

Diving into the Pelotas Basin (Uruguay): Geology and Prospectivity

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Houston, February 8th, 2024

Offshore Uruguay basins



Two main basins are recognized offshore Uruguay in an area of 125,000 km²:

1. Punta del Este to the West
 - Two wells drilled in 1976
2. Pelotas Basin to the East
 - One well drilled in 2016

In shallow waters Punta del Este and Pelotas basins are separated by the Polonio basement high.

Genesis of Uruguayan offshore basins

Upper Jurassic (155Ma)



Modified from Scotese, (2014)

Early K – Barremian (130 Ma)



Modified from Scotese, (2014)

Early K - Aptian (120 Ma)



Modified from Scotese, (2014)

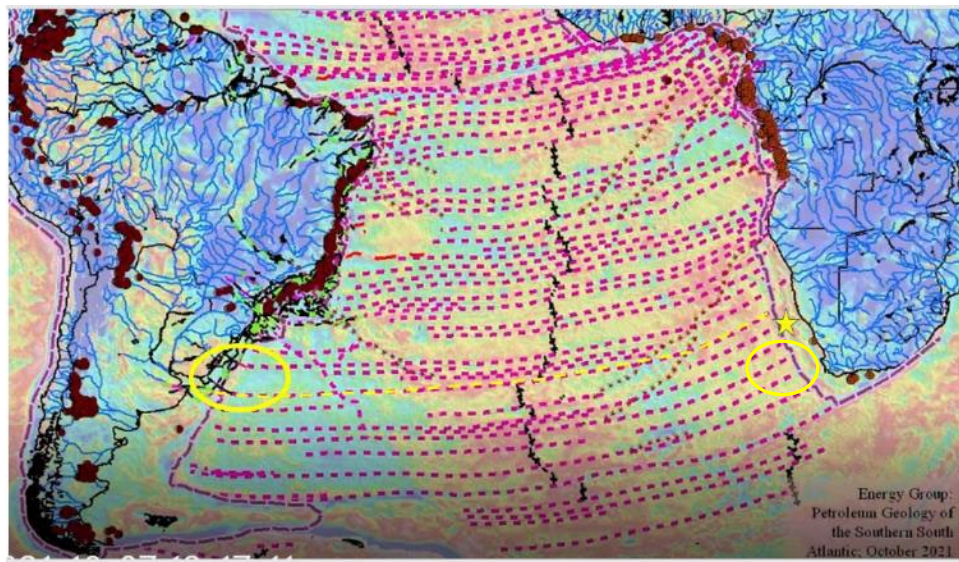
Genesis in common with the southwestern African basins: linked to the Gondwana breakup and the opening of the Atlantic Ocean.

Genesis of Uruguayan offshore basins

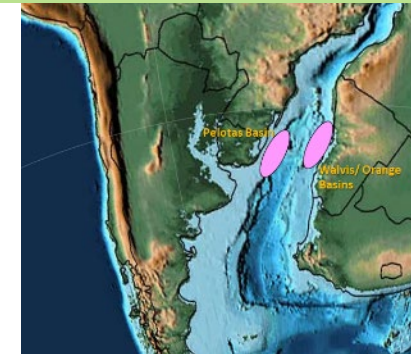
Early K – Barremian (130 Ma)



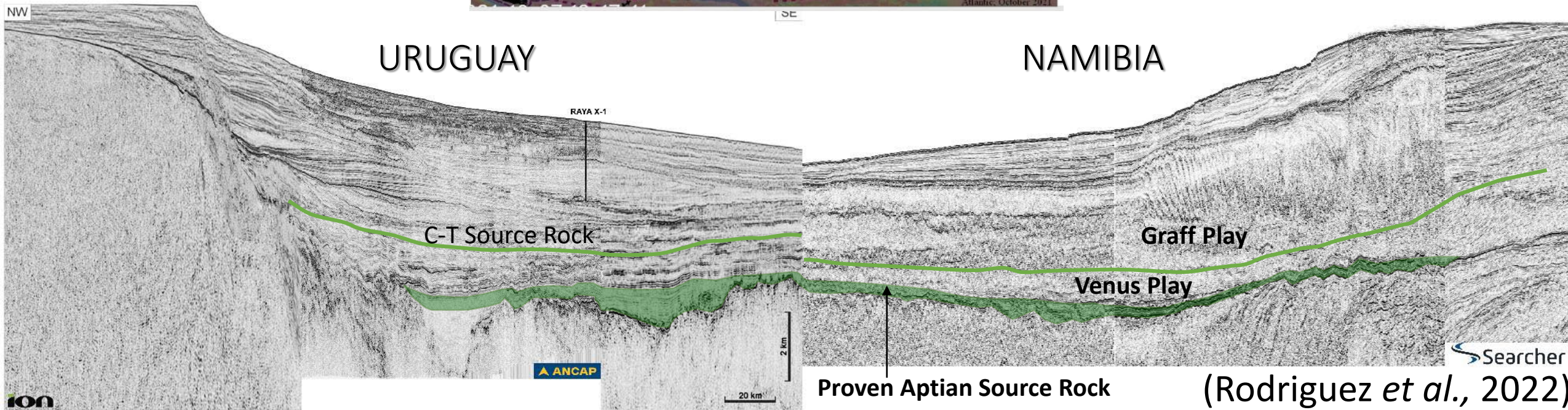
Modified from Scotese (2014)



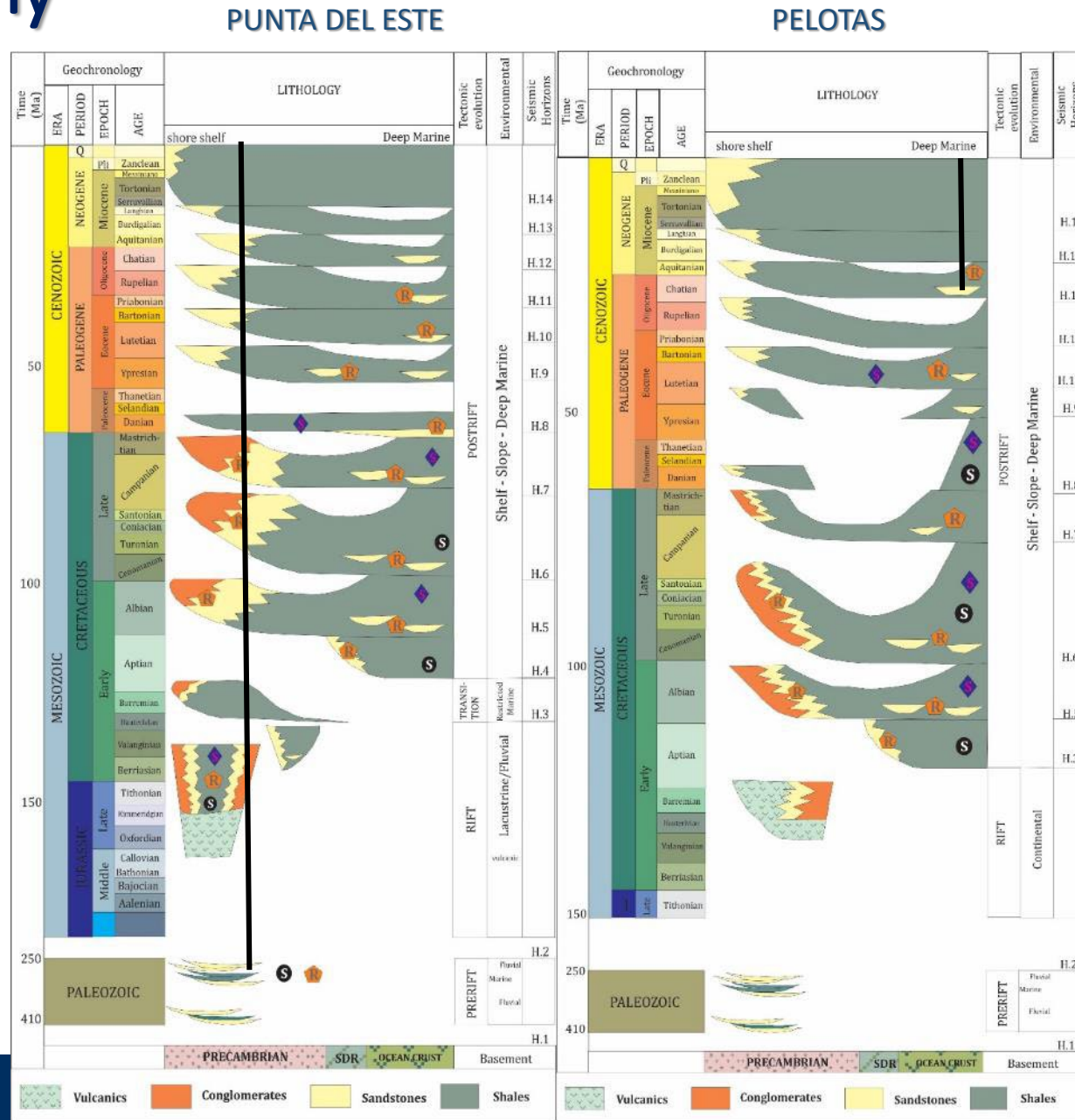
Early K - Aptian (120 Ma)



Modified from Scotese (2014)



Stratigraphy

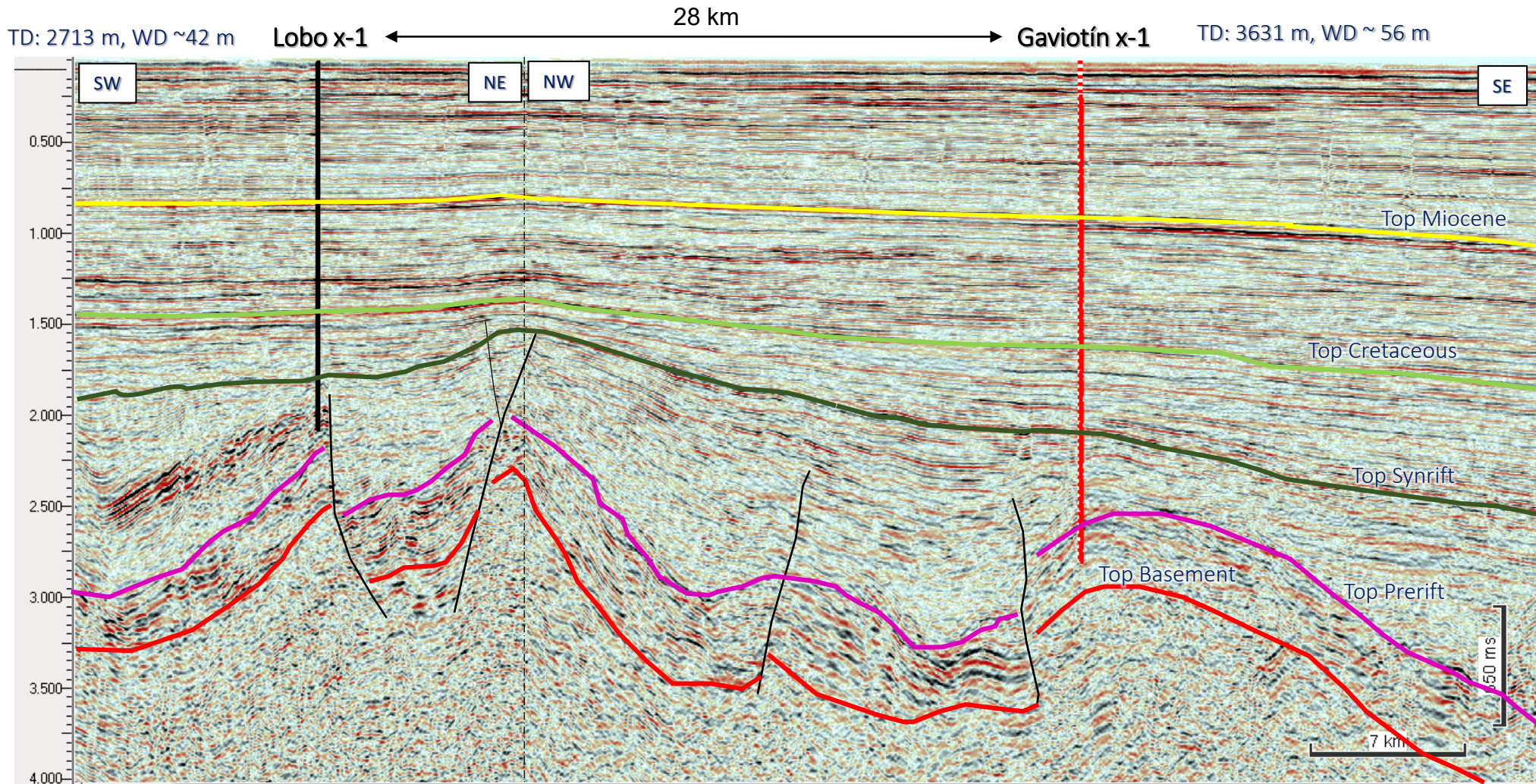


POSTRIFT Development of marine conditions: cycles of transgressions and regressions (Aptian to present day)

SYNRIFT Upper Jurassic to Lower K (Half-grabens and SDR's)

PRERIFT Preserved remnants of Paleozoic basin

Wells: Lobo and Gaviotín

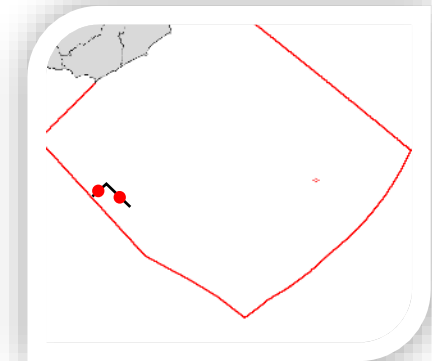


Year drilled: 1976

Company: Chevron

Targets: Faulted blocks and anticlines structures of synrift sequence.

Result: Both dry wells, with gas shows and fluid inclusions.

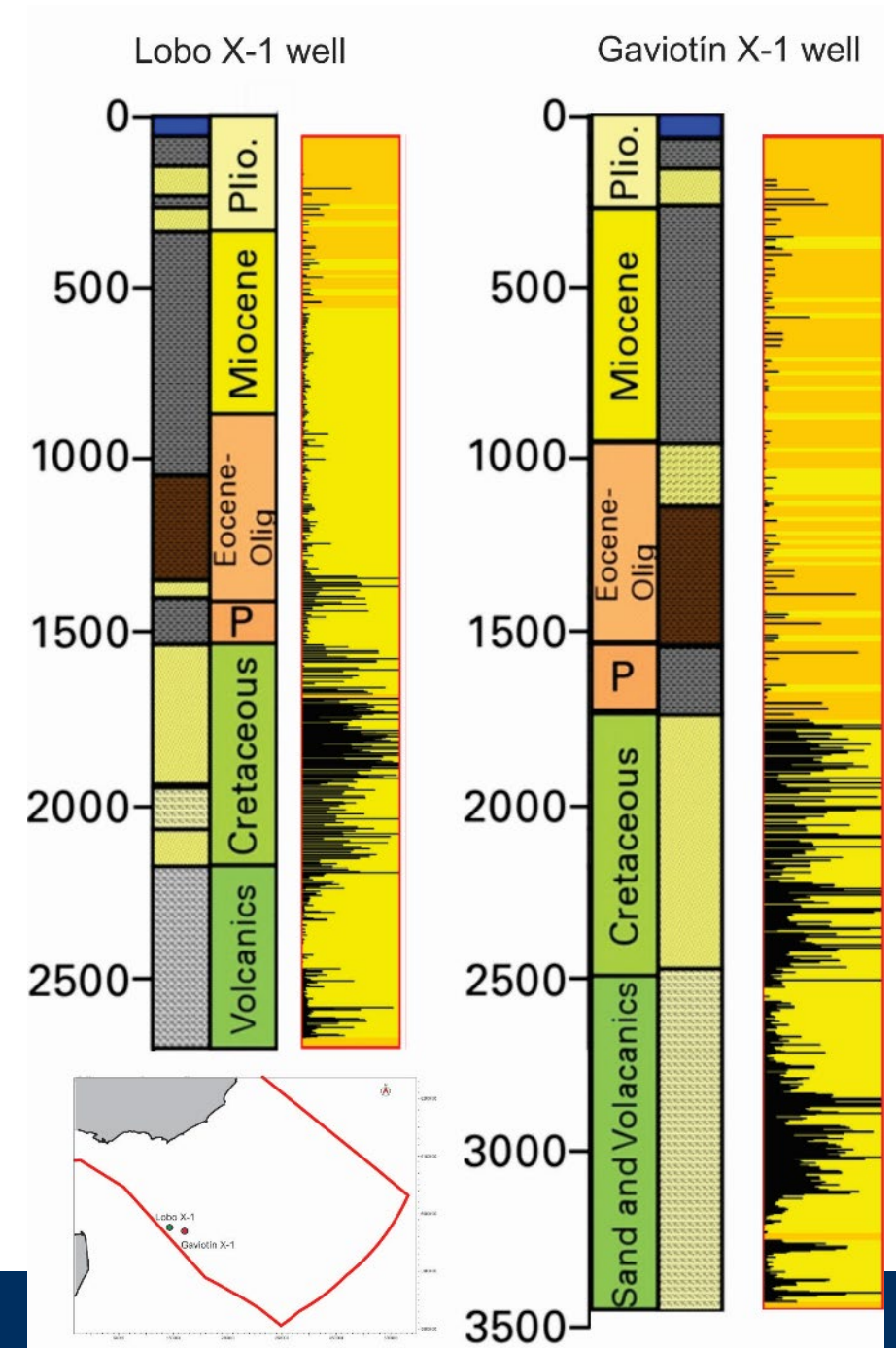


Both wells are located in a proximal region of the Punta del Este basin

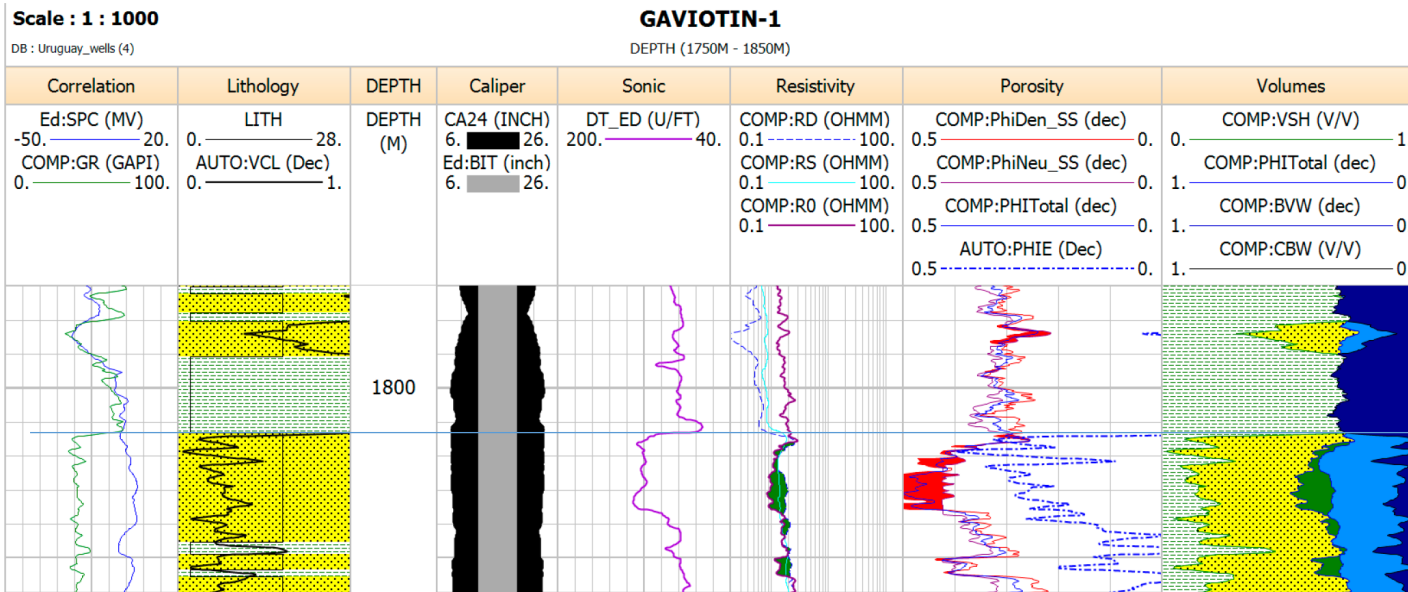
Wells: Lobo and Gaviotín

Fluid inclusions study in Lobo and Gaviotín cuttings made by FIT in 2011:

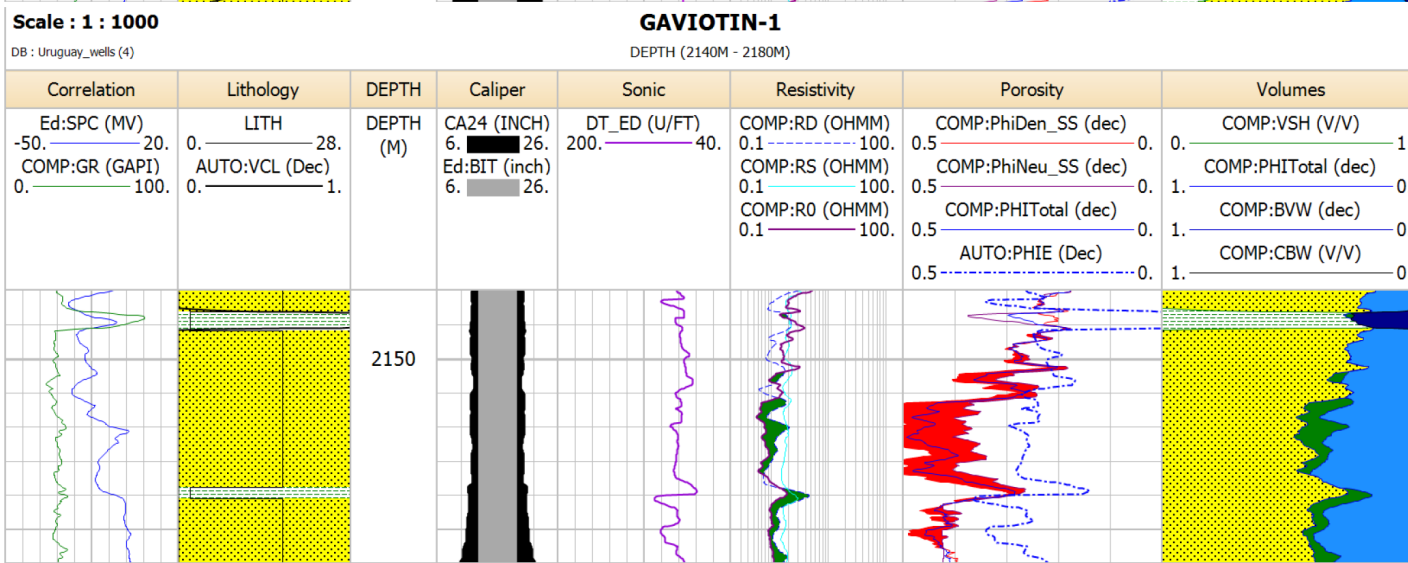
- Dry gas anomalies in each well in Jurassic, Cretaceous and Tertiary levels.
- Low, moderate and high gravity oil inclusions were found.
- Efficiency of the regional seal (Maastrichtian-Paleocene transgression) is evident from the available data.
- The results demonstrate the generation of native hydrocarbons, migration pathways and the existence of paleo-hydrocarbon accumulations (presence of an active petroleum system).



Wells: Lobo and Gaviotín



KT

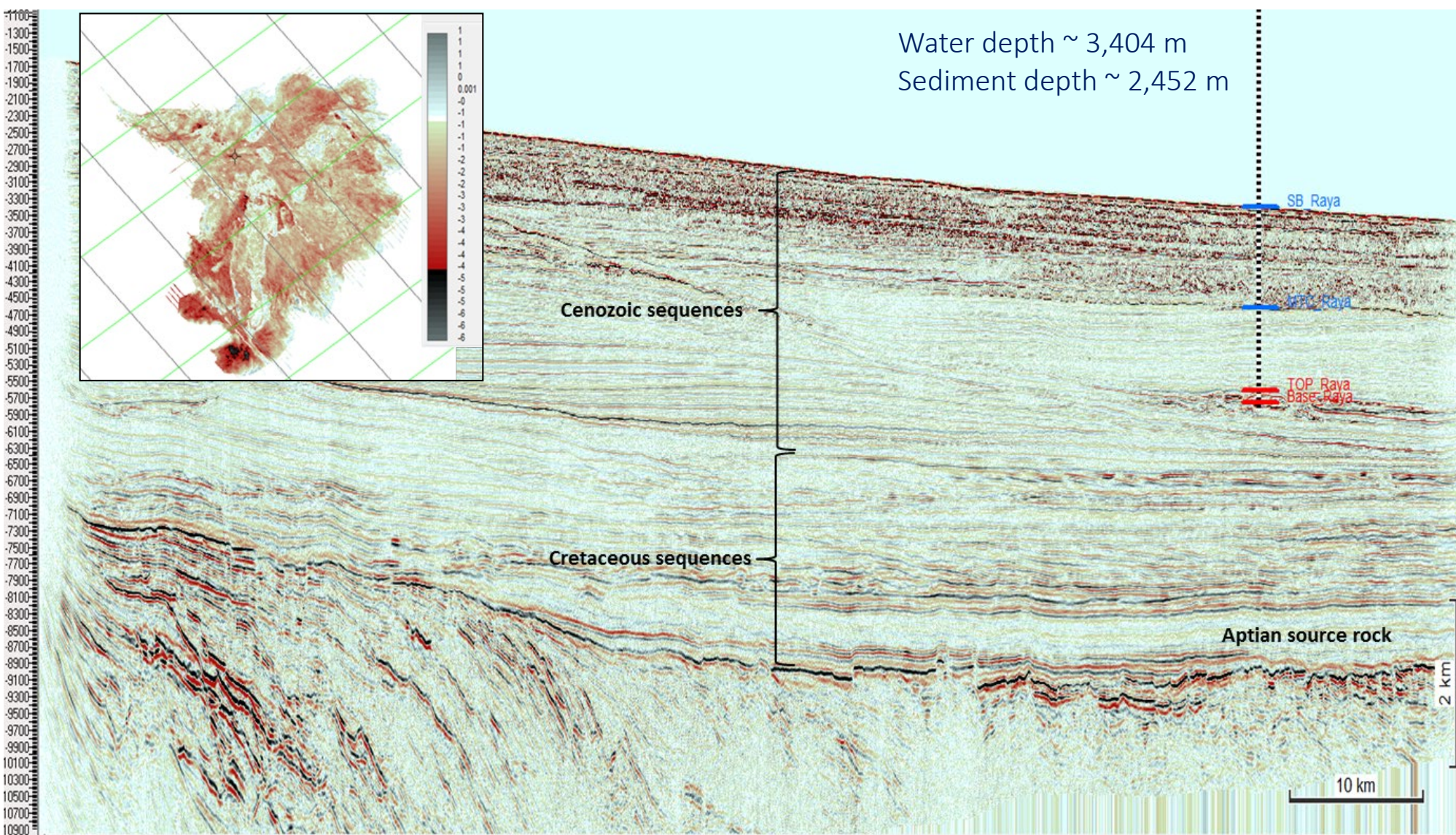


(Rodríguez, 2019)

Gaviotin-X1 Neutron-Density porosities logs crossovers:

- Potential gas indications
- Located within the **Cretaceous sequence**: the first one is located below the Cretaceous-Tertiary boundary and the second one is located 350 m below.
- There is a **shale interval** at the top that act as a **seal**.

Wells: Raya



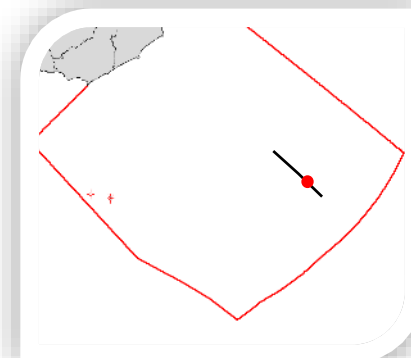
Year drilled: 2016

Company: TOTAL

Target: Oligocene turbidite

Results:

- Water bearing reservoir.
- No gas shows.
- No fluid inclusions.
- 135 m thick turbidite fan with 24% porosity.



Pelotas Basin – Source Rocks

- Aptian SR from seismic correlation with offshore Namibia
- Turonian SR could be also correlated from offshore Namibia and Brazil

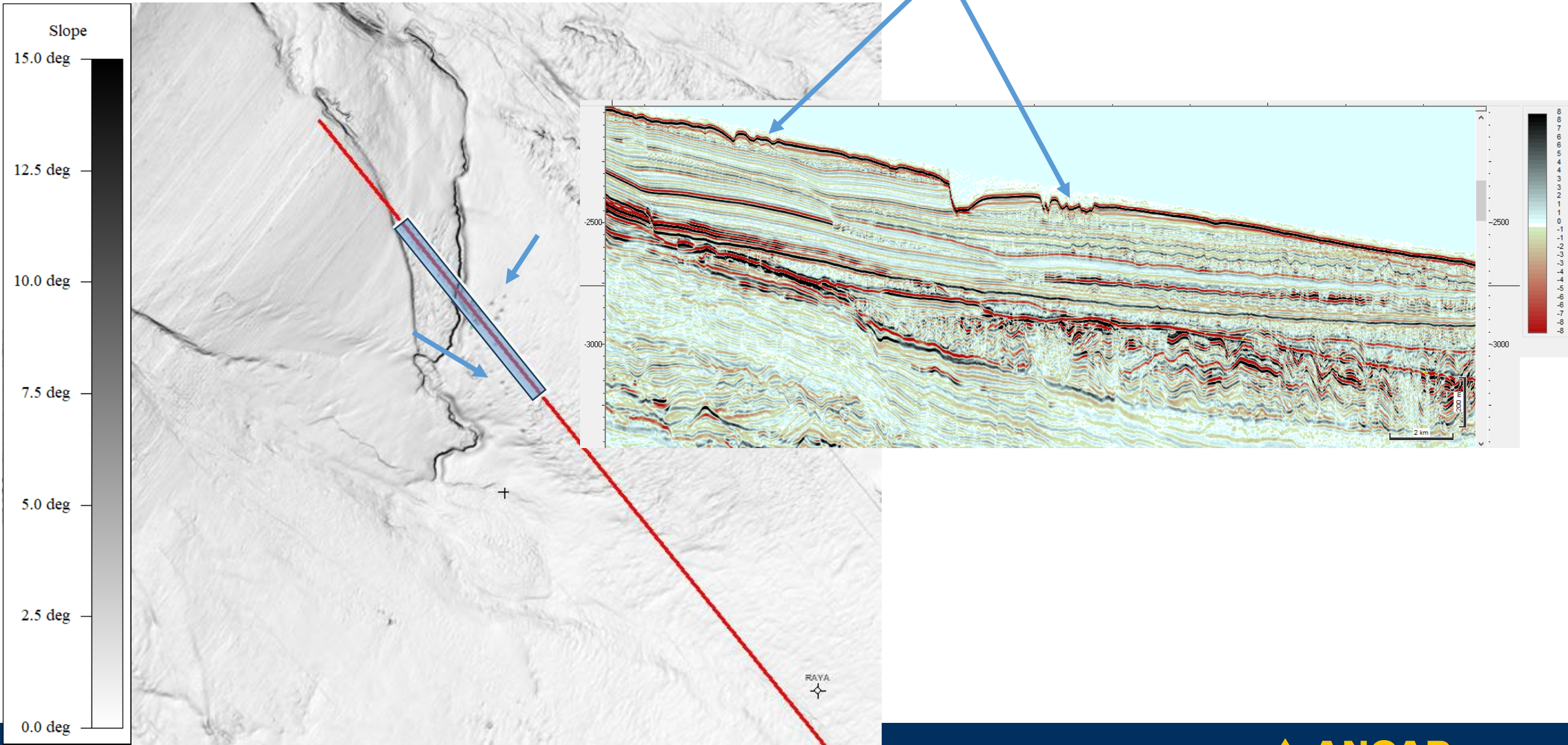
SR seismic evidences

- ✓ Regional high amplitude soft kick events
- ✓ AVO Type IV anomalies
- ✓ DHIs at reservoir levels (support HC generation and expulsion)
- ✓ Fluid escape features: pockmarks and gas chimneys
- ✓ BSRs

Non seismic evidences:

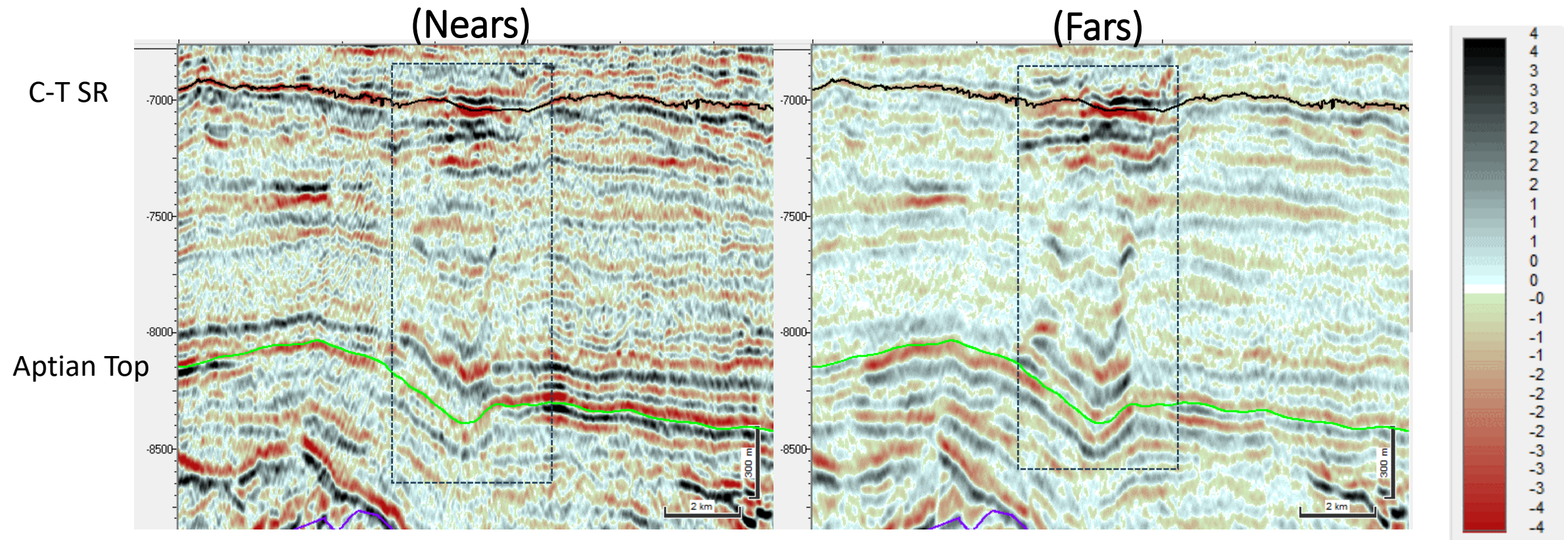
- ✓ Microseeps and Oil Slicks

Pockmarks

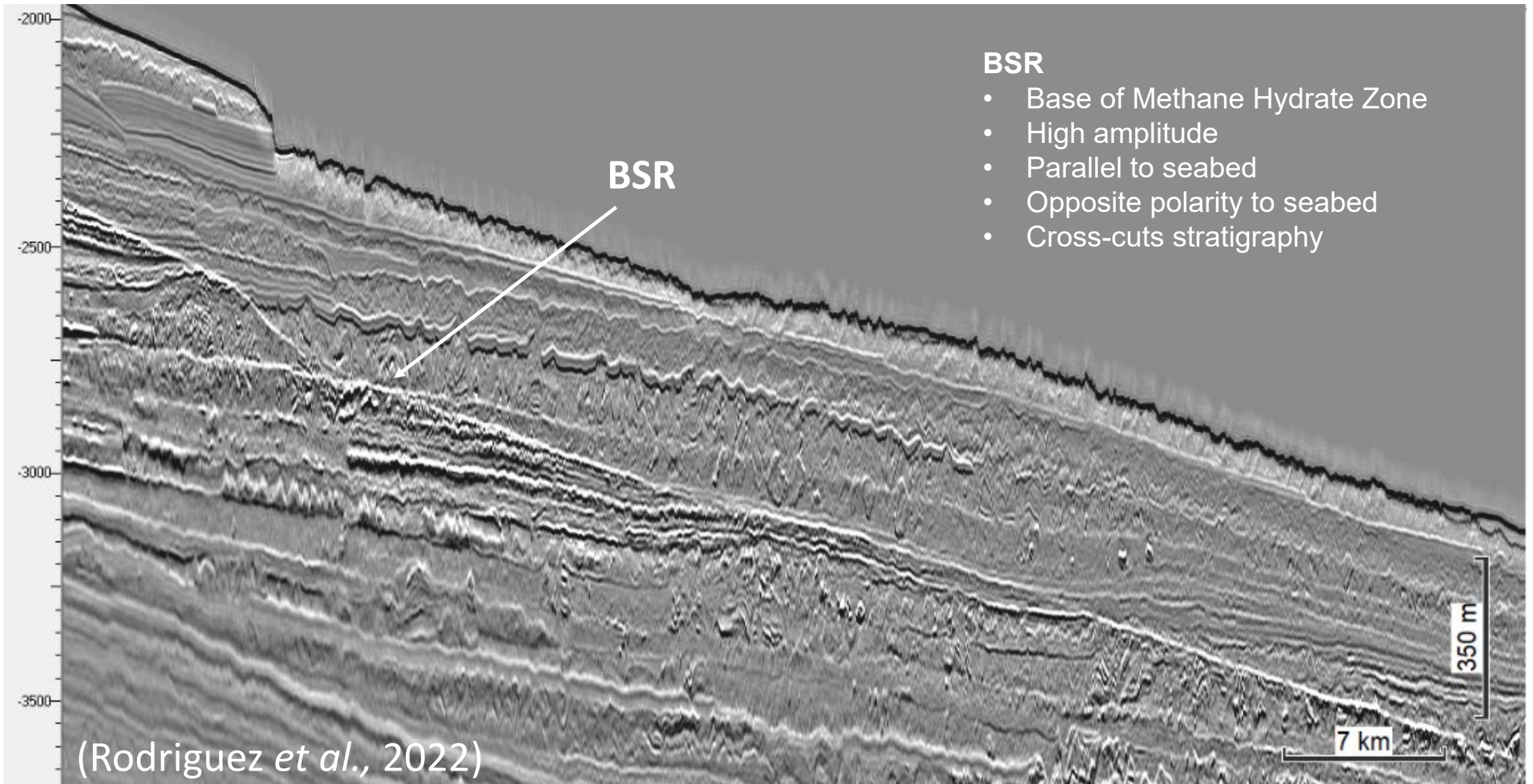


Gas Chimneys

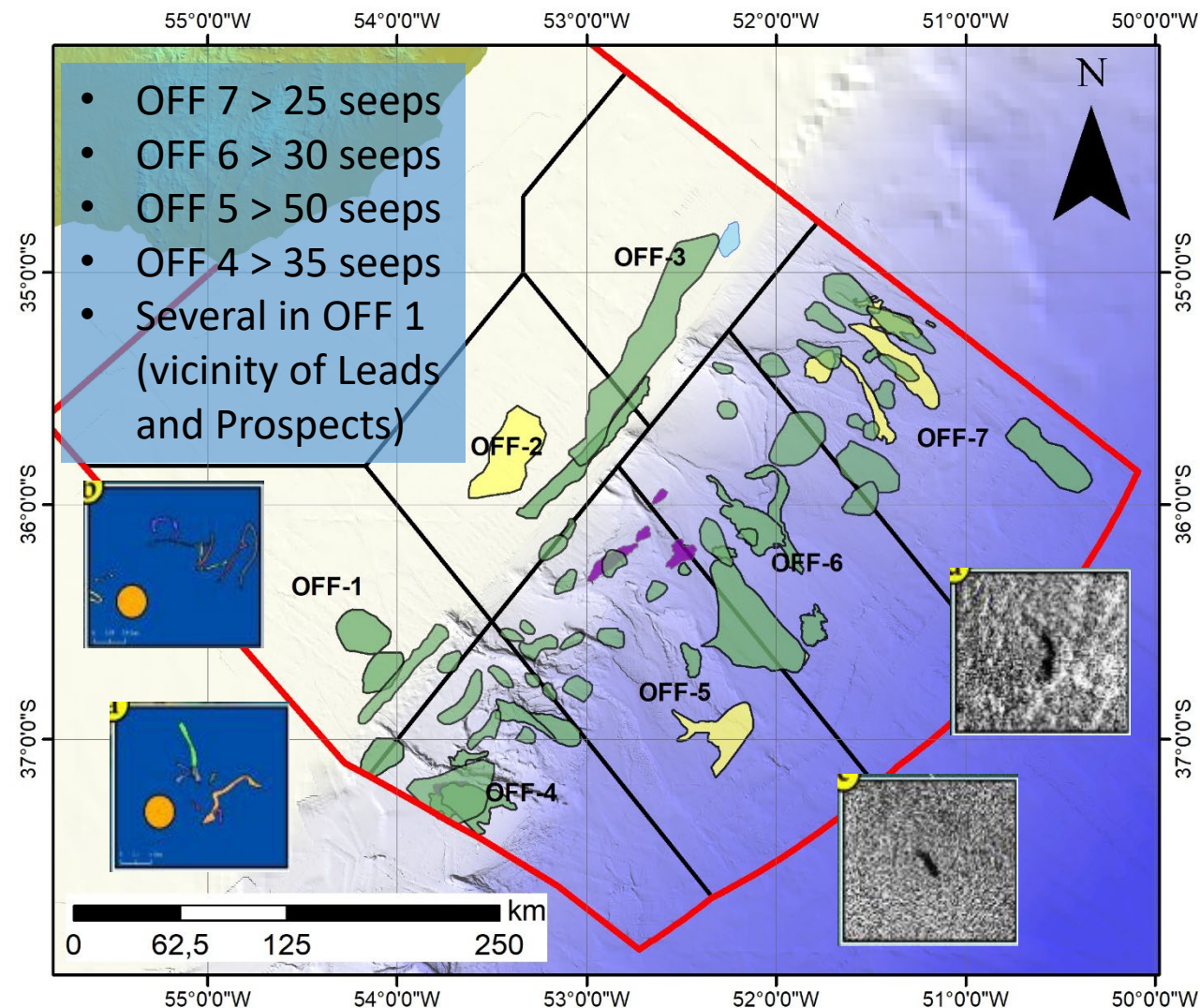
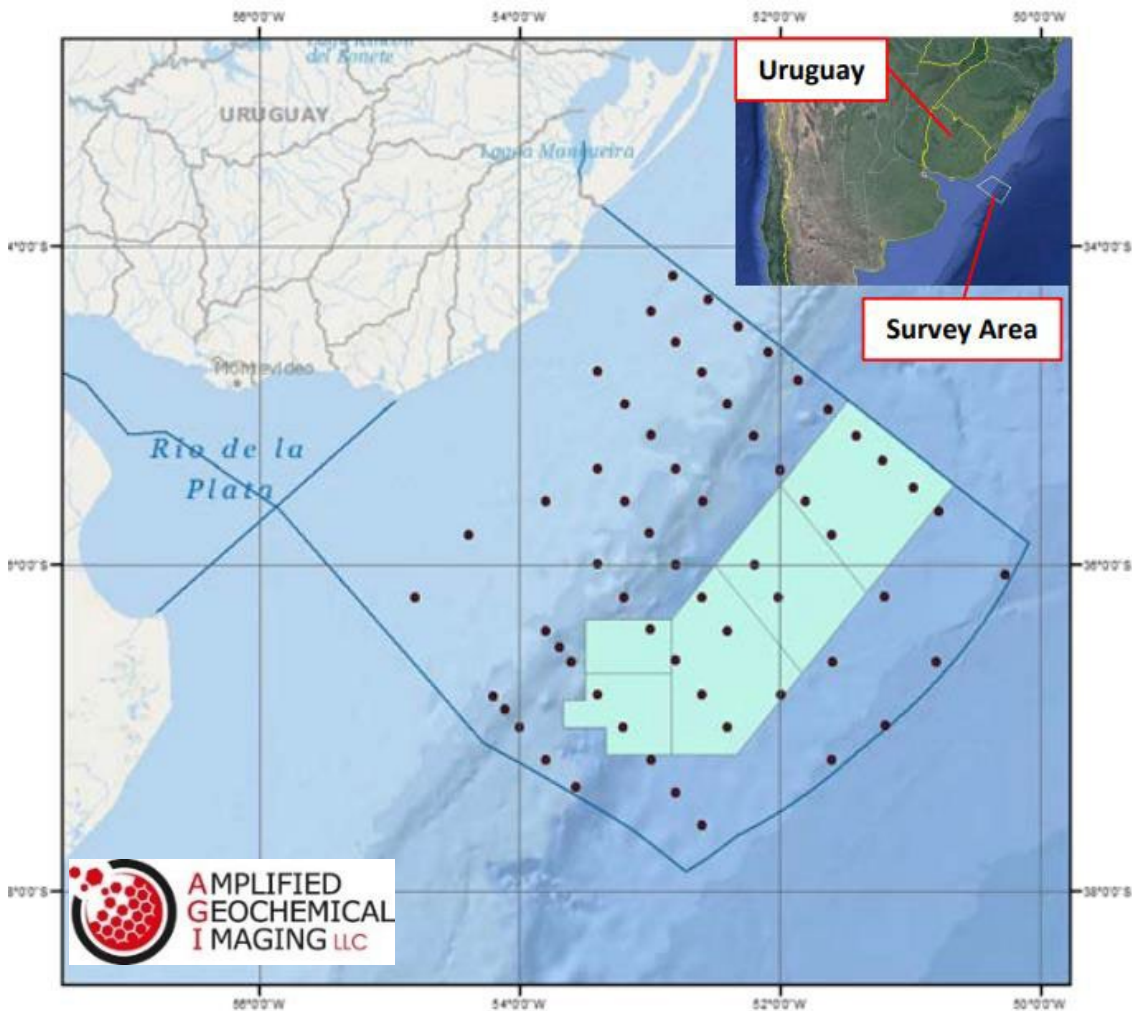
- AVO type III anomaly with increasing negative seismic amplitudes with offset.
- There's also a decrease in its frequency content and a clear pull-down effect.
- Located within the Cretaceous sequence.



Bottom Simulating Reflector



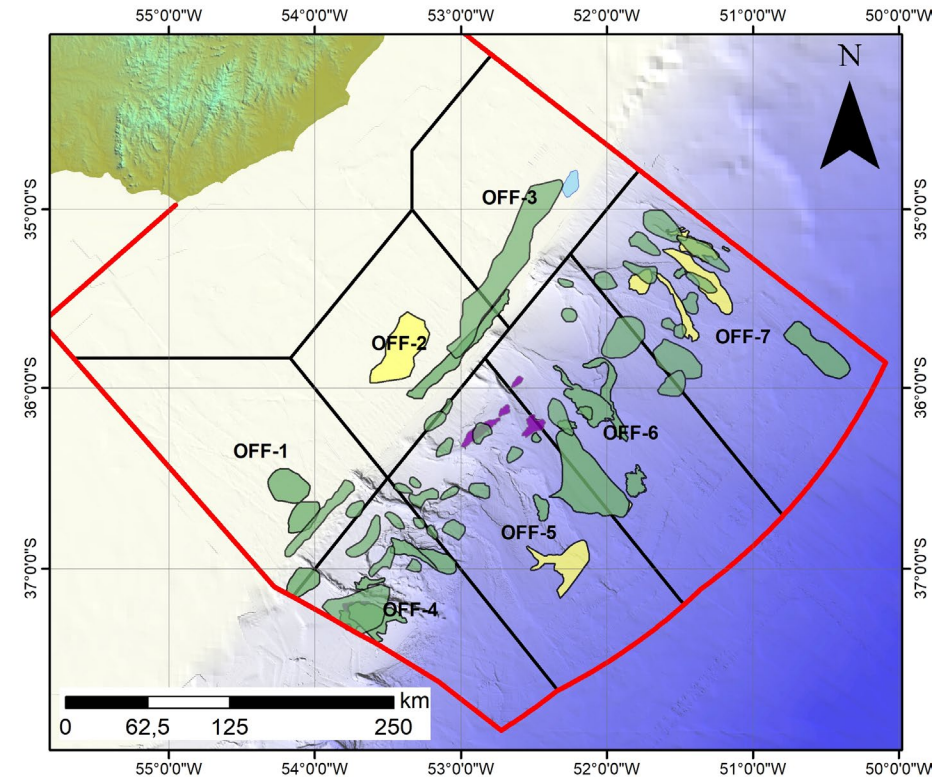
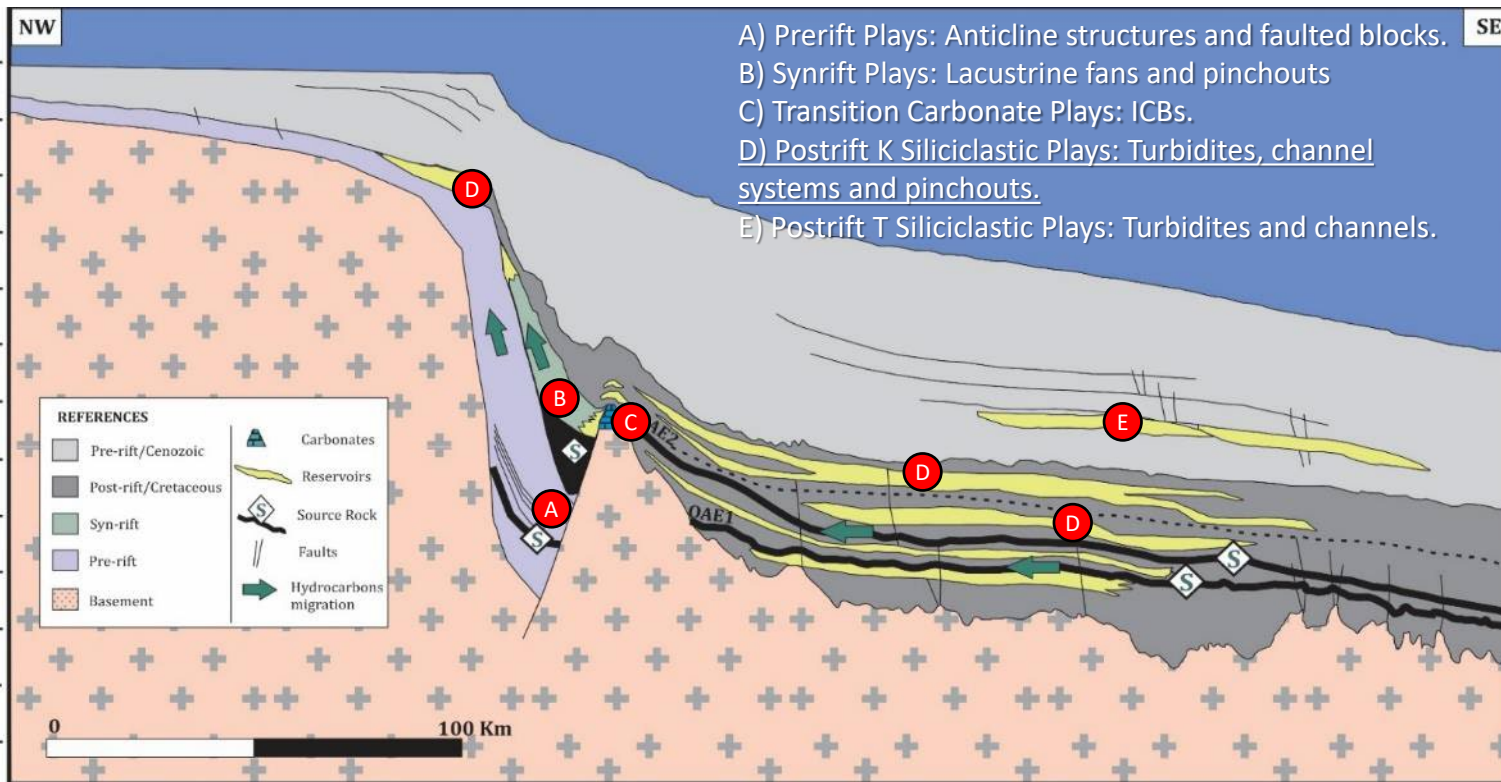
Oil Seeps and Slicks



Microseeps of thermogenic origin found in the entire margin.

Modified from: Clément Blaizot's LinkedIn "Deepwater Uruguay Satellite Seeps"

Play types and prospects



- > 40 offshore prospects and leads (≈ 2/3 located in Pelotas Basin)
- From shallow waters to ultra-deep waters
- Different play types
- Unrisked prospective resources >30,000 MMBOEs (already assessed in 37 prospects)

Final Remarks

- Only 3 exploratory wells drilled in an area of more than 120,000 km²:
 - Lobo and Gaviotín showed several evidences of an active petroleum system: fluid inclusions and gas presence (density-neutron logs crossovers)
 - Raya well did not reach the Cretaceous sequence
- Focus on the **Cretaceous!**
 - Presence of world class source rocks: Aptian and Cenomanian-Turonian
 - Good quality reservoirs
 - Effective regional seal: Paleocene proven by well data
 - Most of the prospects and leads identified with seismic and CSEM data
 - Strong analogies with recent discoveries in offshore Namibia
 - Several direct and indirect HC evidences

Thank you for your attention!



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