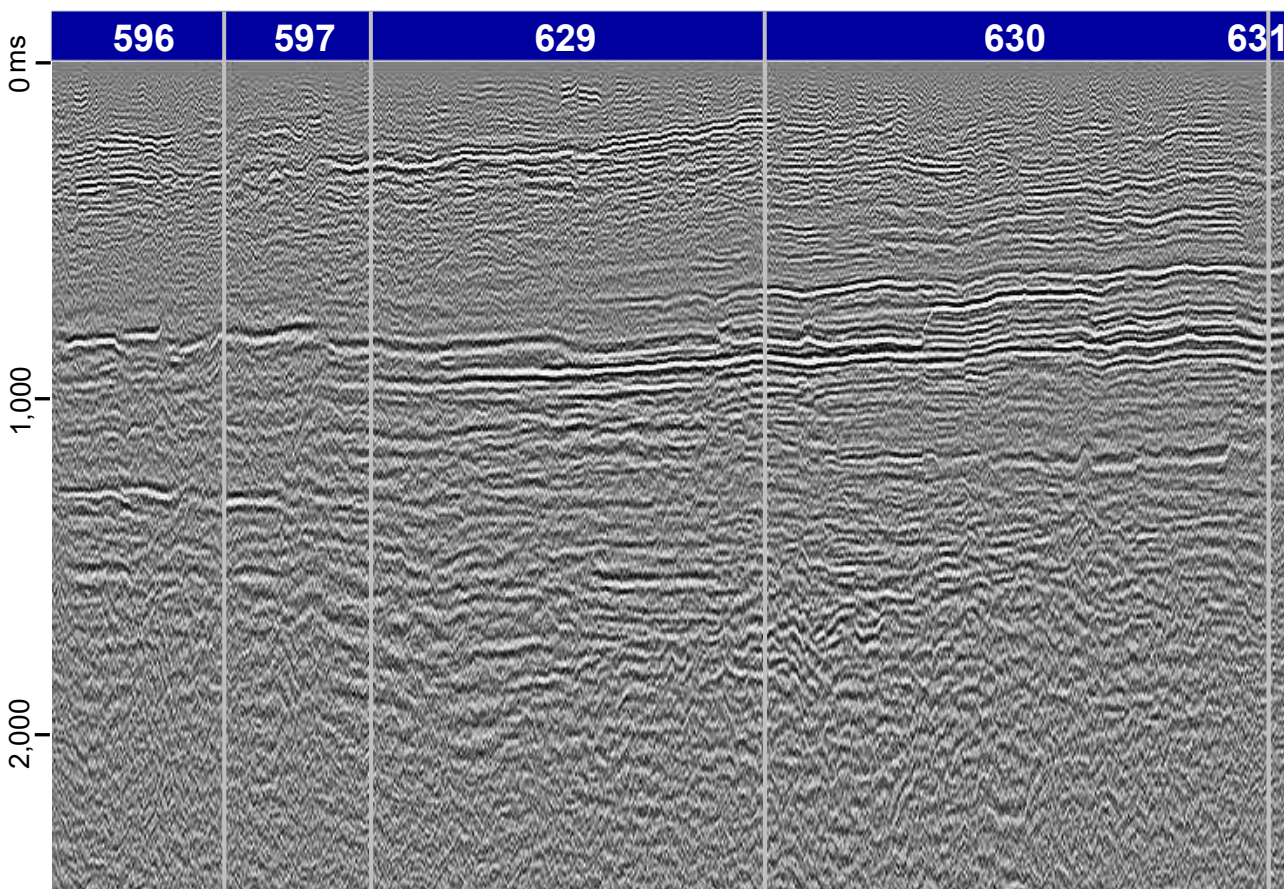
Faults



Leads

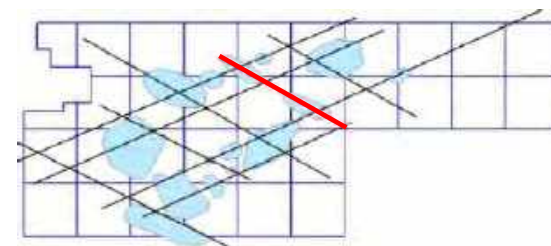
Line LR-107

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

- Cabecas Fm. Top
- Cambrian Unconformity
- / Faults
- Anhydrite
- Sills
- Basement

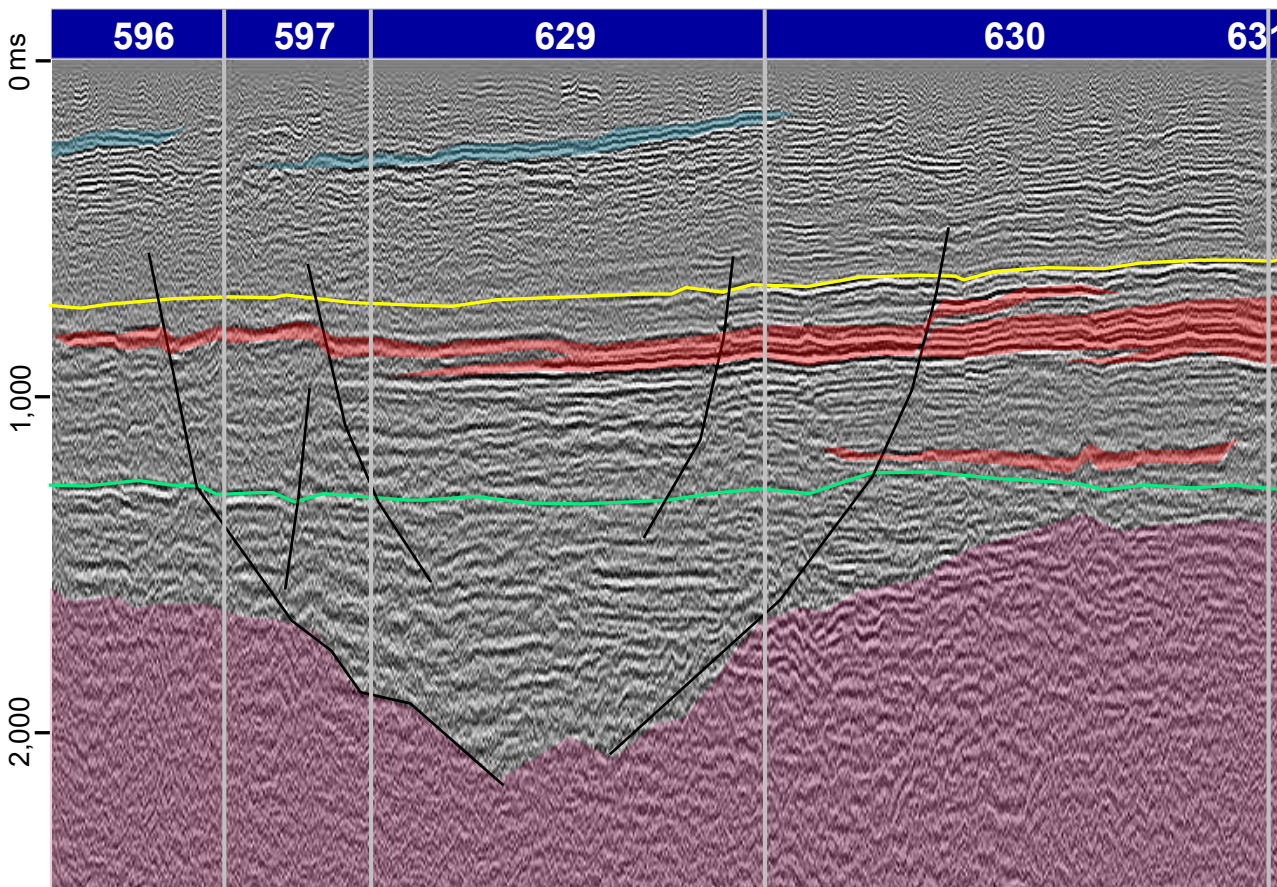


0 10 km

Leads

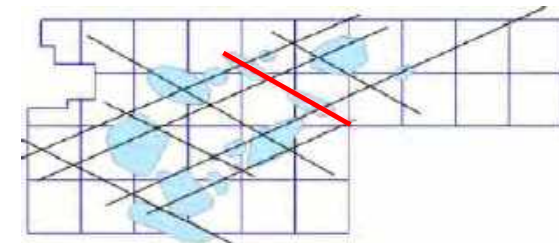
Line LR-107

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

- Cabecas Fm. Top
- Cambrian Unconformity
- / Faults
- Anhydrite
- Sills
- Basement

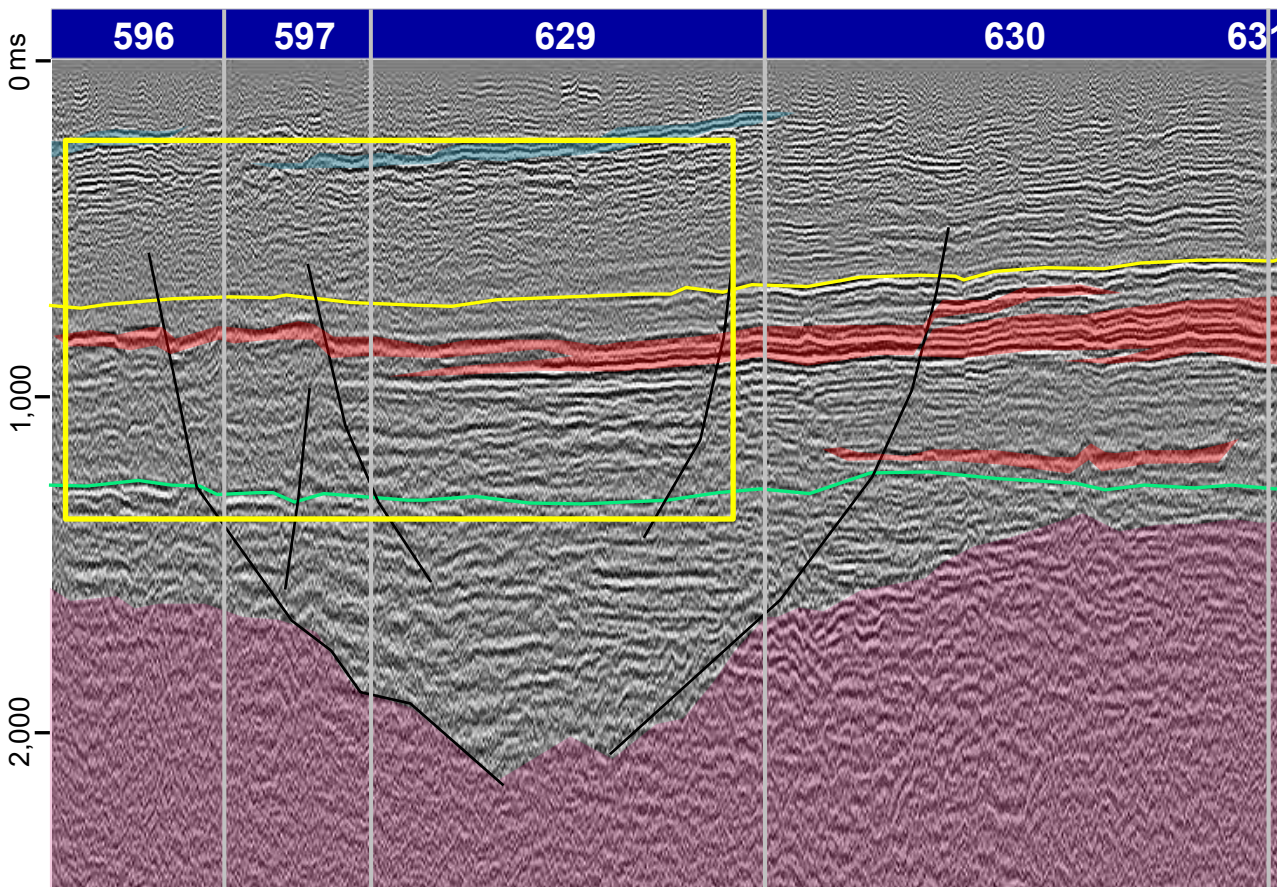


0 10 km

Leads

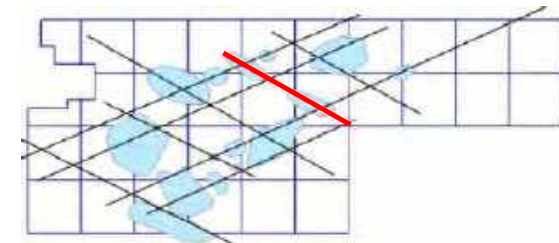
Line LR-107

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

- Cabecas Fm. Top
- Cambrian Unconformity
- / Faults
- Anhydrite
- Sills
- Basement

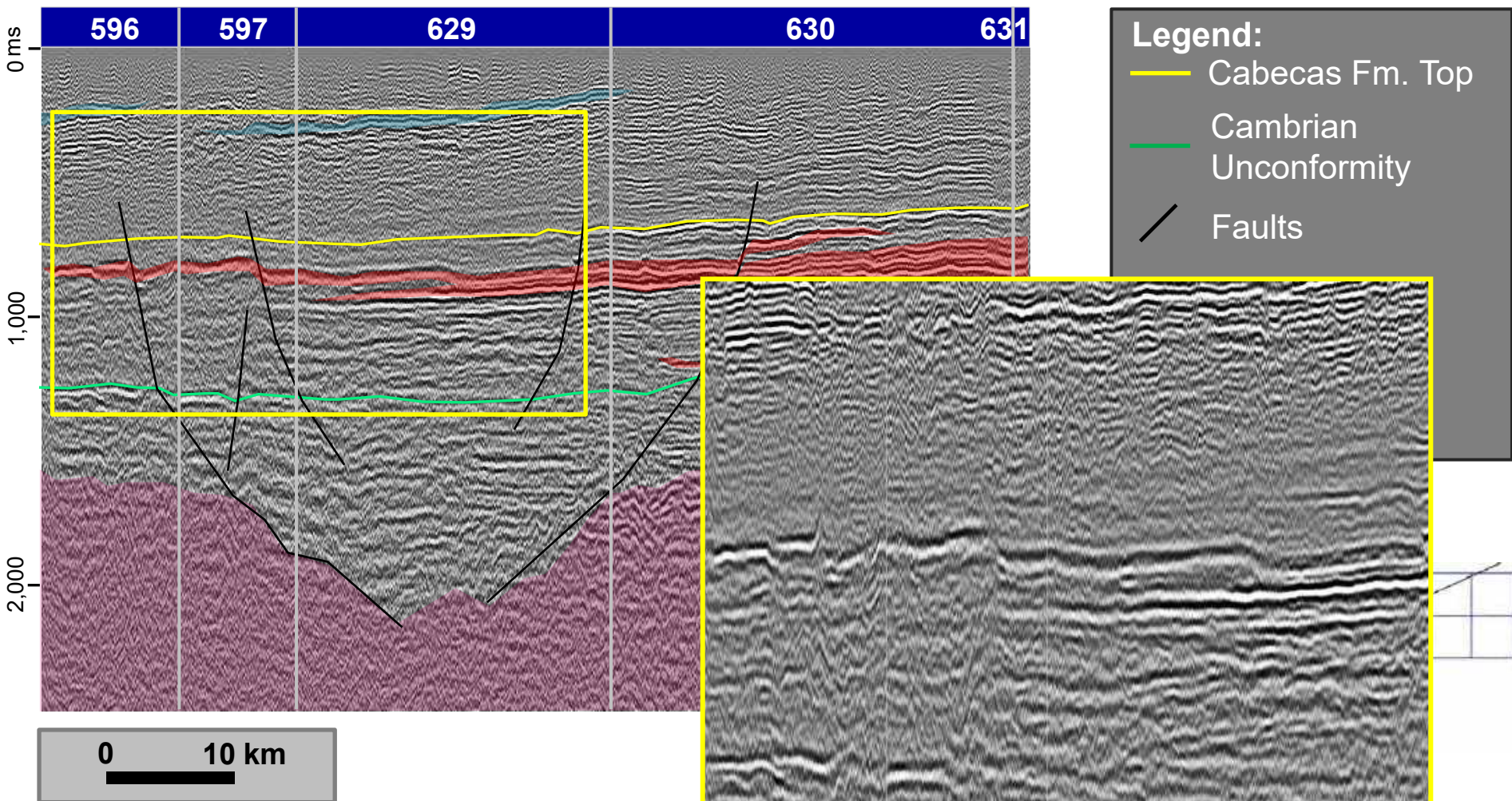


0 10 km

Leads

Line LR-107

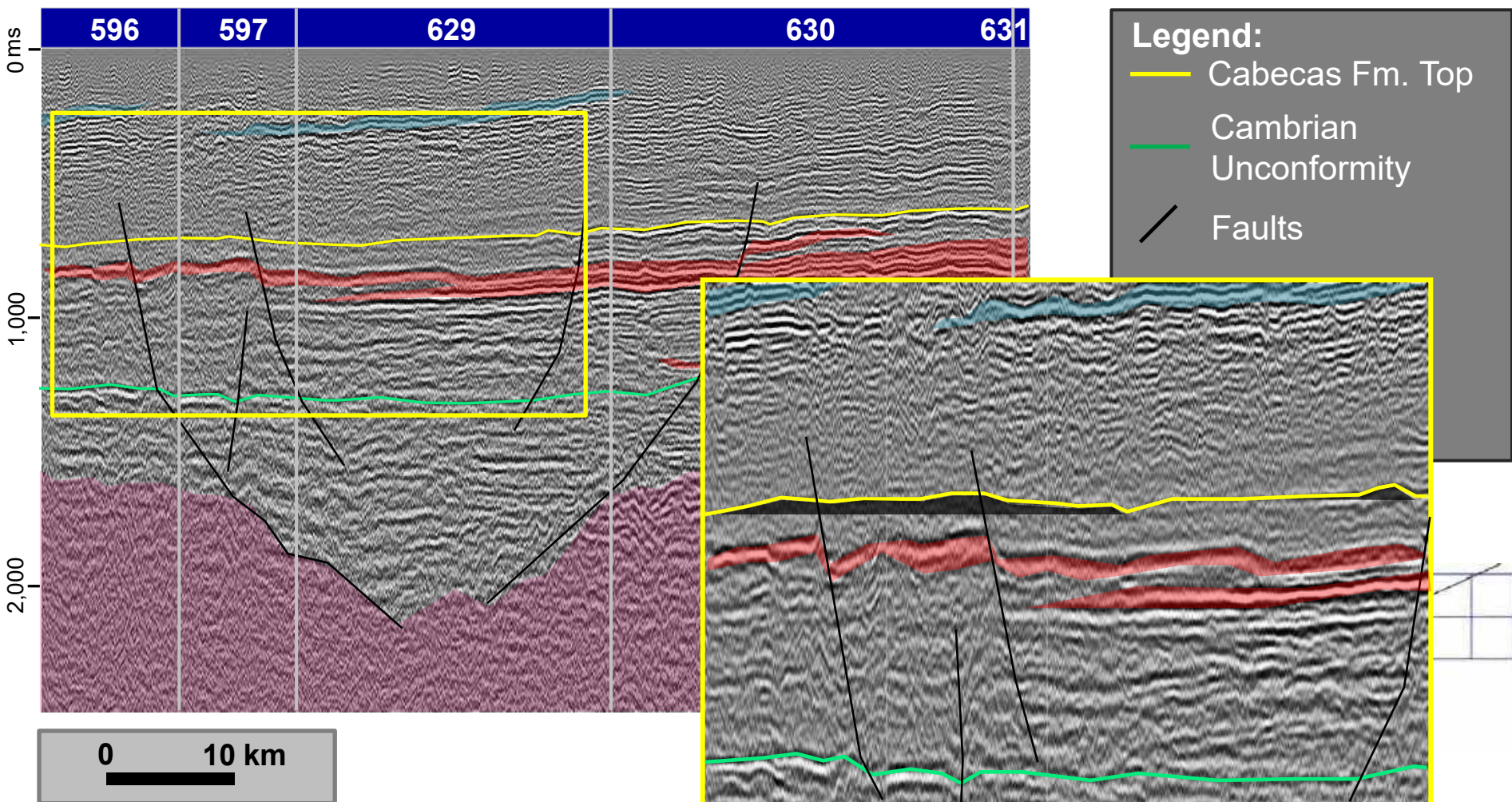
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-107

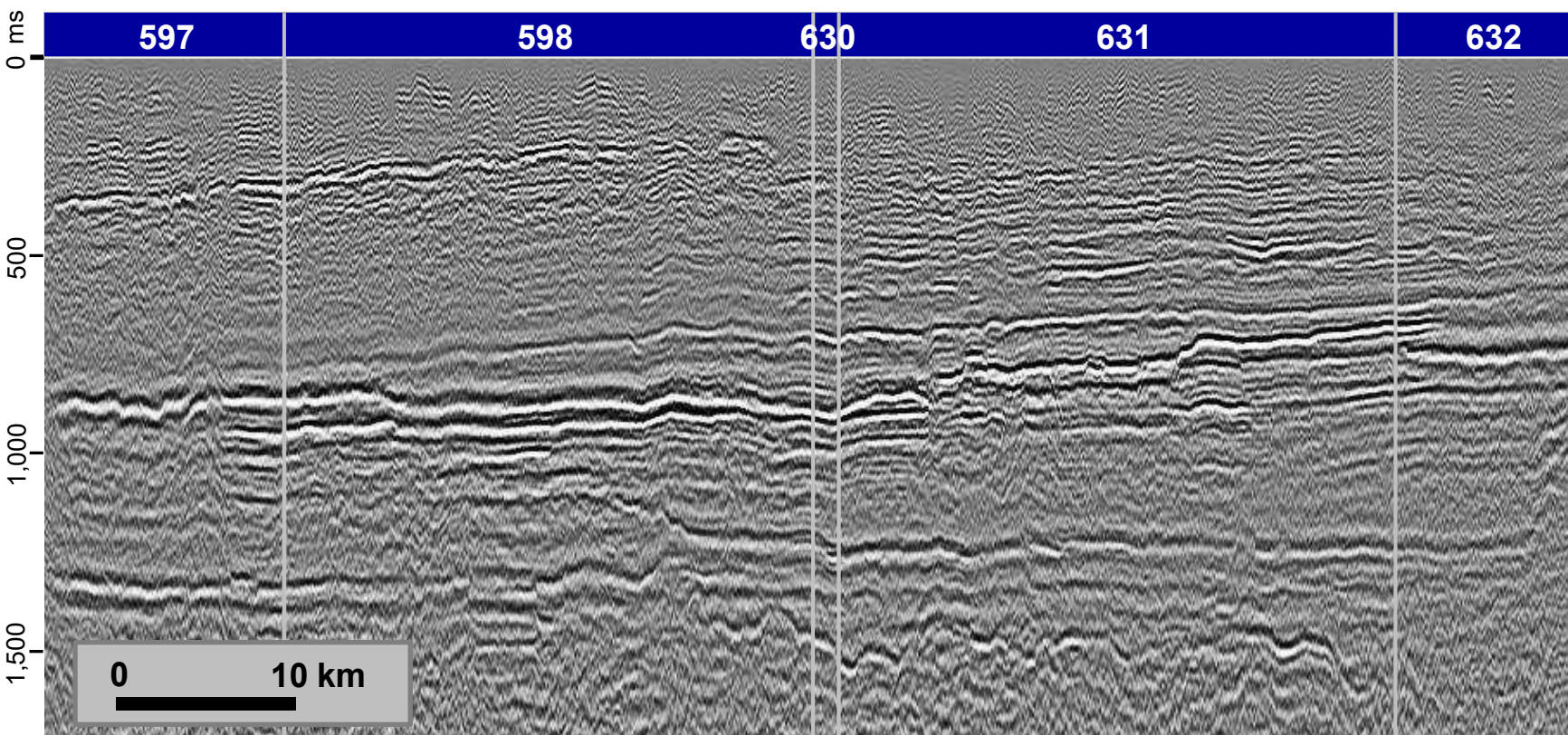
0317_2D_ANP_BACIA_DO_PARNAIBA



Leads

Line LR-116

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

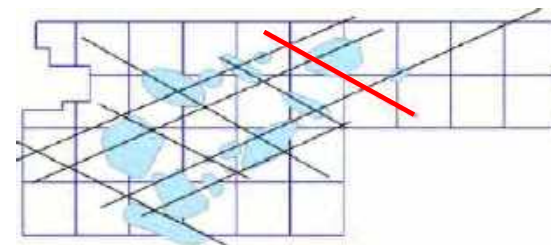
— Cambrian Unconformity

— Faults

Anhydrite

Sills

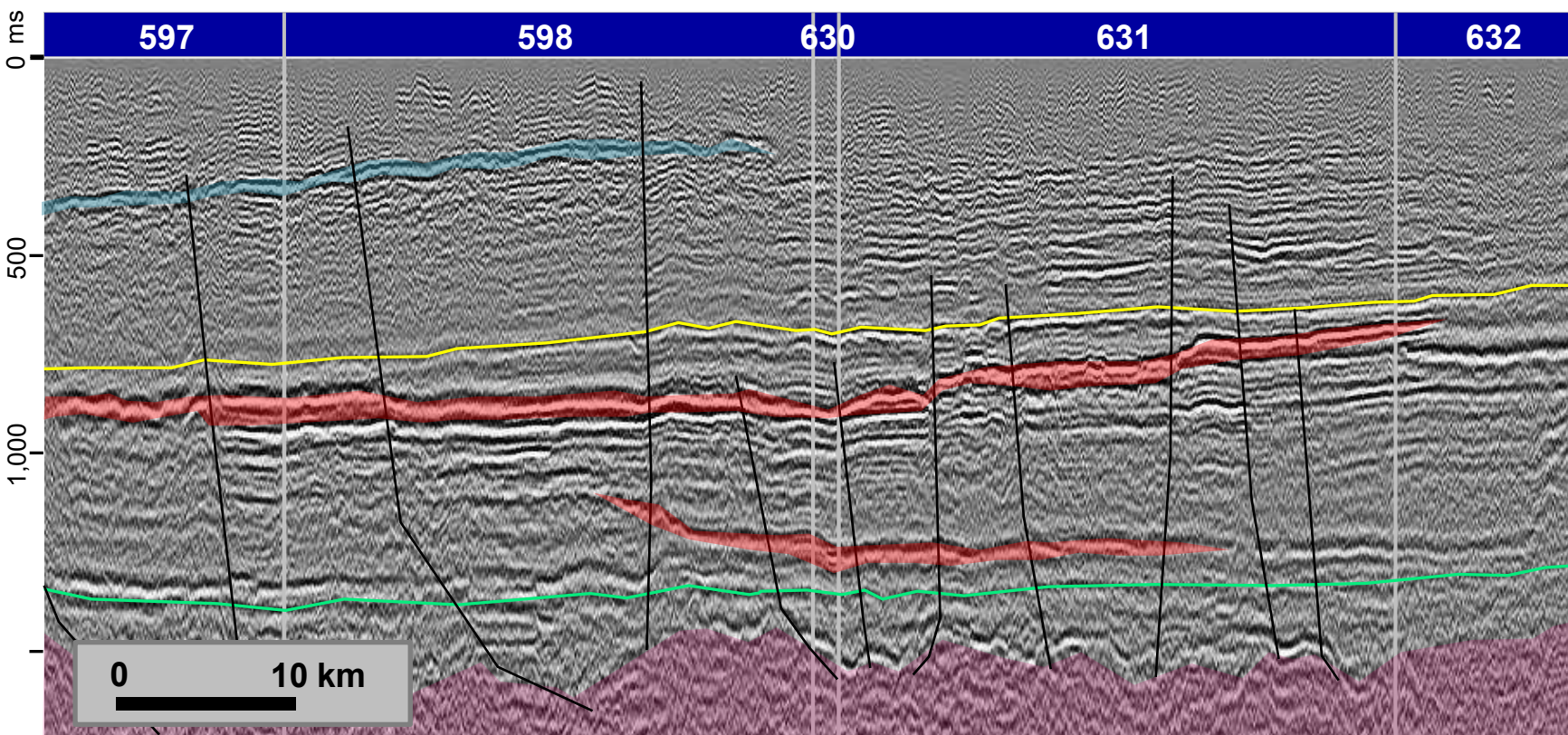
Basement



Leads

Line LR-116

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

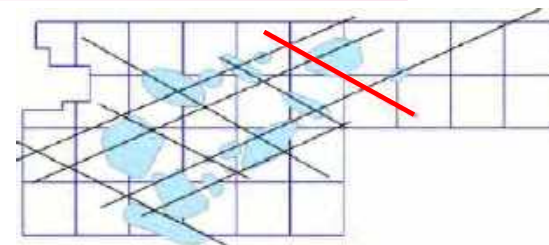
— Cambrian Unconformity

— Faults

— Anhydrite

— Sills

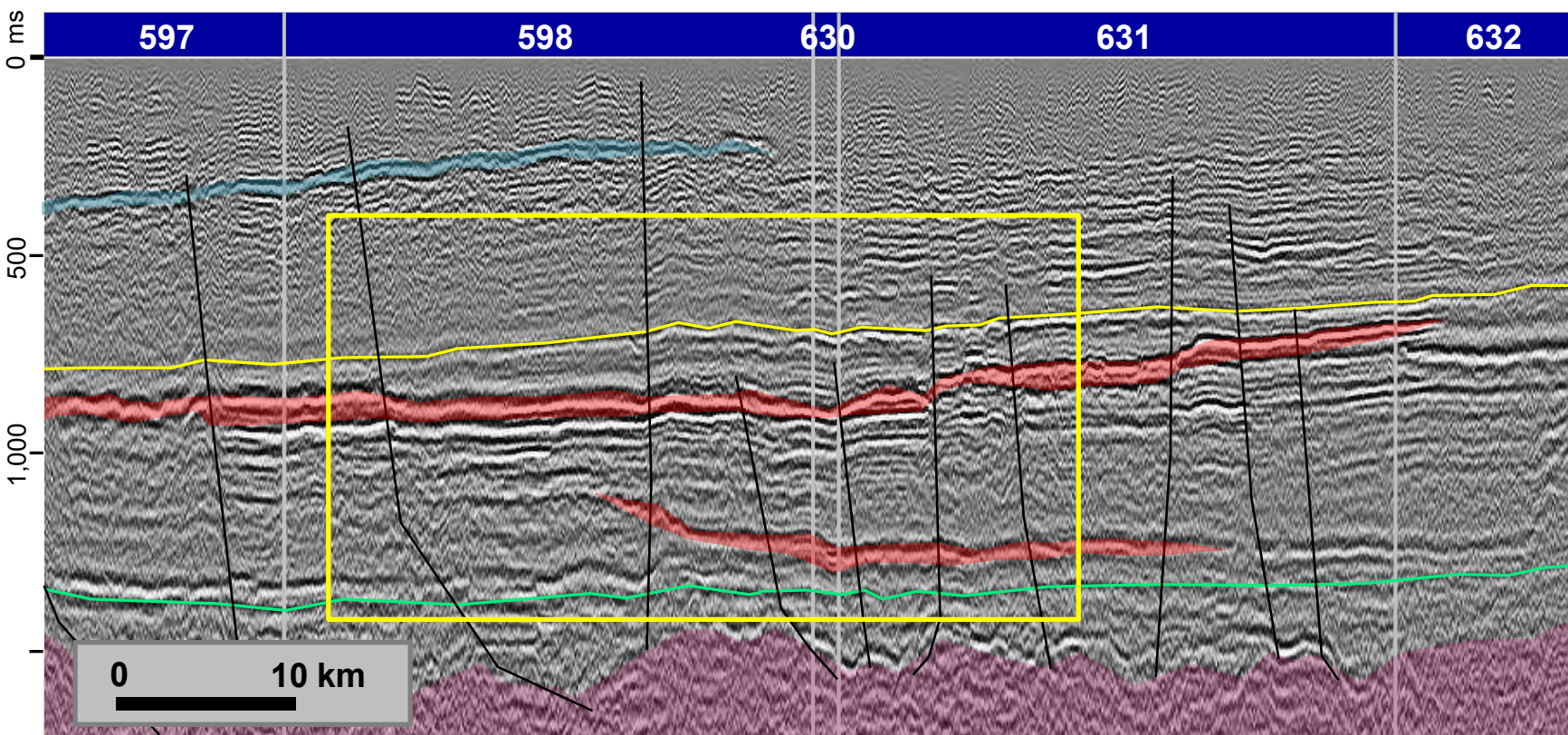
— Basement



Leads

Line LR-116

0317_2D_ANP_BACIA_DO_PARNAIBA



Legend:

— Cabecas Fm. Top

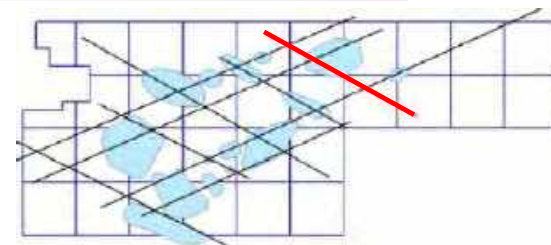
— Cambrian Unconformity

— Faults

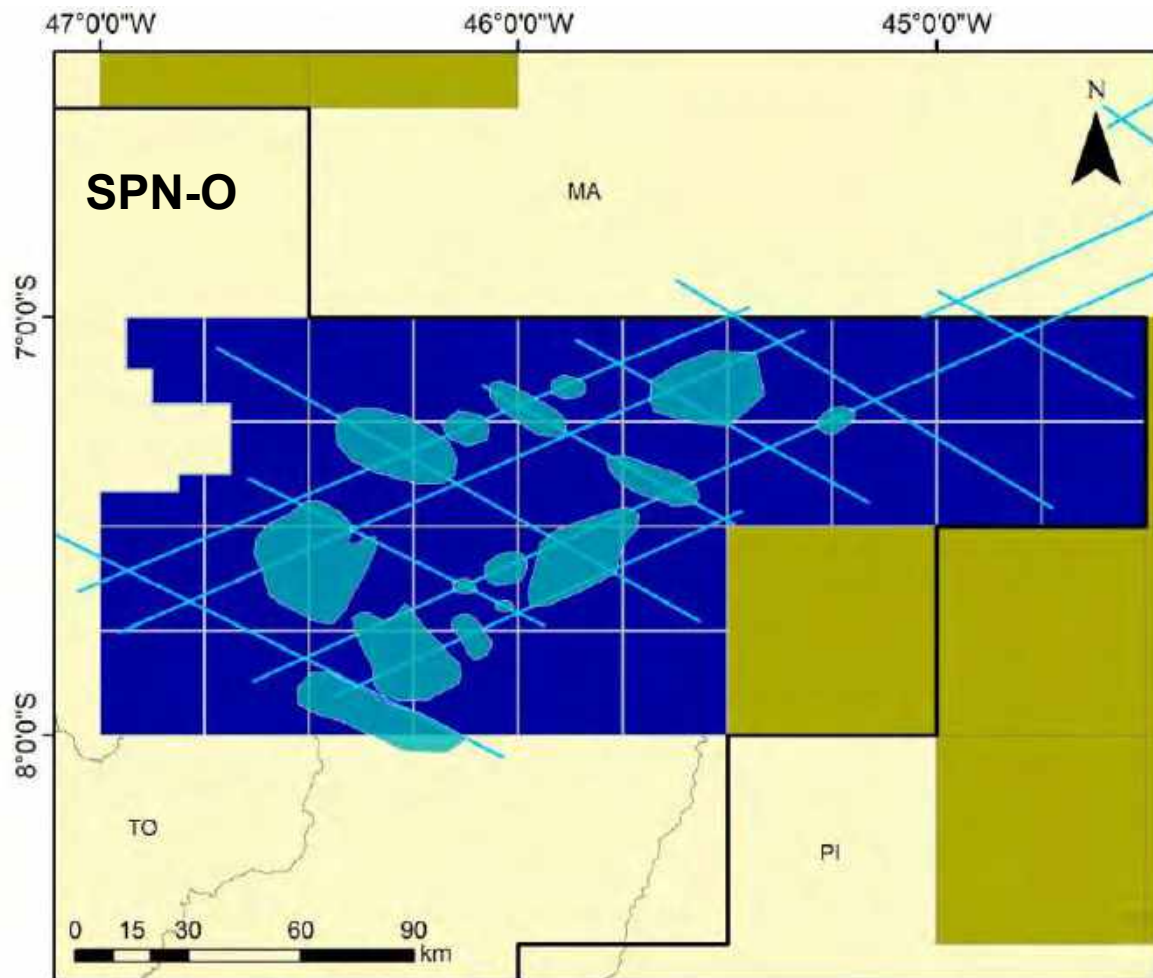
— Anhydrite

— Sills

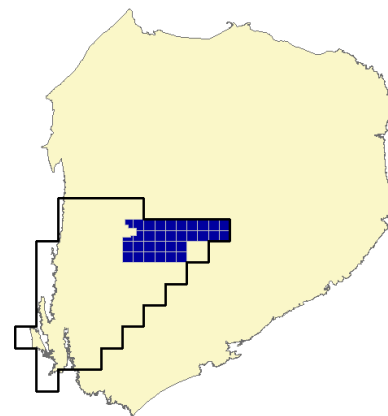
— Basement



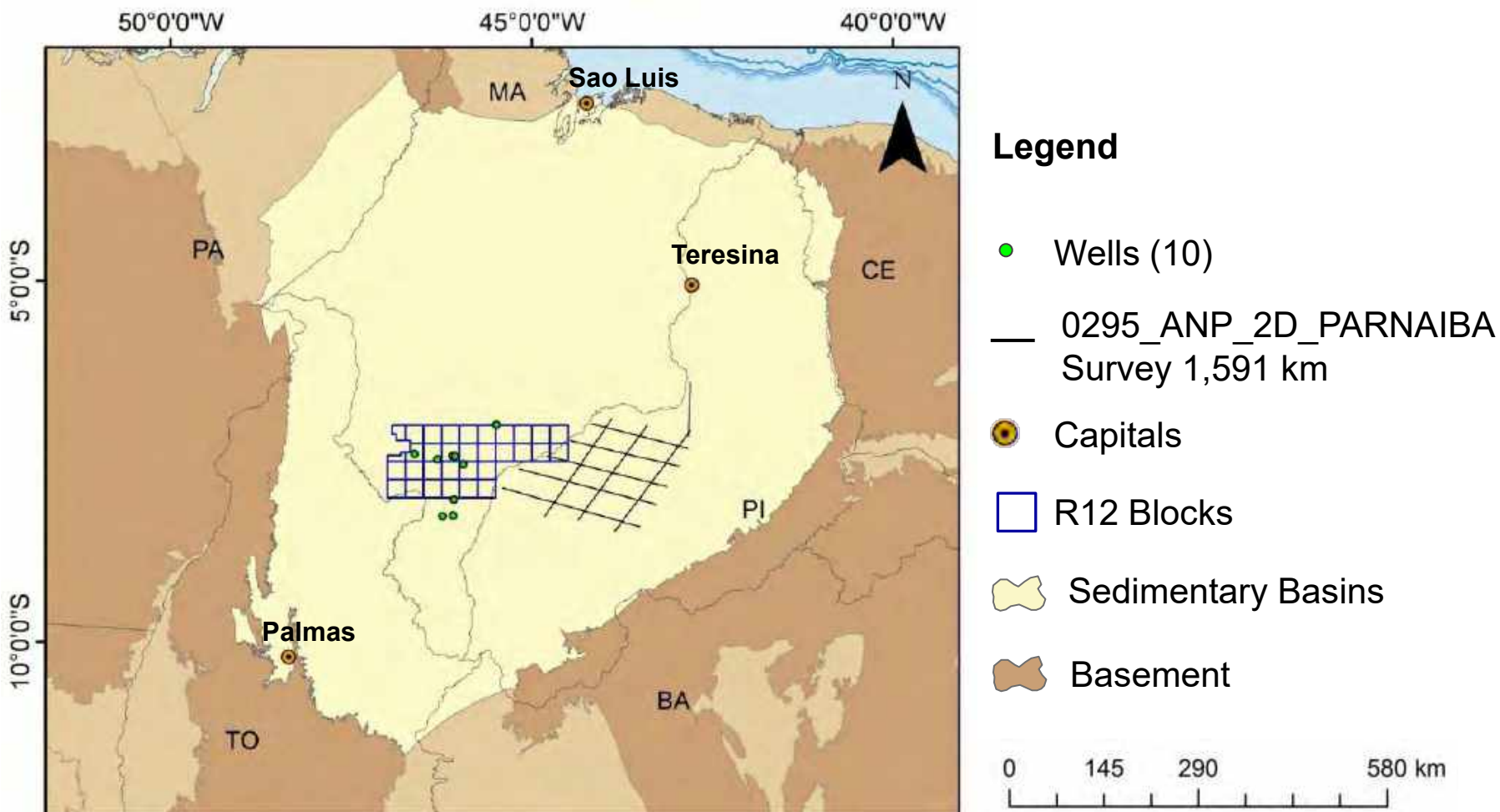
Estimated Volumes



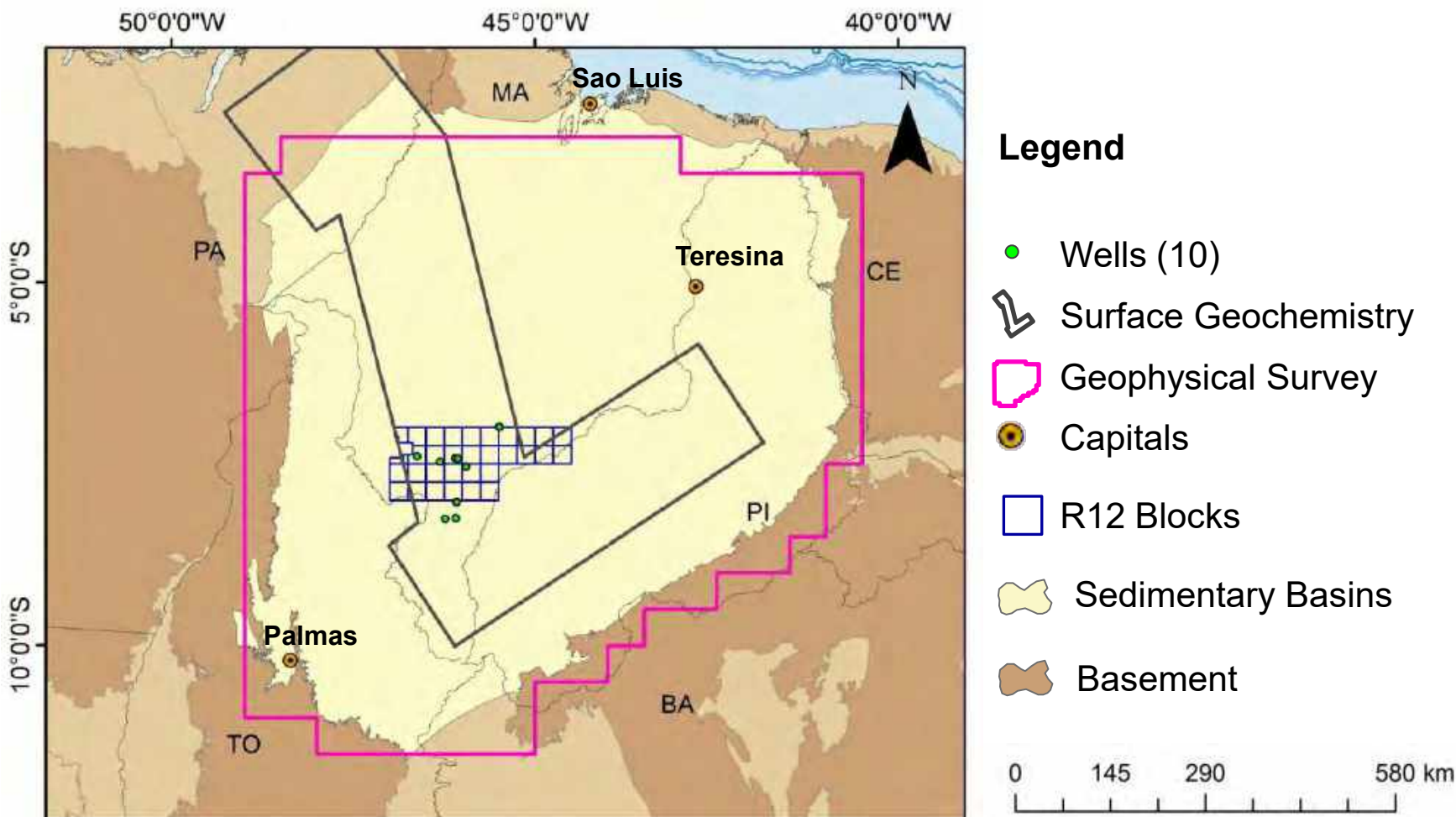
Gas Volume in place
Estimative
~ 9 TCF
~ 1.5 Billion boe



Data Package



Data Package



Contractual Aspects

Name of the Sector	SPN-O
Exploration Model	New Frontier
Number of blocks	32
Area on Offer	~23,500 km ²
Exploration Phase	6 years
Exploration Period	4 + 2 years
Technical Qualification of the Operator	C
Minimum Bonus	R\$ 292 Thousand – R\$ 988 Thousand
Exploration Objective	Devonian (Cabecas Fm.)
Stratigraphic Objective	Devonian (Pimenteiras Fm.)

Agenda

Location

Infrastructure and Operational Conditions

Exploration Overview

Tectonostratigraphic Evolution

Petroleum Systems

Plays

Exploration Successes

Area on Offer

Final Remarks

Final Remarks

- New frontier basin, nonetheless highly promising due to the recent natural gas discoveries (Gaviao Azul, Gaviao Real, Gaviao Branco and West of Gaviao Branco);
- Intrusive rocks acting as catalyst for the hydrocarbon generation, in addition to act as seals for the gas accumulations;
- Thermoelectrics as an alternative for the natural gas produced in the basin;
- Gaviao Real is already in production since 01/19/2013. Production of 4.35 MMm³/day;
- Technical studies promoted by ANP pointed to several leads suchlike the Gavioes fields, producing on the basin;
- For the area on offer, in place estimated volumes are 9 Tcf (1.5 Bi boe) of gas.

National Agency of Petroleum, Natural Gas and Biofuels

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