

Brazil Round 9

Rio do Peixe Basin



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Nona Rodada de Licitações

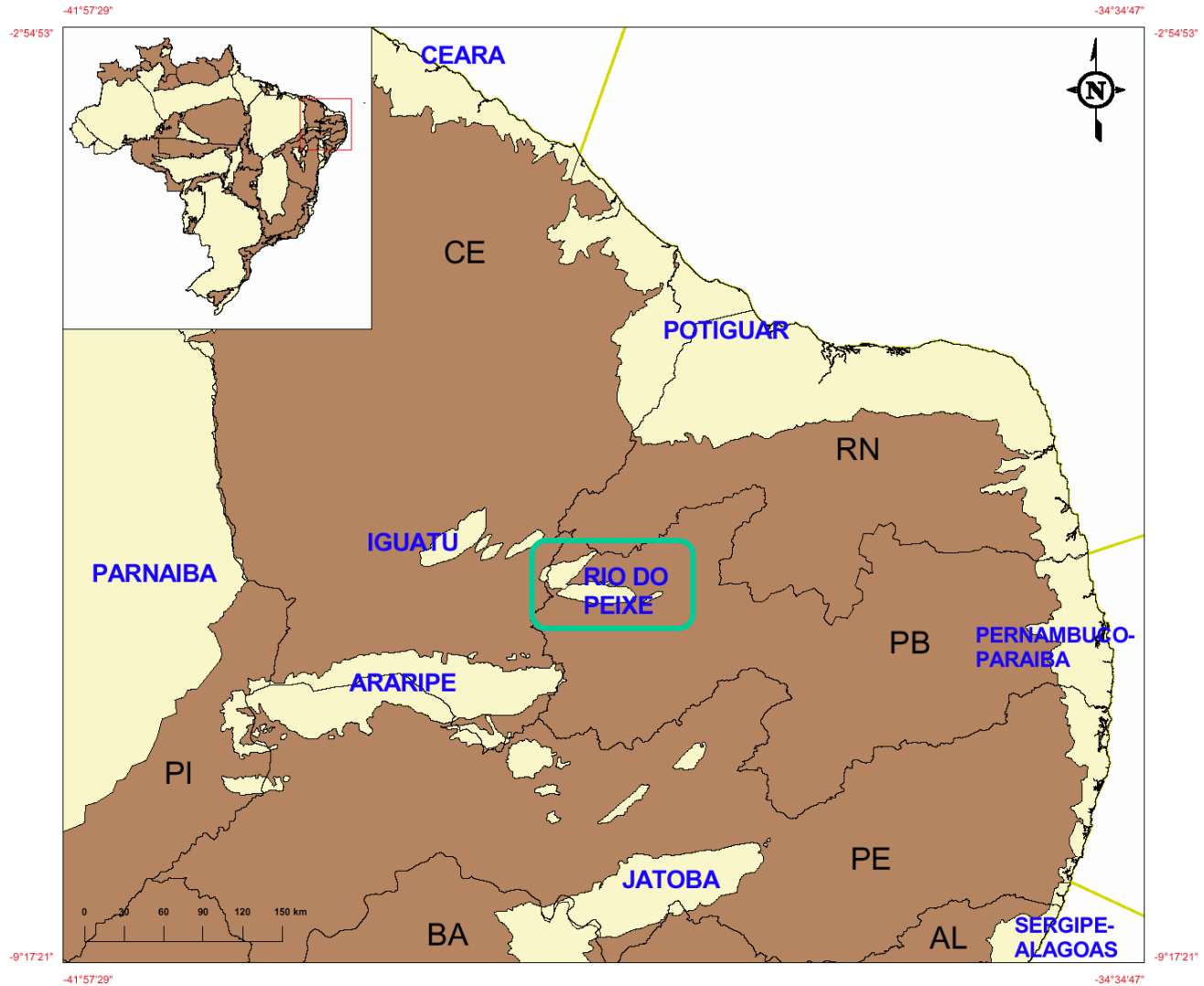
Cid Queiroz Fontes
Bid Areas Departament



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BASIN LOCATION AND OPERATIONAL CONDITIONS

Location Map



General Features

- Part of the Brazilian northeastern region cluster of interior minor basins – Vale do Cariri (Araripe, Iguatú, Lavras da Mangabeira, Icó).
- Almost entirely placed in the Estado da Paraíba, leaving a small western portion in the Estado do Ceará. Main drainages: Rio do Peixe and Rio Piranhas.
- It covers an area of 1,424 km², with a ESE-WNW elongated elliptical shape, split in three sub-basins: Brejo das Freiras or Triunfo, Sousa and Pombal.
- Presence of remarkable palaeontological sites. Dinosaurs footprints and fossiliferous deposits of fishes and molluscs in the Sousa Formation are similar to those from the Araripe Basin.
- The Rio do Peixe Basin and its neighbourhood offer suitable technical and economic operational conditions to small/medium sized companies.

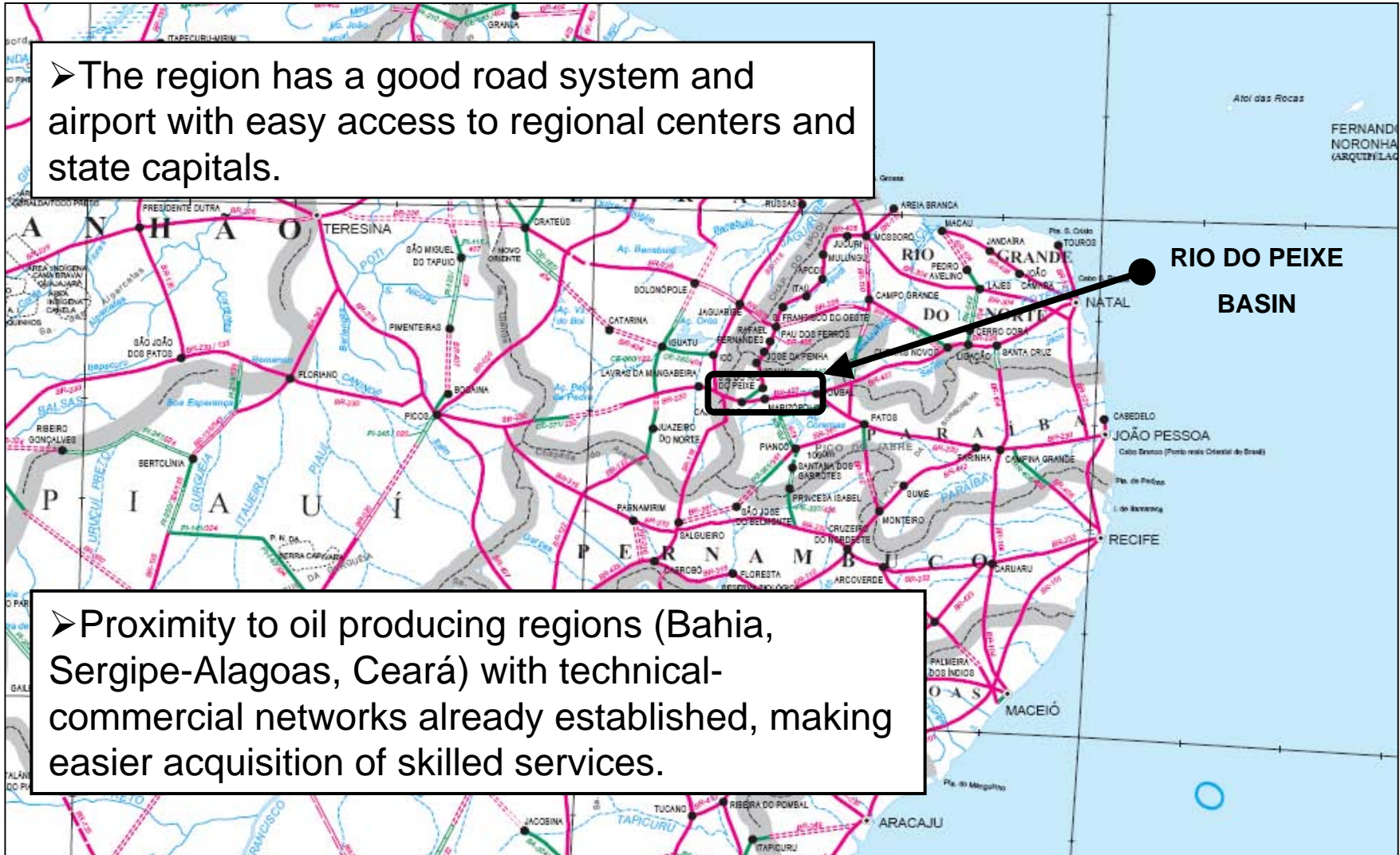
Regional Location



Regional Infrastructure

➤ The region has a good road system and airport with easy access to regional centers and state capitals.

➤ Proximity to oil producing regions (Bahia, Sergipe-Alagoas, Ceará) with technical-commercial networks already established, making easier acquisition of skilled services.



EXPLORATORY AVAILABLE DATA

Exploratory Available Data

- DNPM stratigraphic well (Lagoa do Forno nº 1)
(1,075m total length)
- Surface geochemical survey (1,850 samples / 1,500 km²)
- Seismic lines (3 lines - 80 km)
- Gravimetric surveys
- Magnetometric surveys
- Water well data
- Surface geological mapping
- Geological and palaeontological studies
- Structural and stratigraphic studies (surface, gravity, magnetics methods)
- Geochemical analysis point out to termochemically evolved oil

Well LFst-1-PB

- Project DNPM – 1970

- Locality: Lagoa do Forno , Município de Sousa-PB, Sousa Basin eastern flank.

- TD: 1.075m, hit crystalline basement

- Drilling method: Continuous core-drilling

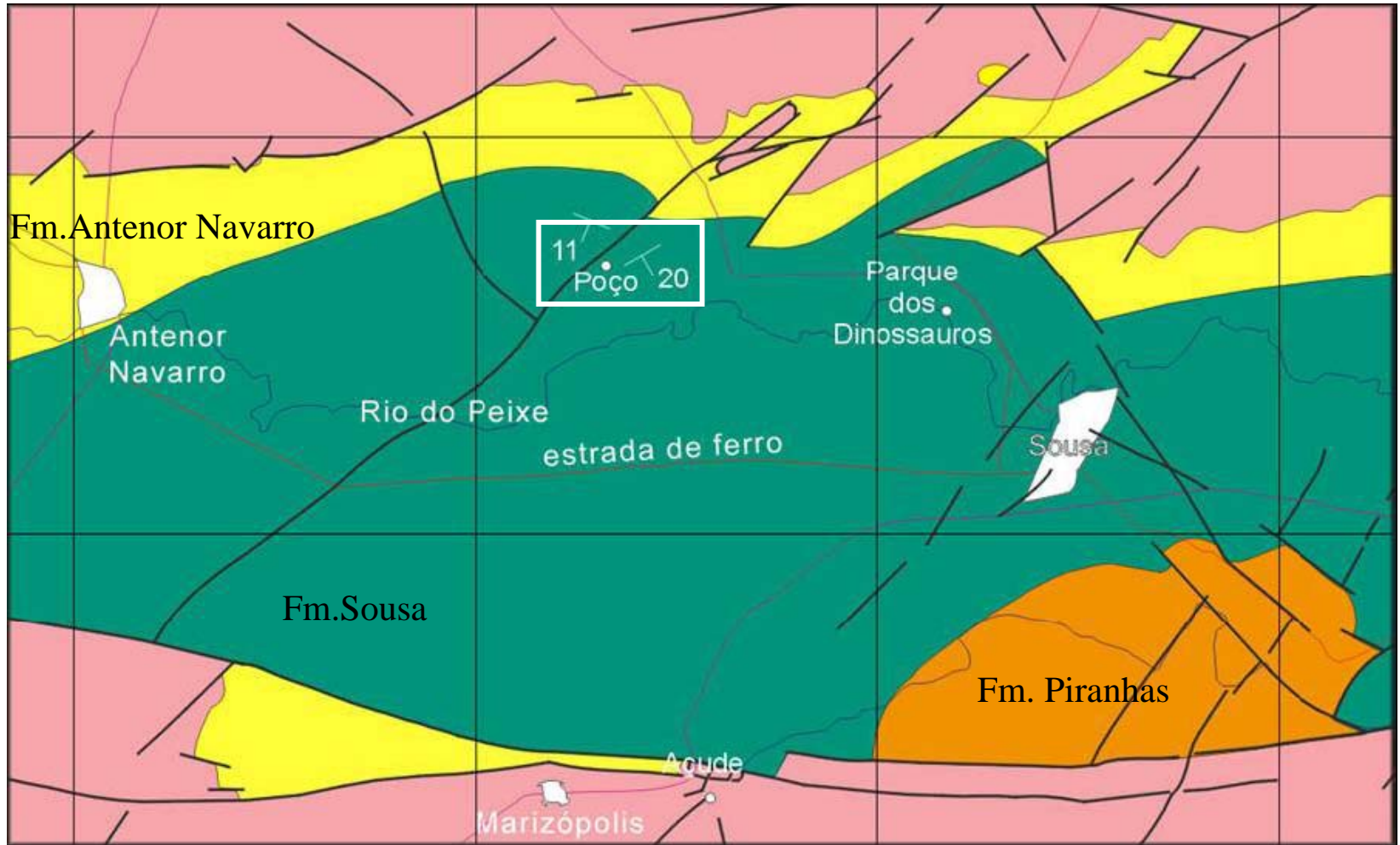
- Lithology: Fm. Rio Piranha = Medium to coarse grained sandstones/
 Shales / Conglomerates

 Fm. Sousa = Siltstones / Argillites / Fine grained sandstones

 Fm. Antenor Navarro = Coarse grained sandstones/
 Conglomerates

- Result: Dry, without showings

Fm. Sousa Oil Seep Location



Oil seep location (water well)

Significant Oil Shows

- Locality: Sítio Sagüí, district of Lagoa das Estrelas, Sousa City.
- Other water wells in the region also show the same contamination.
- Geochemical analyses data confirmed an oil of good quality (Paraffinic), not biodegraded, around 30° API, and its similarity to that from the Pendência Formation (Potiguar Basin), and the oils produced in Recôncavo and Sergipe-Alagoas Basins.

Sampled Oil



Oil sample being collected in proper container from the water well.

Sampled Oil



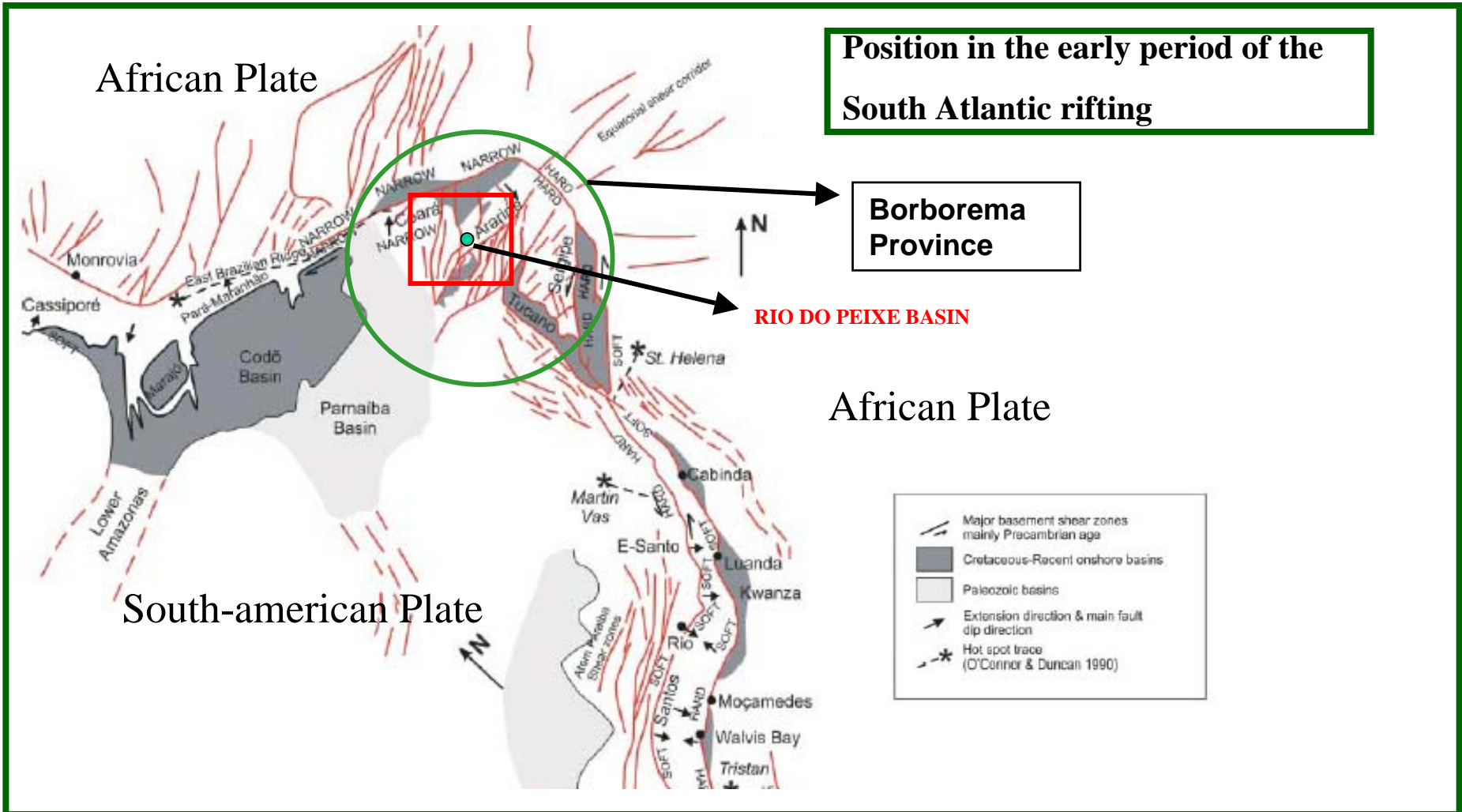
- Sítio Sagüí water well.
- Oil Seep Sampling.



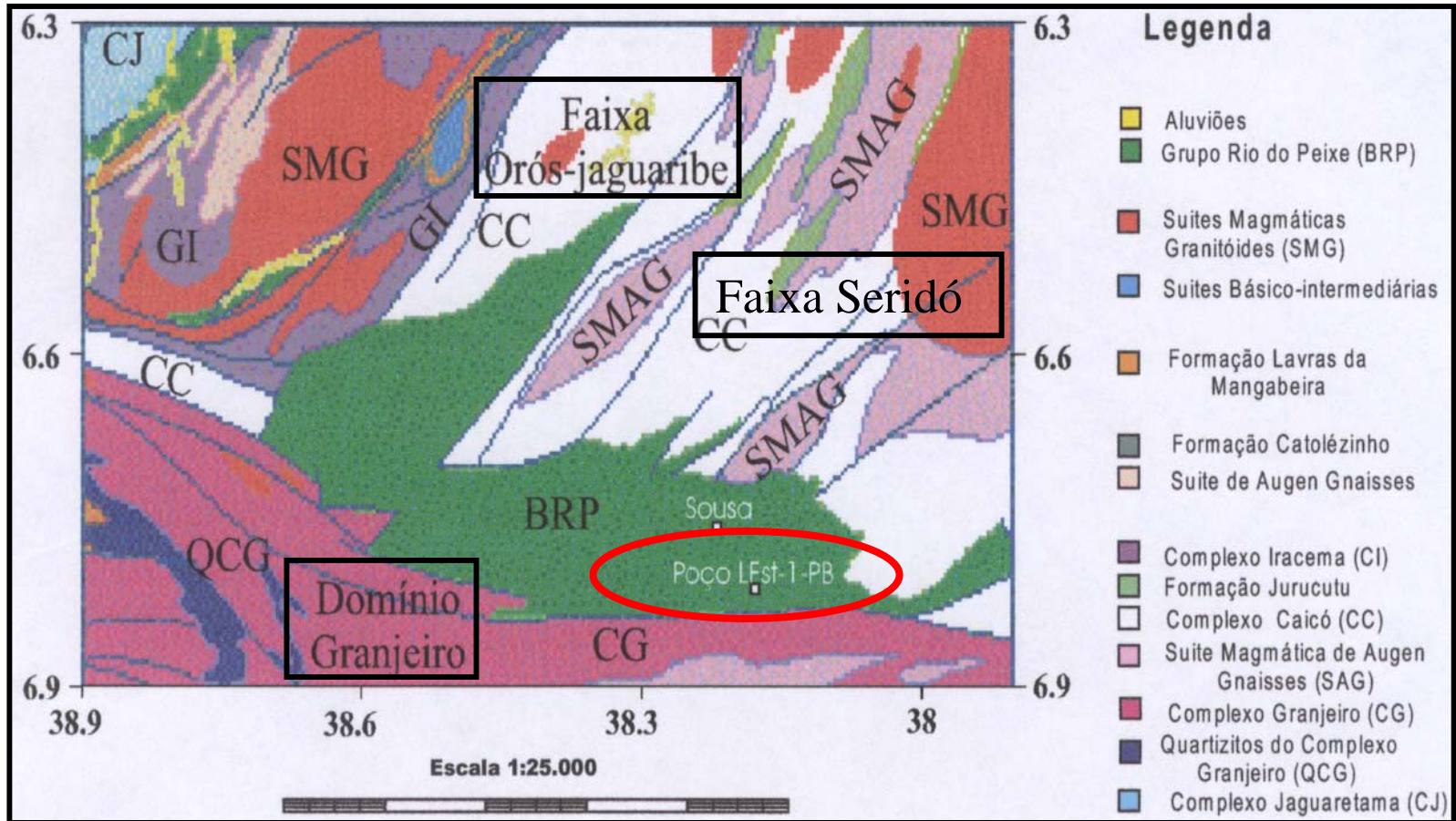
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BASIN GEOLOGY

Geotectonic Framework



Regional Geology



Rio do Peixe Basin geological setting within the Borborema Province.

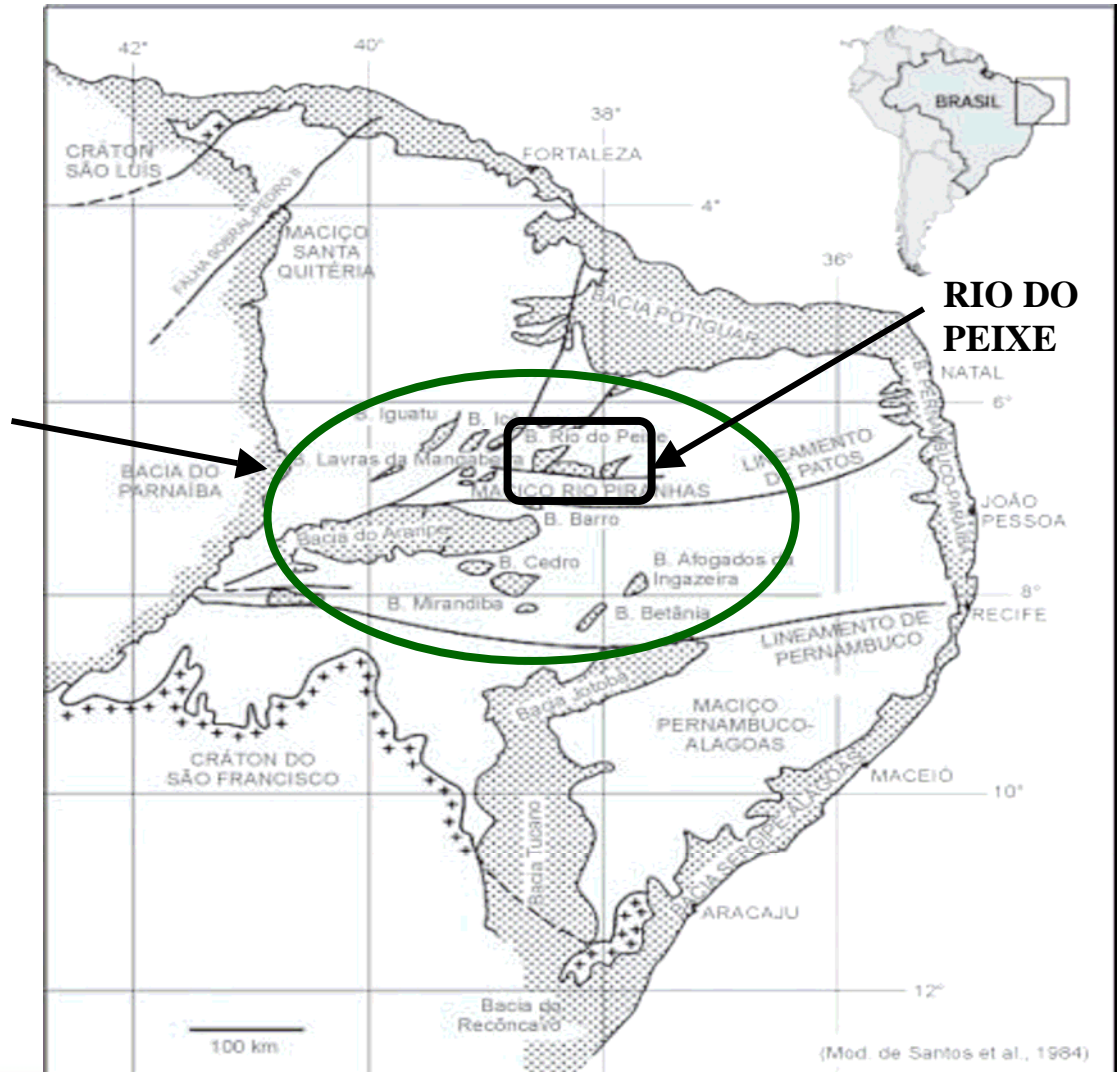
Drillhole LFst-1-PB location.

General Geology

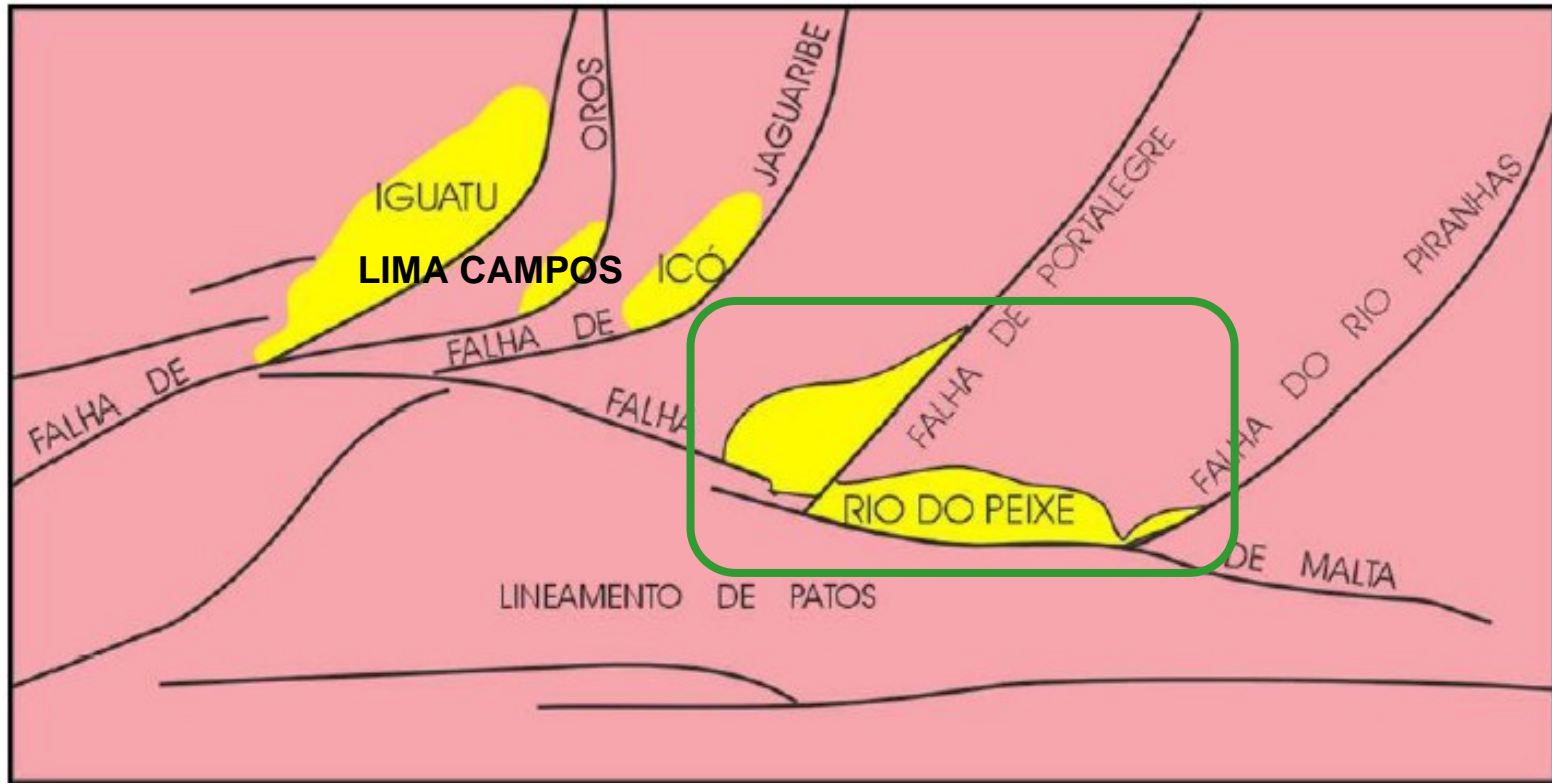
- **Within the cluster of the northeastern region minor cretaceous basins, remaining segments of larger basins that included them and should have attained greater thickness with an adequate burial for the oil generation.**
- **Structured in three south-dipping partly rotated semi-grabens (Triunfo, Sousa and Pombal sub-basins).**
- **Early Cretaceous age (Neocomian). Same tectonic-sedimentary cycle that gave rise to the Potiguar and Jatobá basins.**
- **Transcurrent tectonics, mainly transtensive/partly transpressive; main structures: horizontal, normal, oblique, rotational, reverse faults and open folds.**
- **Estimated sedimentary thickness: 2,000m at Triunfo; 1,700m and 1,075m at Sousa.**

Adjacent Basins

➤ Cluster of the Northeastern region main interior minor basins surrounded by larger basins nearby.

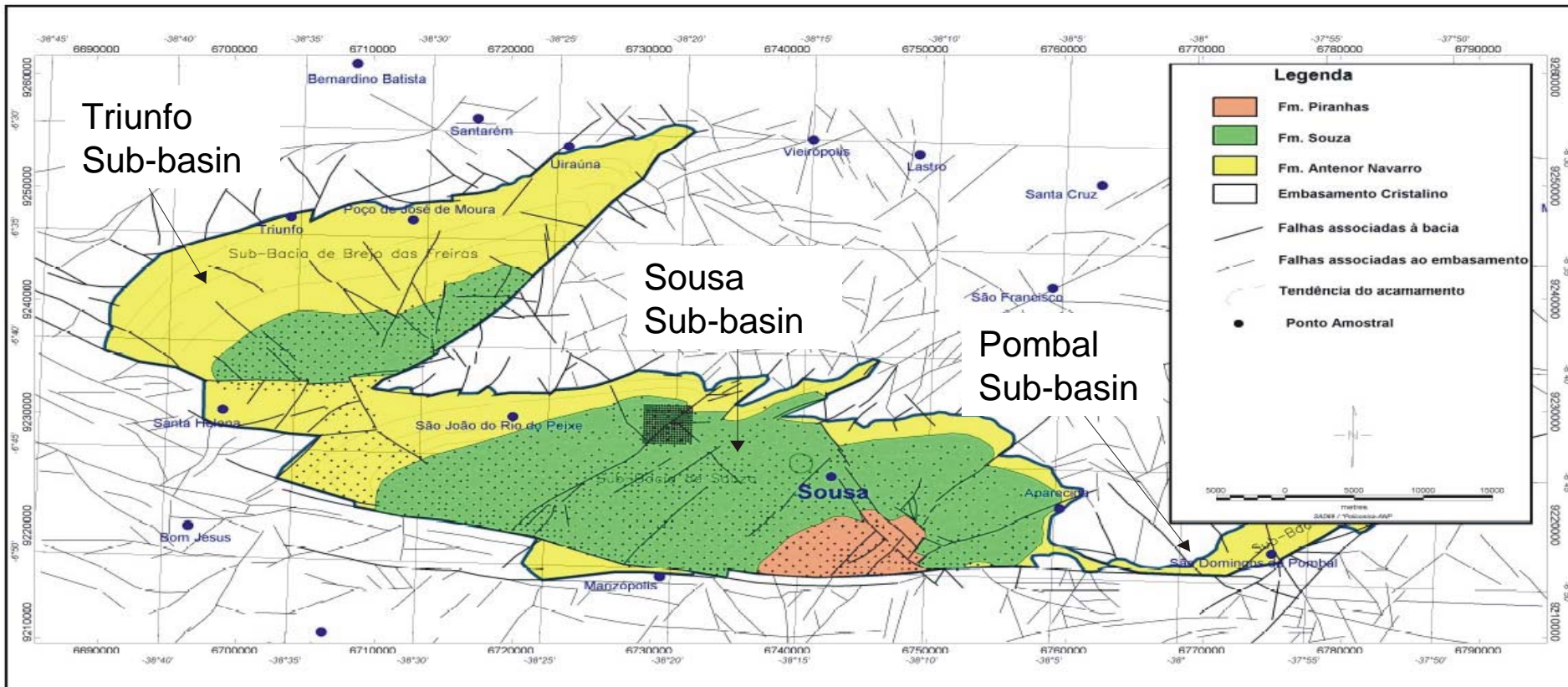


Main Regional Faults



Main regional faults that controlled subsidence and sedimentation in the Rio do Peixe Basin

Geochemical Sampling



Geological map and the sub-basins splitting.

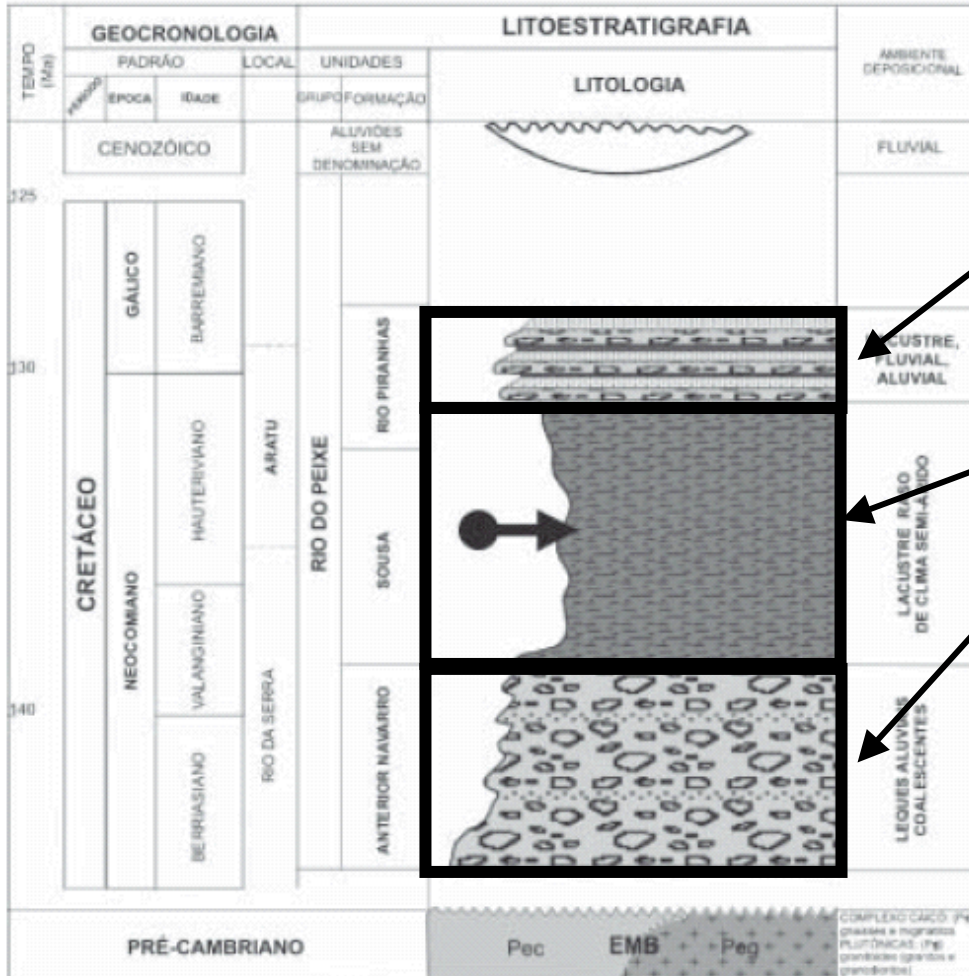
Dotted area indicates the ground geochemical sampling.

Bouguer Contour Lines



Bouguer anomaly contour lines delineating the main depocenters.

Stratigraphy



 Ocorrência do óleo analisado

Artenir Arivas Reef Formation:

- Neocomian -
- Neocomian -

Sousa Formation:

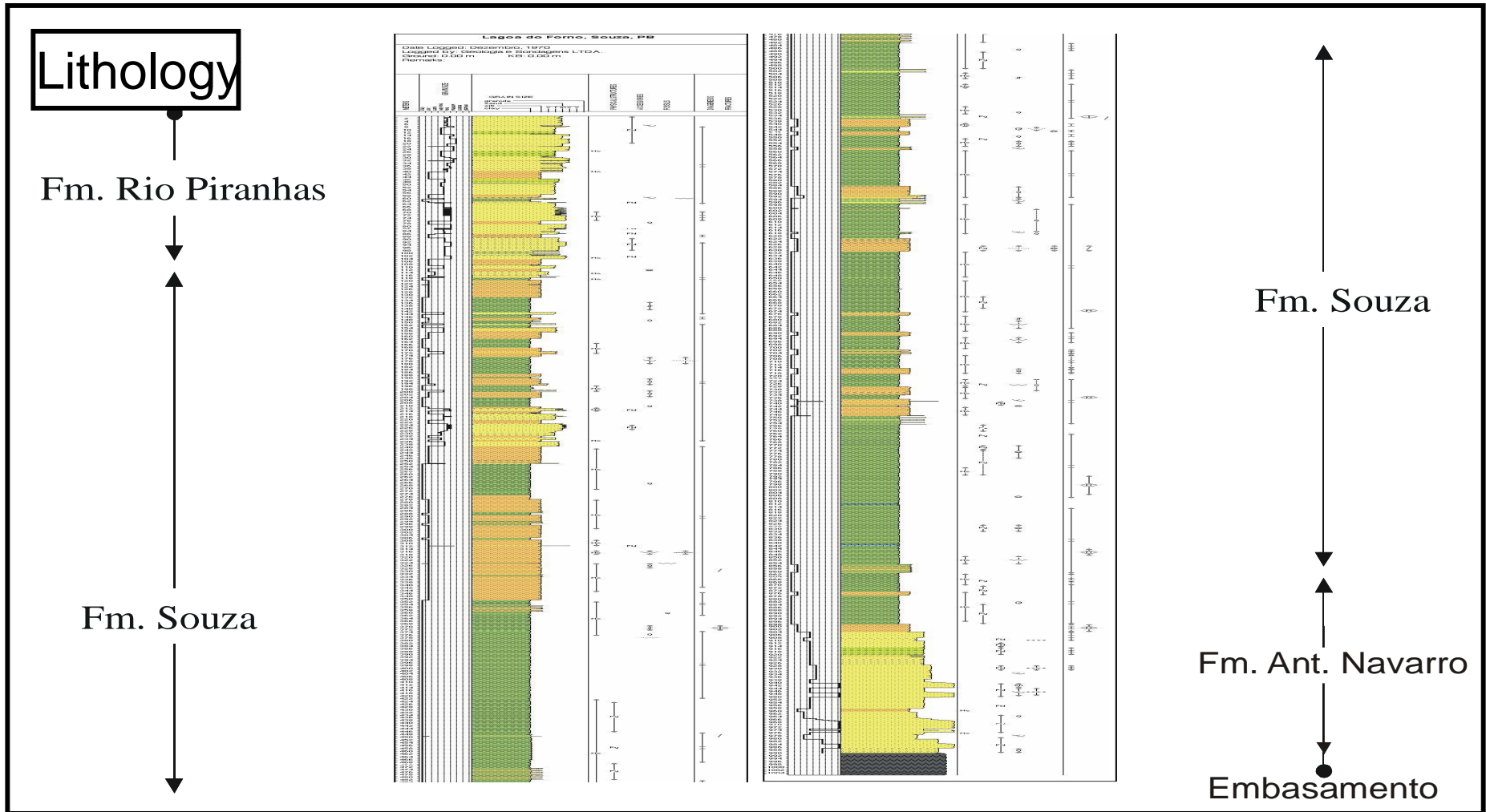
Upper: conglomeratic sandstones, clay matrix conglomerates
- Neocomian -
Unconformity, above cristalline Siltstones and argillites and fine grained sandstones
Lower: fine/medium sandstones and shale intercalations.

Environment: Shallow lacustrine, lacustrine, coarse and fine grained sandstones, siltstones, argillites
Environment: lacustrine, fluvial, flood plain, meandering fluvial, aluvial

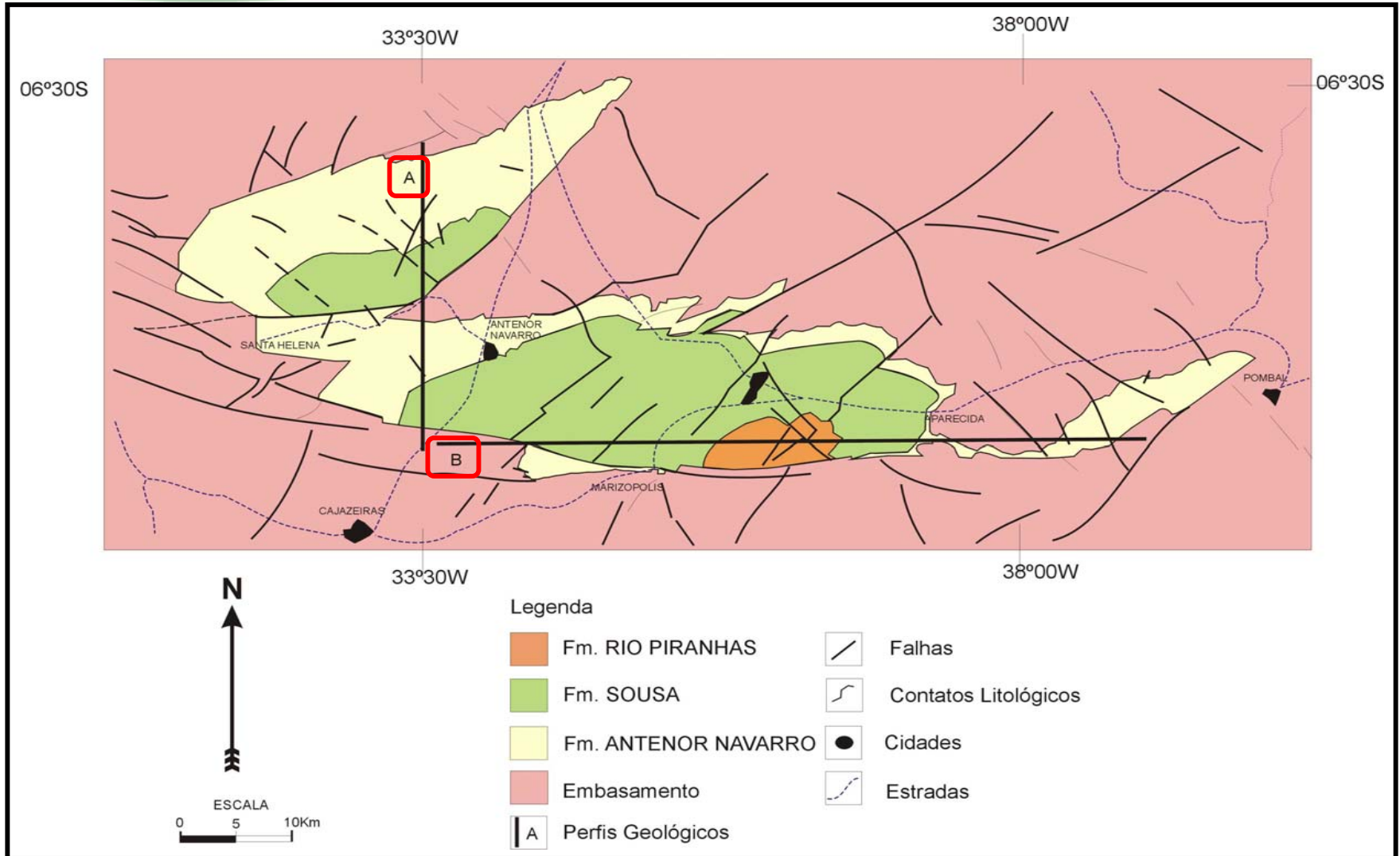
Environment: aluvial fans, braided fluvial and lacustrine.

Stratigraphy

LFst-1-PB (Lagoa do Forno)



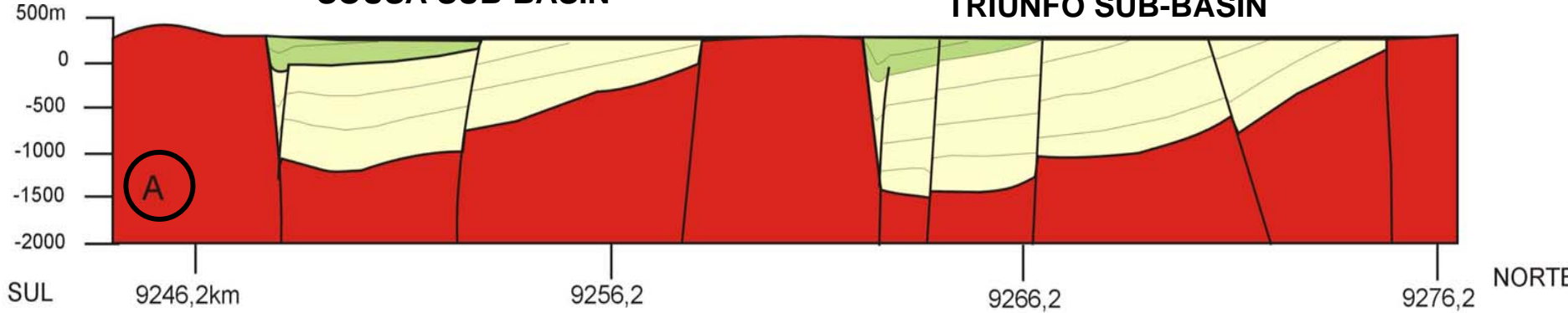
Geological Sections Location



Geological Sections

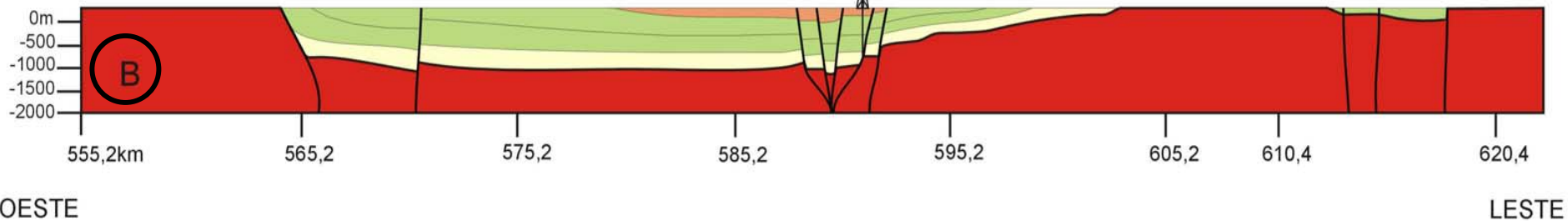
SOUSA SUB-BASIN

TRIUNFO SUB-BASIN



SOUSA SUB-BASIN

POMBAL SUB-BASIN



 EMBASAMENTO

 FORMAÇÃO ANTENOR NAVARRO

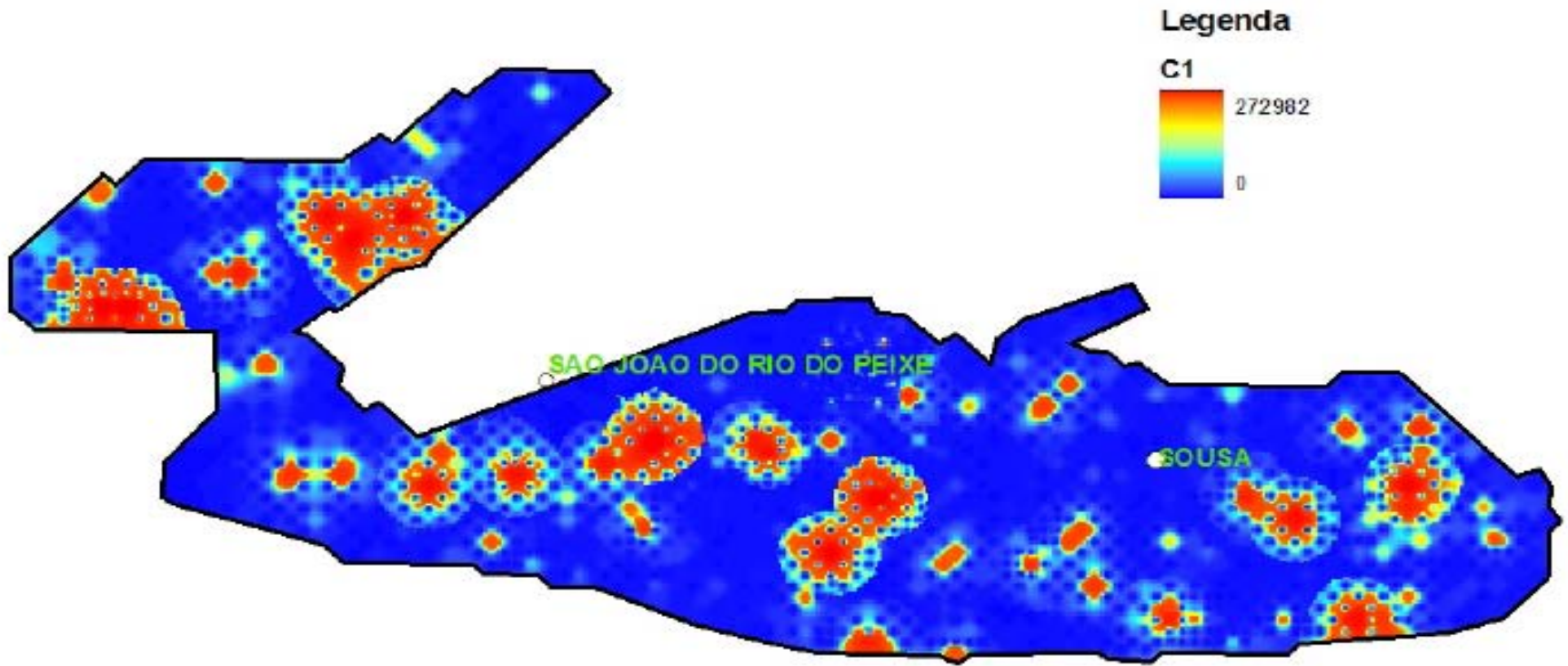
 FORMAÇÃO SOUSA

 FORMAÇÃO RIO PIRANHAS

 POÇO ESTRATIGRÁFICO

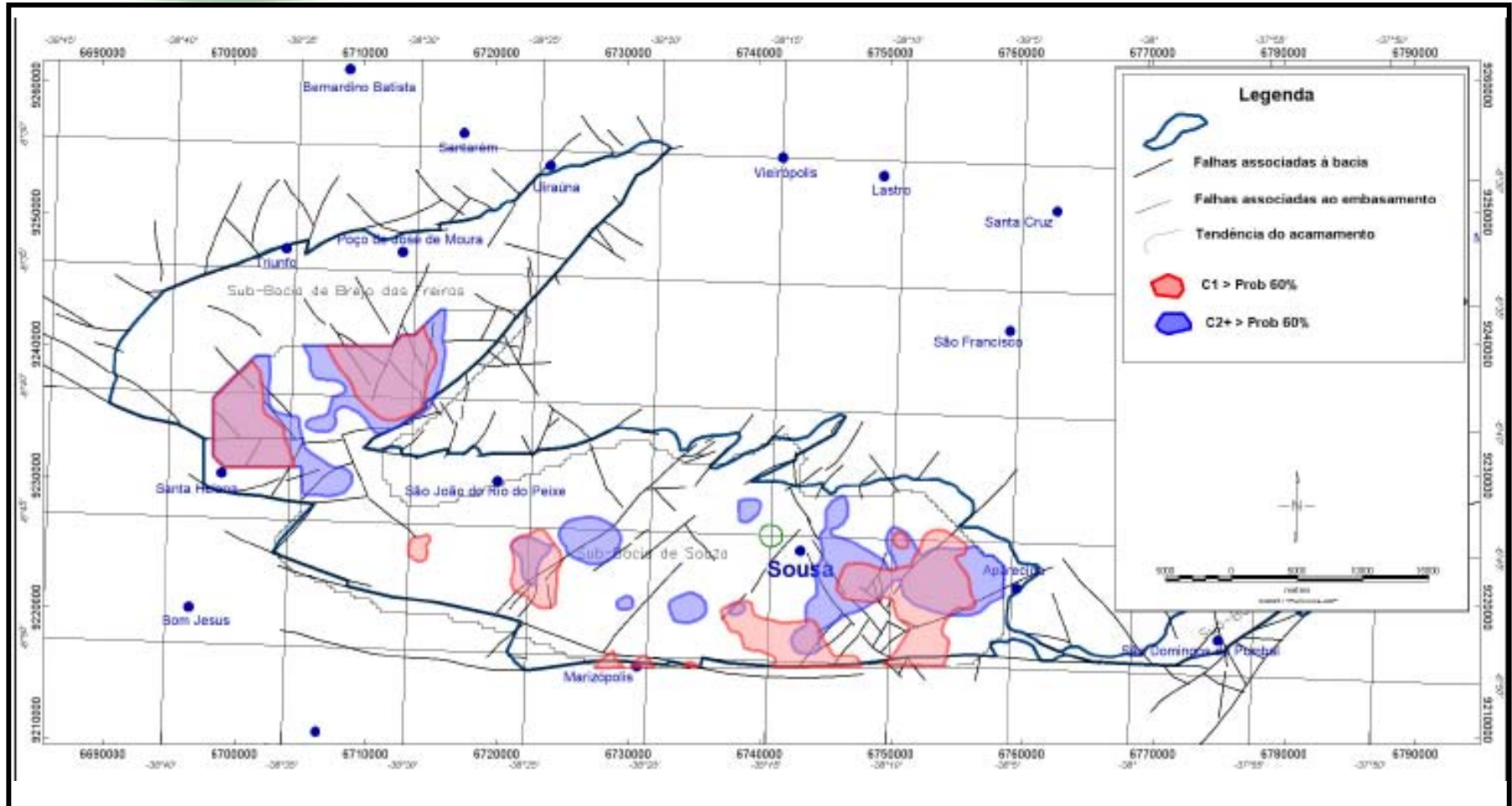
SOIL SAMPLING GEOCHEMISTRY RESULTS

Methane Concentration



Map of methane concentrations obtained from analyzed samples (headspace)

Combined C1 e C2+ Map



Combined map of methane (C1) and heavier hydrocarbons (C2+) anomalies



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SEISMIC



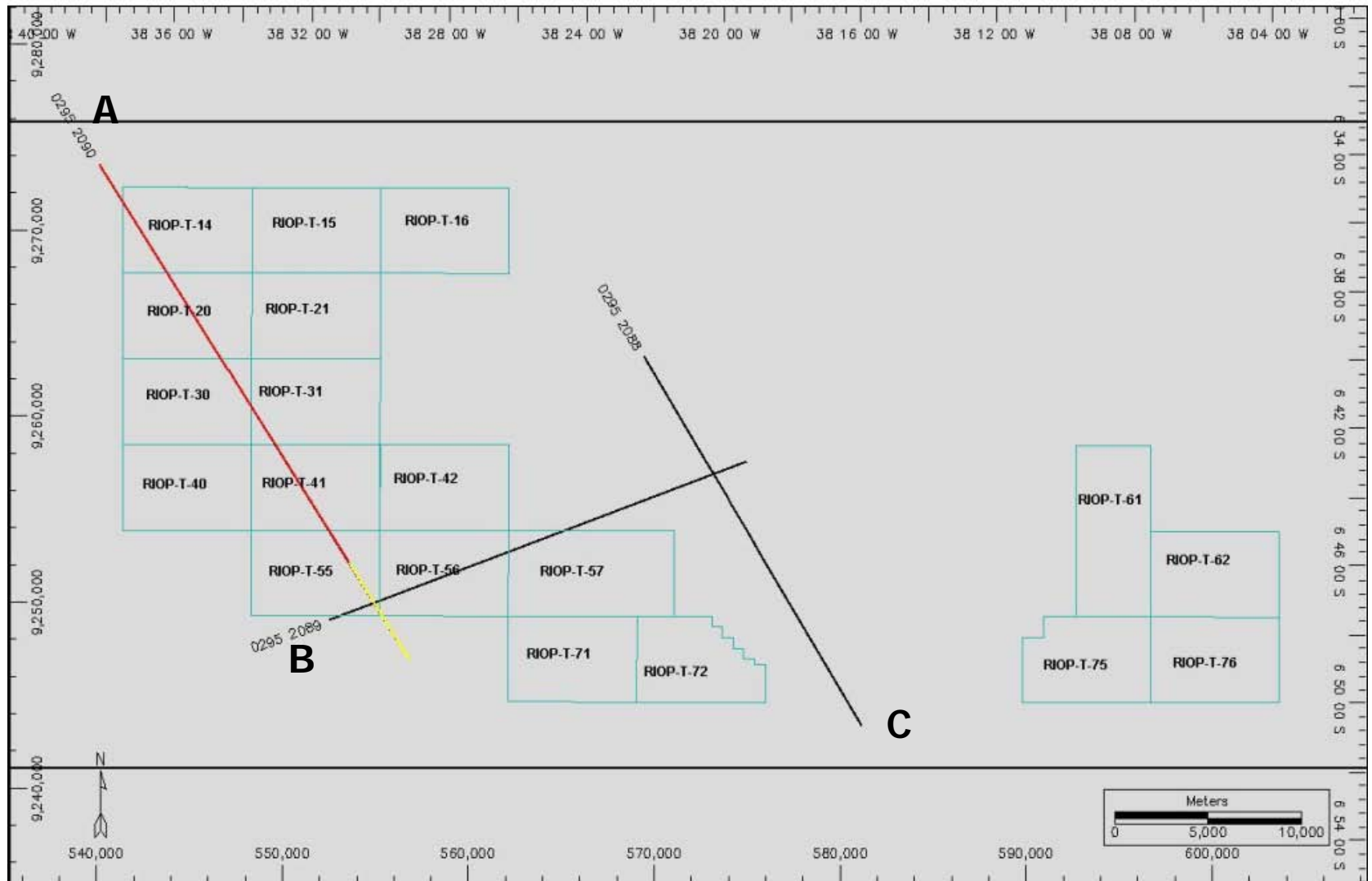
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Seismic Survey

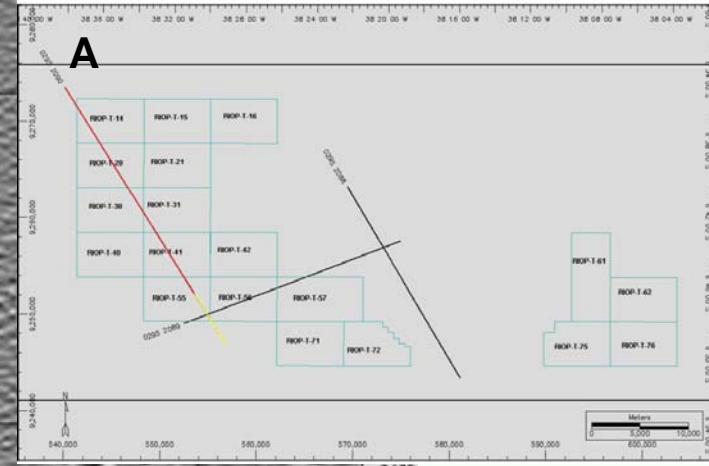
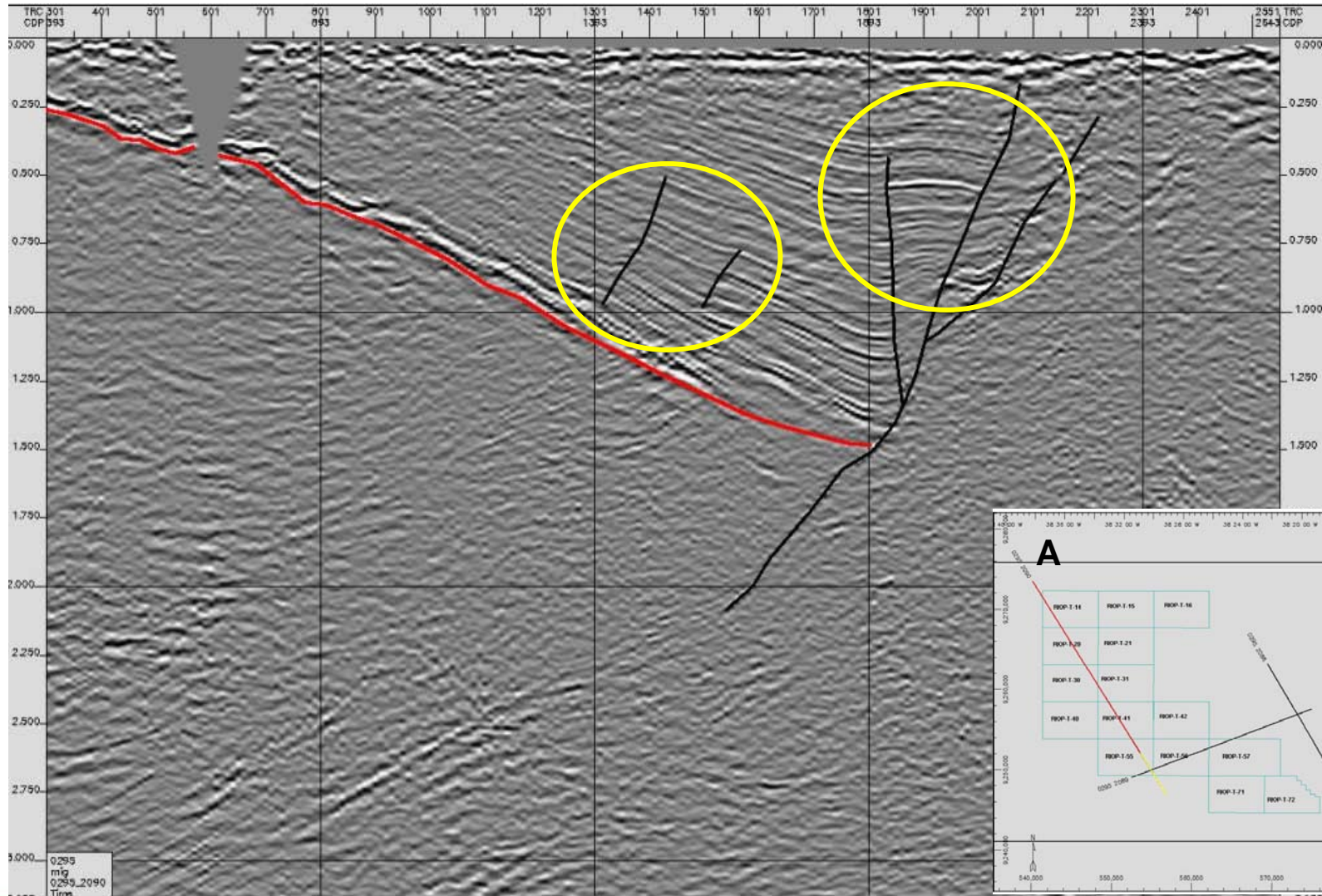
- A joint effort of Universidade Federal do Rio Grande do Norte (UFRN), Petrobras and Brain Tecnologia produced the first seismic survey in the basin.

- Three 2D seismic lines, reaching 80 km length, were surveyed in the Sousa county region.

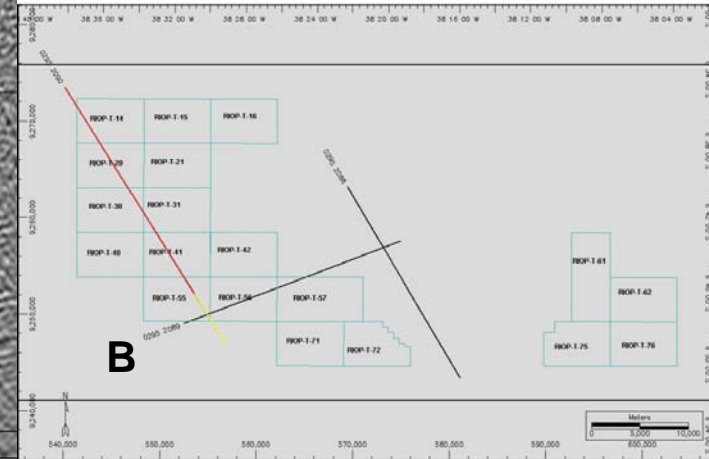
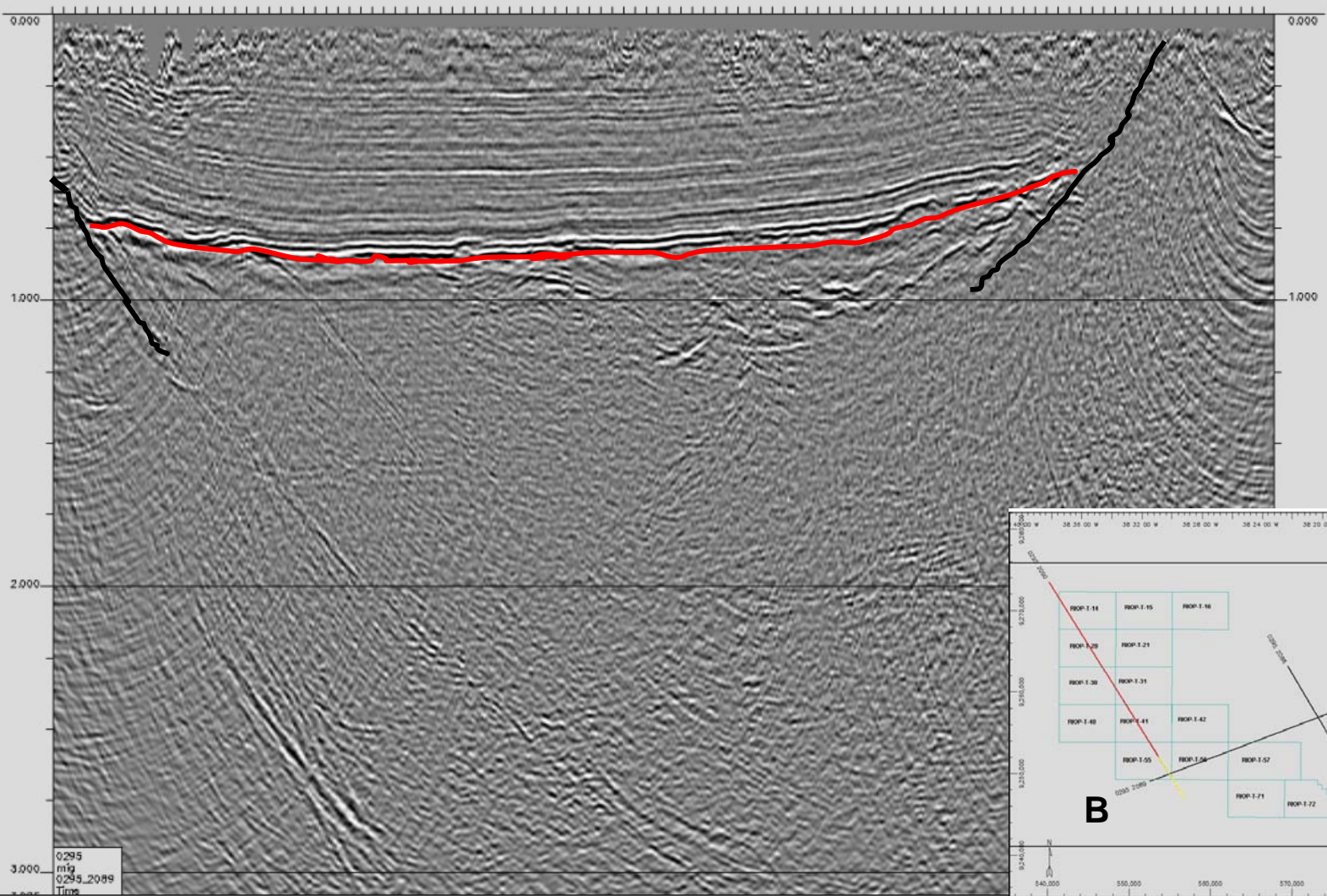
Seismic Lines Location



Seismic Line (A)



Seismic Line (B)





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PETROLEUM SYSTEMS

Petroleum Systems

- Source rocks: Black shales: Sousa Formation (Neocomian)
- Reservoir: Sandstones: Sousa Formation (Neocomian)
Sandstones: Antenor Navarro Formation (Neocomian)
- Migration: Subvertical/vertical faults, direct contact, carrier beds
- Seals: Pelites and Limestones: Sousa Formation (Neocomian)
- Traps: Structural, Stratigraphic and Paleogeomorphic

Archaeological Registration in the Sousa Sub-Basin

- Neocomian -

➤ **Dinosaur footprint in the Sousa Formation, on which early age estimations of the basin sediments were made.**

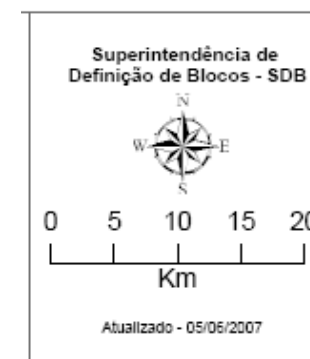
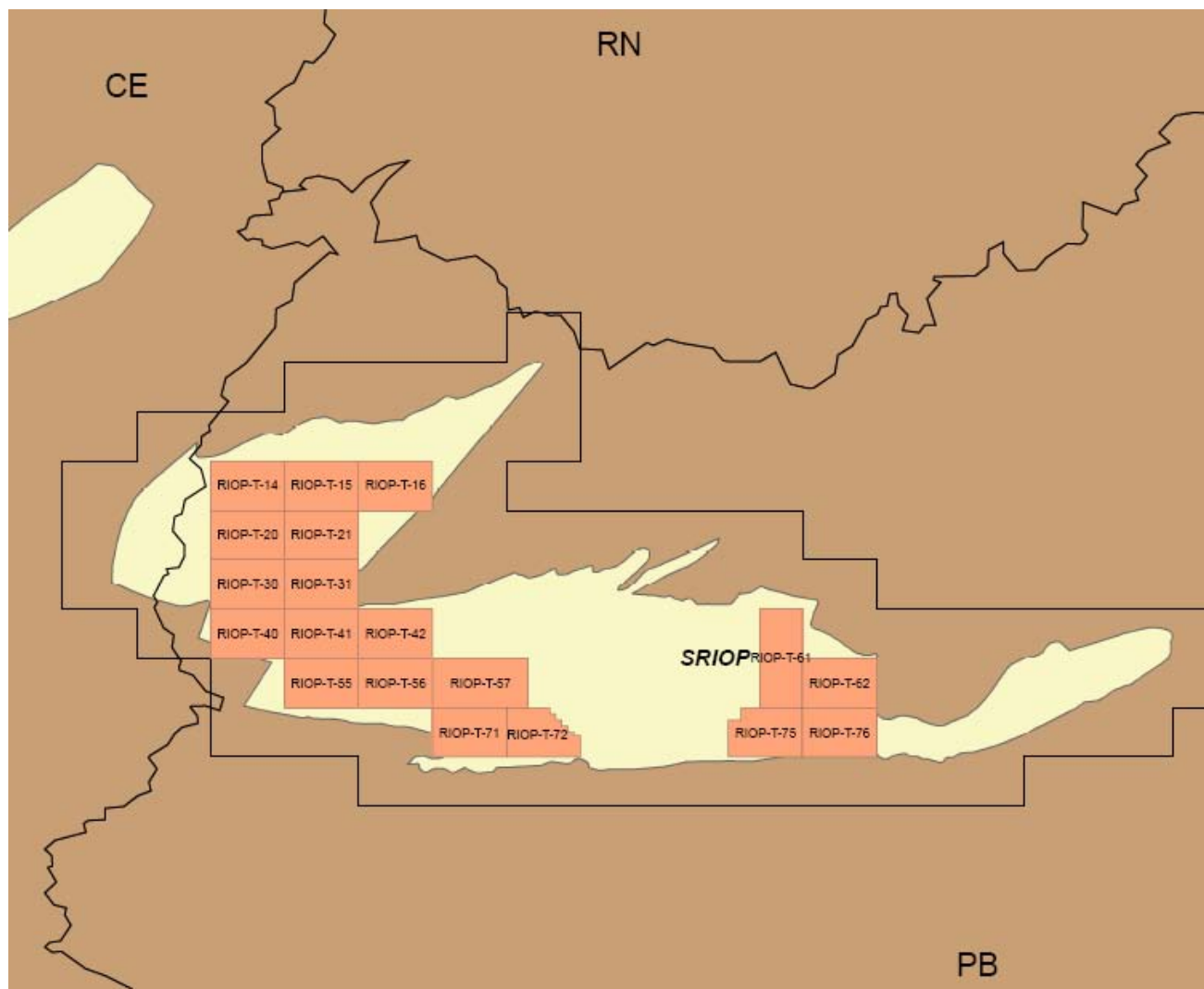
➤ **Unit of Conservation. Natural monument is worth of the dinossauros, Sousa-PB**



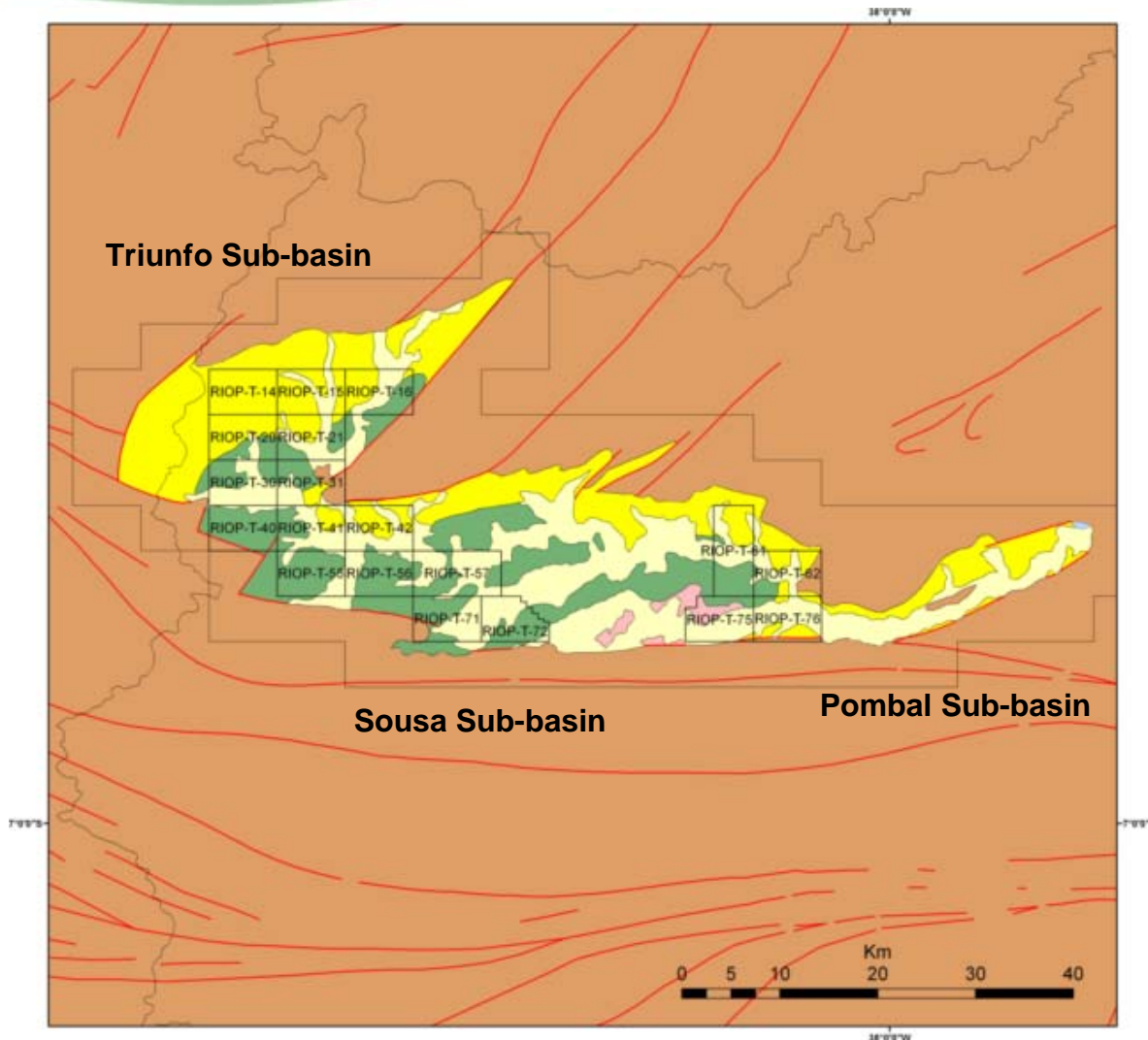
OFFERED AREAS

Offered Blocks

- SRIOP Sector -



Offered blocks - SRIOP Sector Geological Map





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EXPLORATORY INFORMATION



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EXPLORATORY INFORMATION

SECTOR

SRIOP

Exploratory Class

New Frontier

Number of blocks

19

Area of block

30 km²

Total Bid Area

~ 613 km²

Exploration Phase

4 years

Exploratory Period

3 + 1 years

Operator Technical Qualification

C

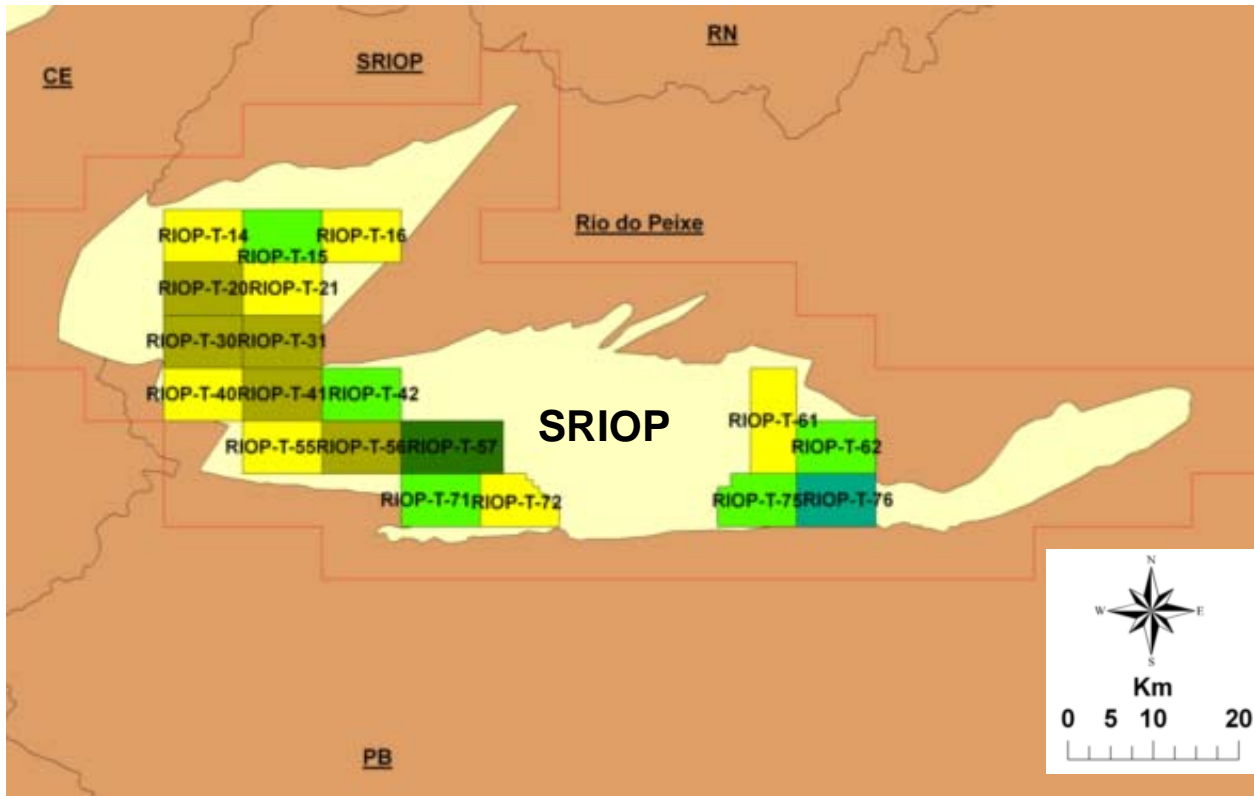
Minimum Bonus

R\$ 8,000.00 to R\$ 22,000.00

Minimum Target

Sousa Formation (Neocomian)

Offered Blocks with Minimum Bonus Value SRIOP Sector



-  Block - R\$8.000
-  Blocks - R\$10.000
-  Blocks - R\$13.000
-  Blocks - R\$16.000
-  Block - R\$22.000
-  Sector
-  Rio do Peixe Basin

Data Package

- Well Report
- Seismic Data: 3 lines
- Geochemical Survey Report



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FINAL REMARKS

Final Remarks

- The Rio do Peixe Basin is situated in an attractive group of medium size mesozoic sedimentary basins, where production and shows of hydrocarbon has been reported.
- Suitable rocks for oil generation occurs in the sedimentary section.
- Adequate geological, technical, economic and operational conditions for small/medium sized companies.
- System Proven Petroleum.



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<http://www.brasil-rounds.gov.br>

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