

TECHNICAL ASSESSMENT

OFFSHORE KWANZA AND BENGUELA BASINS

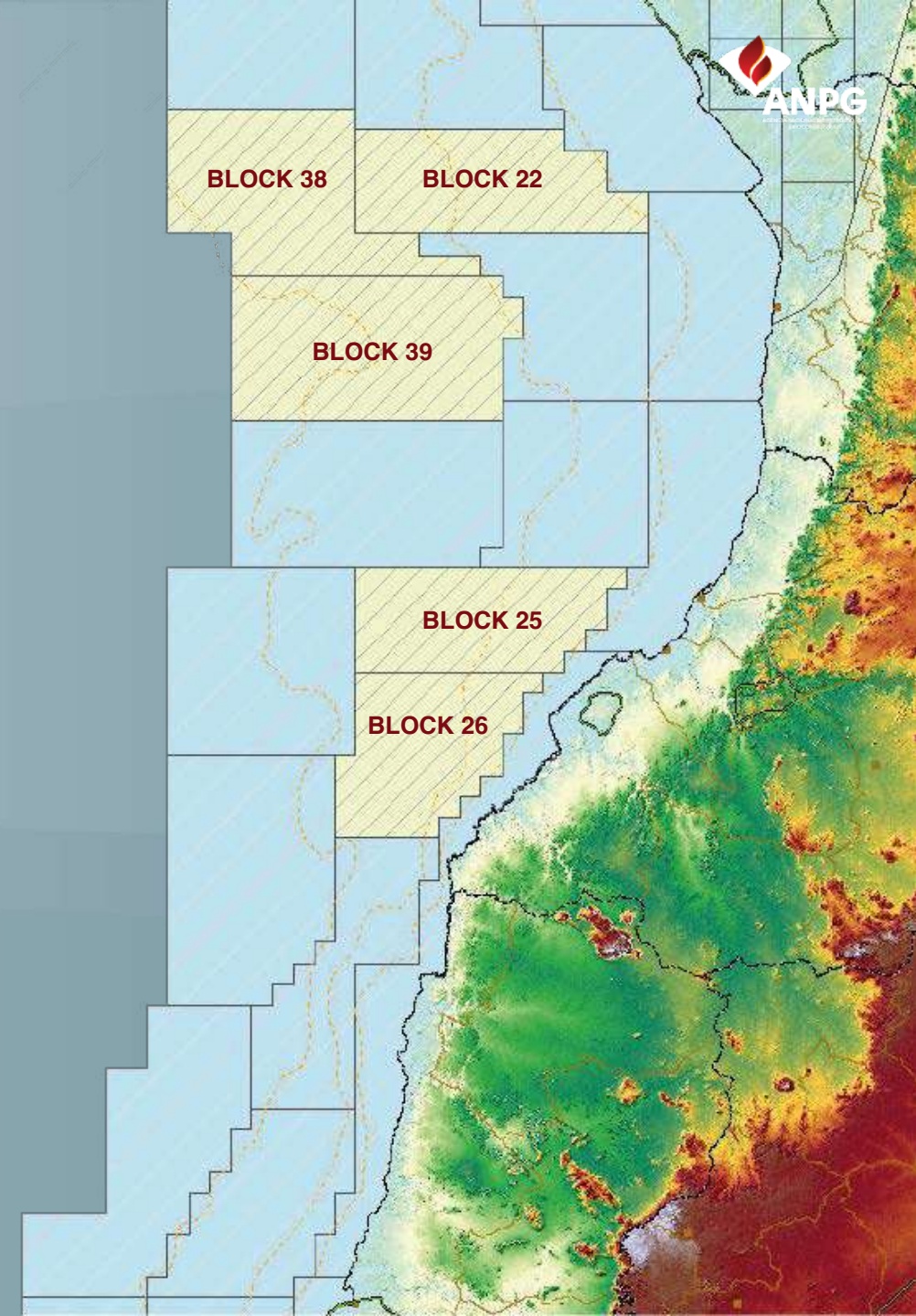
LOCATION

The Kwanza Basin is located on the West African margin, between latitudes 8° and 11°30'S, bordered to the north by the Offshore Lower Congo Basin and to the south by the Offshore Benguela Basin.

The Benguela Basin On the West African margin, between latitudes 8° and 11°30'S, is bordered to the North by the Offshore Kwanza Basin and to the South by the Offshore Namibe Basin.

- Area ~ 70.578,87 Km²
- Blocks 14 + KUD
- Water Depth < 4000

- Area ~ 25.047,9 Km²
- Blocks 05 + BUD
- Water Depth < 3000



OFFSHORE KWANZA AND BENGUELA BASINS E&P HISTORY



KWANZA

1968 - 1969

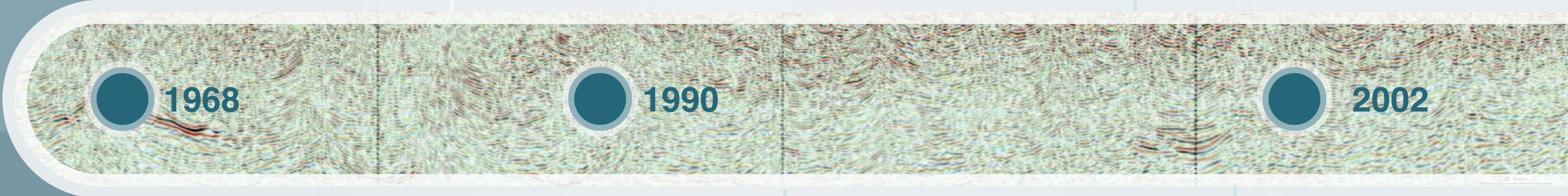
- **1968:** Start of exploration in the Offshore Kwanza Basin (Total, CFP, Texaco)
- **1969:** 2 exploration wells drilled by PETRANGOL (Praia-1 and Sangano-1) in Block 7

1980 - 1996

- 1968: 1980: 5,570 km of 2D seismic by Citie Services, 5 exploration wells. Dendém-1 well, non-commercial discovery;
- Block 7: 5,816 km of 2D seismic and 1,557 km² 3D by ELF, and 5 exploration wells drilled (Zimbo-1, Quiteta-1, Voluta-1, Porcelana-1 and Navalha-1);
- Block 8: 2 exploration wells with indications of oil, Ametista-1 and Berílio-1.

1997 - 2002

- Block 7: 1997- ENERGY AFRICA acquired 632 km² of 3D seismic, multi-client by WGC and drilled 2 exploration wells (Mabanga-1 and Mexilhão-1);
- Block 9: 1999-2002 Texaco drilled 2 exploration wells Jambo-1 and Goiaba-1.



BENGUELA

1995

- Gravimetric data survey and acquisition of 2D and 3D seismic lines, with 3 462 Km 2D and 9775 Km² 3D in Block 24 by PGS; 2 771.99 Km 2D and 4 920 Km² 3D in Block 40 acquired by PGS; 1 651 Km 2D and 949.43 Km² 3D in Block 10
- 5 exploration wells drilled in Block 24, Semba-1, Eova-1 and Varina-1/ ESSO, Kabetua-1/ DEVON and Katambi-1/ BP.

2000

- 2000 to 2001, 3 exploration wells were drilled in Block 25 by AGIP, Leão-1, Jaguar-1 and Pantera-1,
- 2001 was marked as the year of the first oil discovery in the Benguela Maritime Basin by the Semba-1 well.

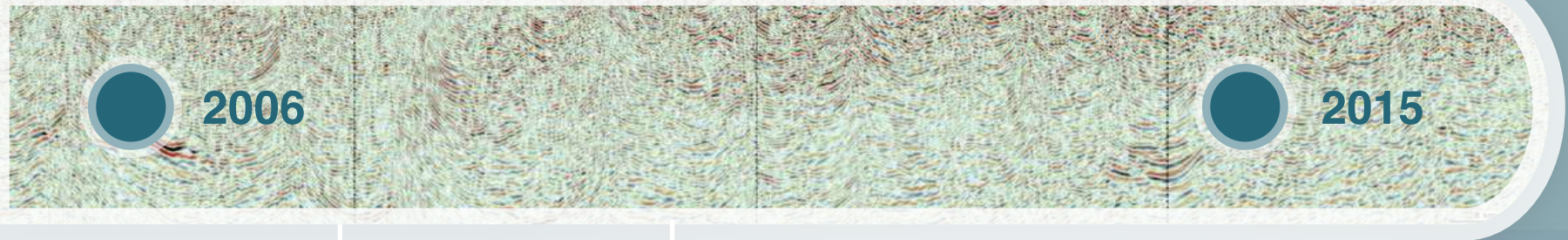
OFFSHORE KWANZA AND BENGUELA BASINS E&P HISTORY



KWANZA

2006 - 2015

- Block 8: Maersk acquired 1,200 km2 of 3D seismic in 2006..;
- Block 9: Between 2009 and 2016, Cobalt acquired 2,501 km2 of 3D seismic and drilled a Loengo-1 exploration well;
- Block 23: first pre-salt discovery with the Azul-1 exploration well, followed by the Cameia-1 well on Block 21, the Katambi-1 well on Block 24, Golfinho-1, Golfinho-2 and Granadier-1 on Blocks 20/21.



2010

- DEVON drilled two (2) exploration wells in Block 10 (Ngueve-1 and Henda-1),

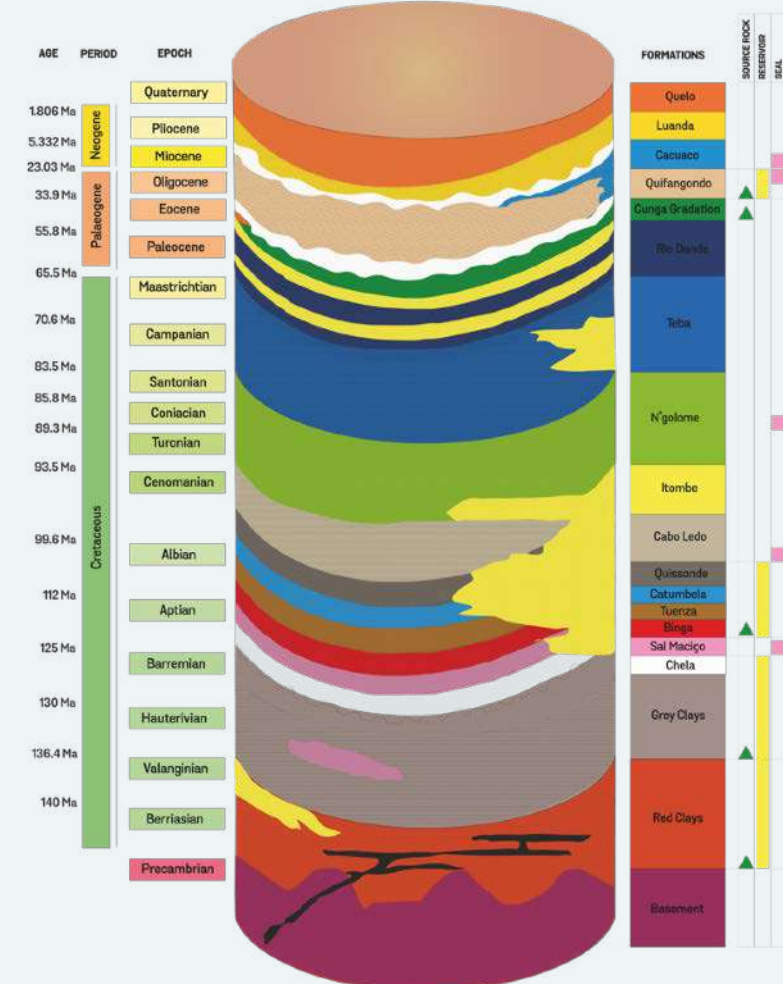
BENGUELA

2011

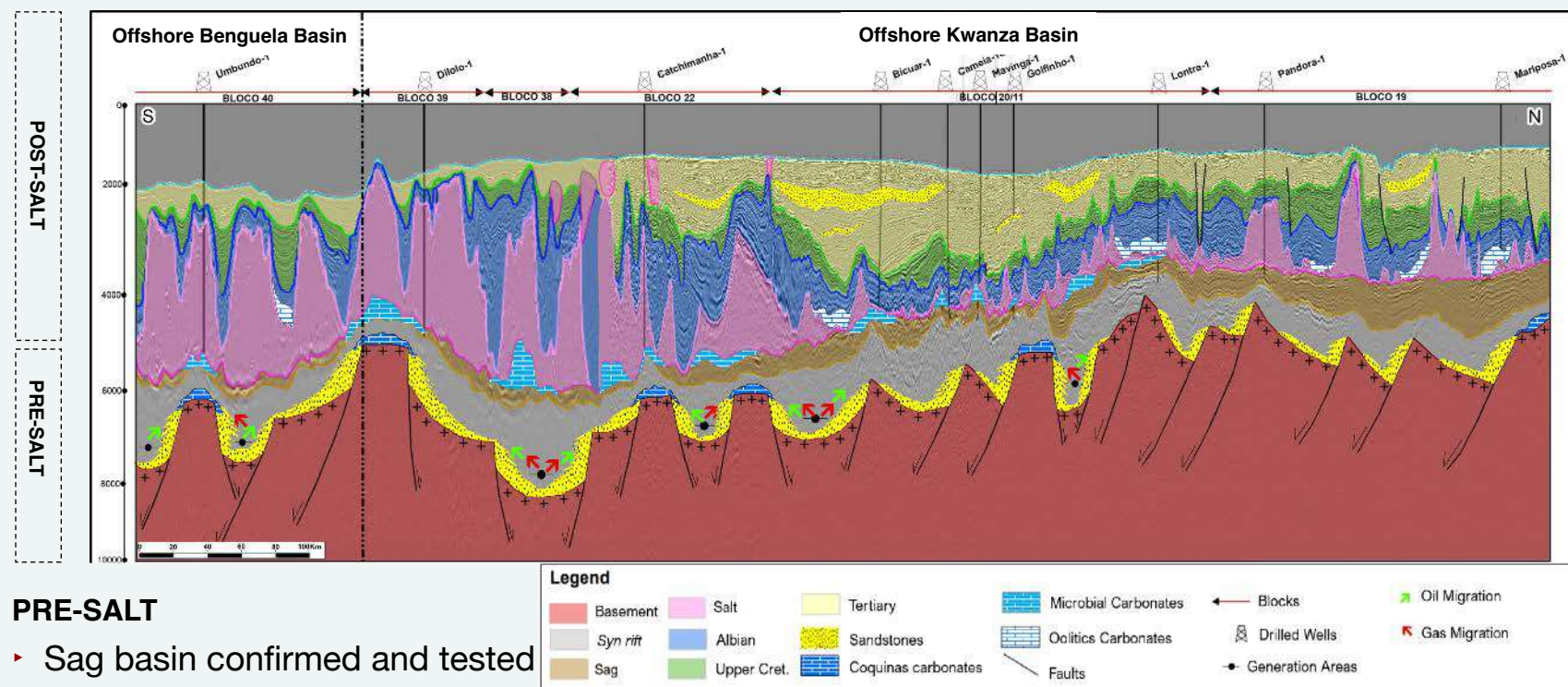
- In 2011 it acquired 11,837.9 km² of 3D seismic.
- In 2012, PETROBRAS drilled the Ogonga-1 well in Block 26, targeting the pre-salt.
- In 2014 TOTAL drilled the Puma-1 pre-salt exploration well in Block 25 and 5,219 km² of multi-client 3D seismic were acquired by PGS between 2017 and 2019.
- Gas discovery from the Katambi-1 well at pre-salt level in 2014 in Block 24.
- In 2015 TOTAL drilled the Umbundu-1 exploration well in Block 40 at pre-salt level.

OFFSHORE KWANZA AND BENGUELA BASINS E&P HISTORY

PETROLEU M SYSTEM



GEOLOGICAL MODEL



PRE-SALT

- Sag basin confirmed and tested
- Microbial carbonates at the Sag basin

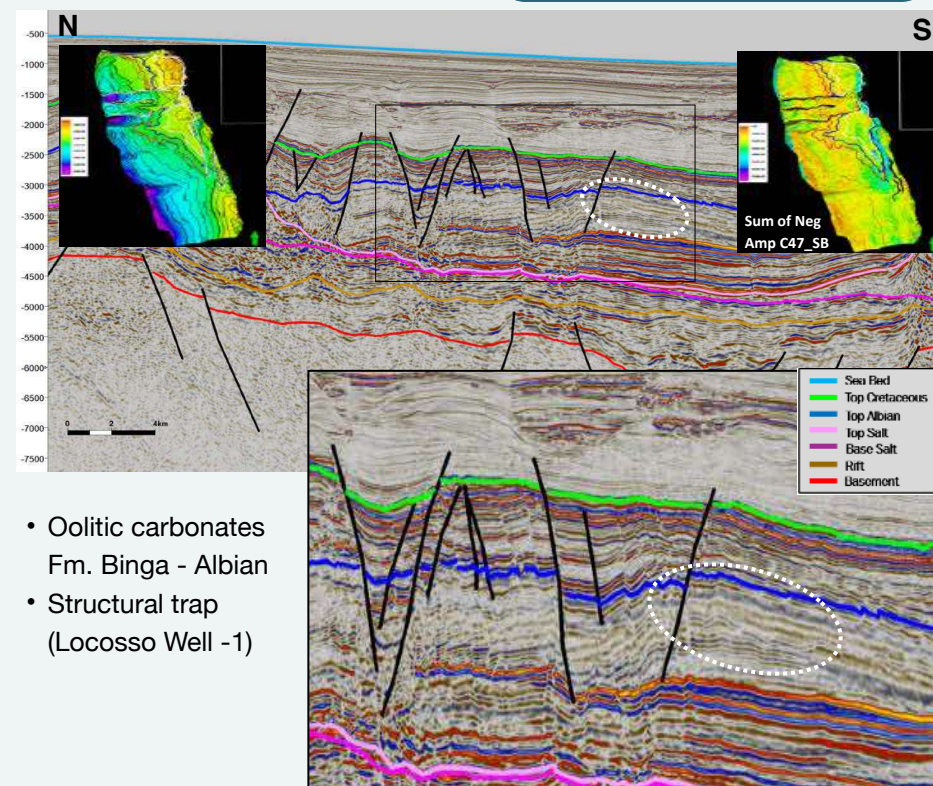
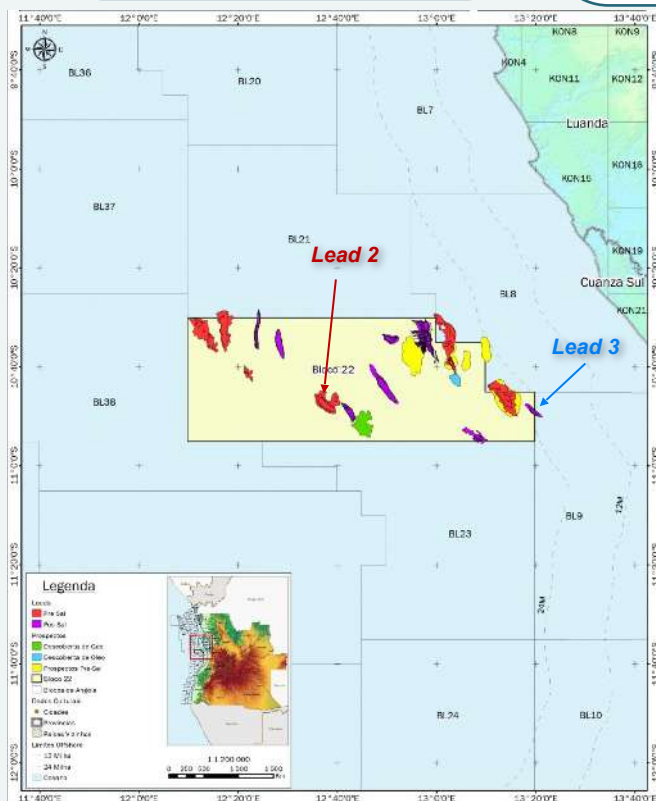
POST-SALT

- Tertiary troughs

BLOCK 22 – PLAY CONCEPT

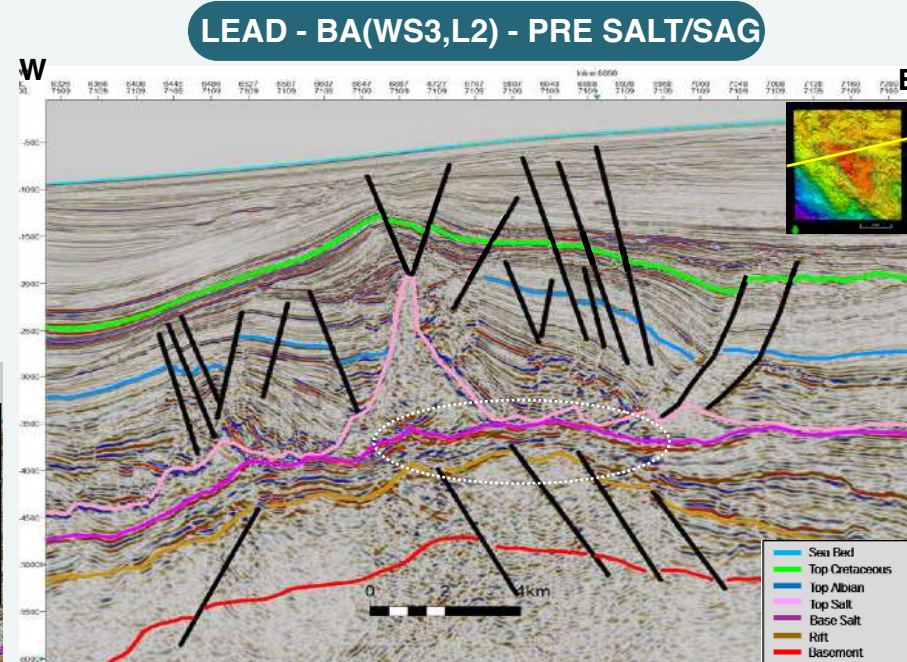
Technical Data Sheet

- Location:** Offshore Kwanza Basin
- Area:** 5 843 Km²
- Water depth:** 955 - 2 500 m
- Potential Data Gravimetry:** 50%
- Magnetometry:** 100%
- Seismic:** 2D ~ 2 087 Km & 3D: ~ 4 310 Km²
- Wells drilled :** 3 exploration wells
- Exploration Opportunities** (Oil and Gas)
- Pre-salt:** 12 Leads
- Post-salt:** 19 Leads



- Oolitic carbonates Fm. Binga - Albian
- Structural trap (Locosso Well -1)

LEADS - JG(WS1, L3) - ALBIAN



Microbiolite carbonates from the Fm. Cuvo - Sag /Pre- salt in a structural trap

WELLS RESULTS

LOCOSSO WELL -1

- API grade: 35
- Reservoir: Gross 109 m and 32.5 m of net pay (microbiolites and coquinas).

CATCHIMANHA WELL -1

- API grade: 35
- Reservoir: Porosity 11-15% and N/G of 90

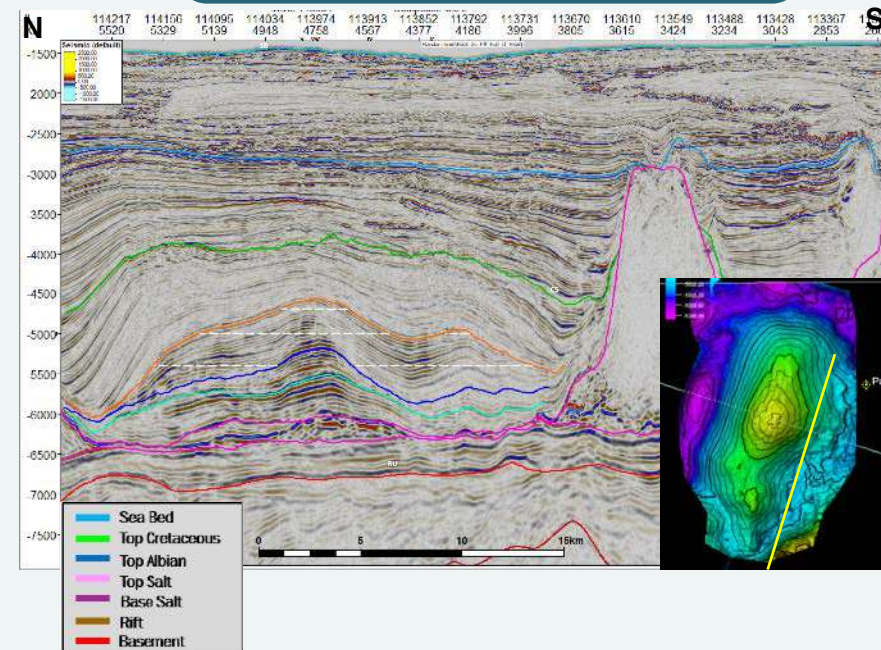
BLOCK 25 – PLAY CONCEPT

Technical Data Sheet

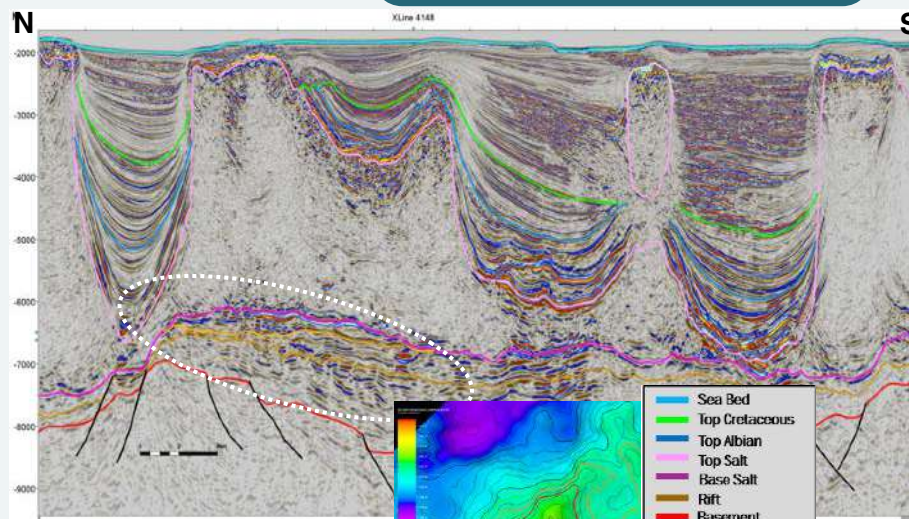
- **Location:** Offshore Benguela Basin
- **Area:** 5 219.6 Km²
- **Water depth:** 700 - 2 500 m
- **Potential Data Gravimetry & Magnetometry** 100%

- **Seismic:** 2D ~ 2 827 Km & 3D: ~ 5 110 Km²
- **Wells drilled:** Leão-1, Jaguar-1, Pantera-1 and Puma-1 exploration wells
- **Exploration Opportunities** (Oil and Gas)
- **Pre-salt:** 9 Leads
- **Post-salt:** 13 Leads

LEAD - MN (WS1, L1) – POST-SALT/ALBIAN

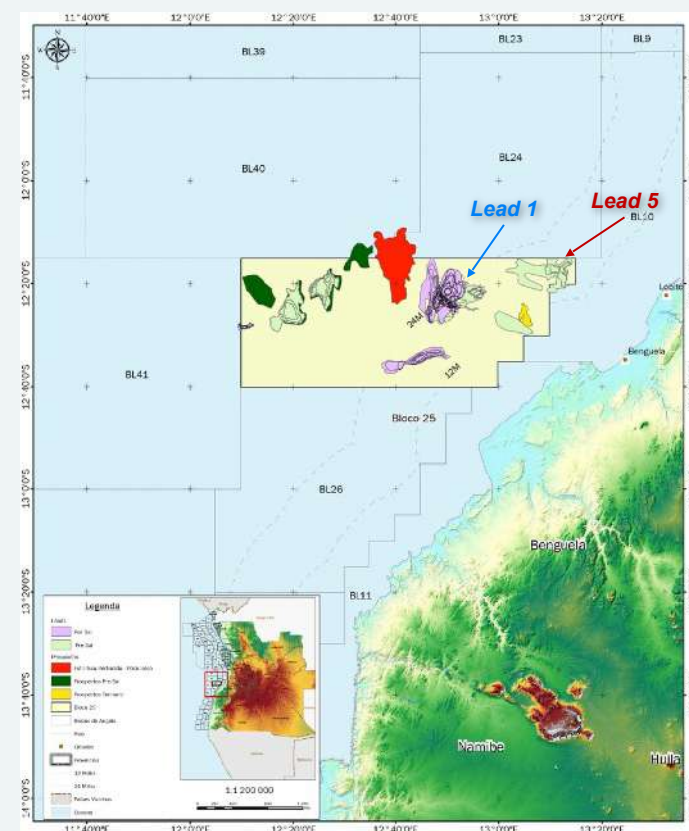


LEAD - EA (WS3, L5) – PRE-SALT/SAG



- Microbiolite carbonates from Fm. Cuvo - Sag / Pre-salt;
- Structural trap with four-way closure;

- Oolitic Carbonates Fm. Binga - Albian;
- Anticlinal structure with closure in four directions;

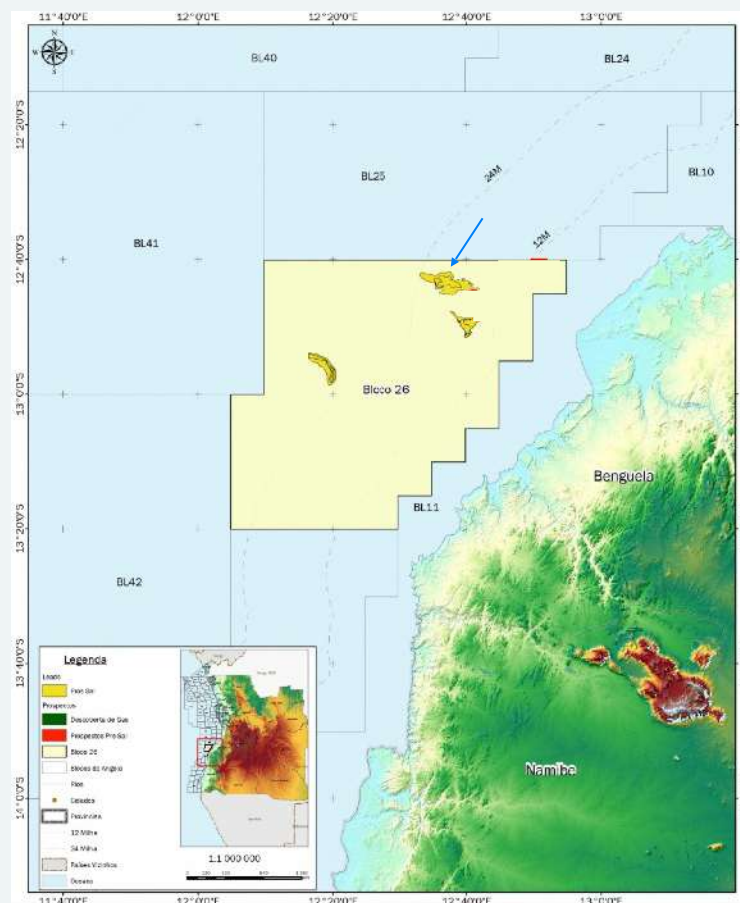


BLOCK 26 – PLAY CONCEPT

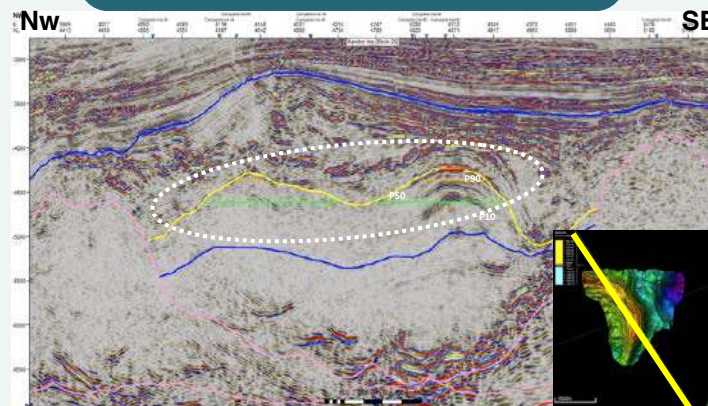
Technical Data Sheet

- **Location:** Offshore Benguela Basin
- **Area:** 4 838 Km²
- **Water depth:** 800 – 3 000 m
- **Potential Data Gravimetry & Magnetometry** 100%

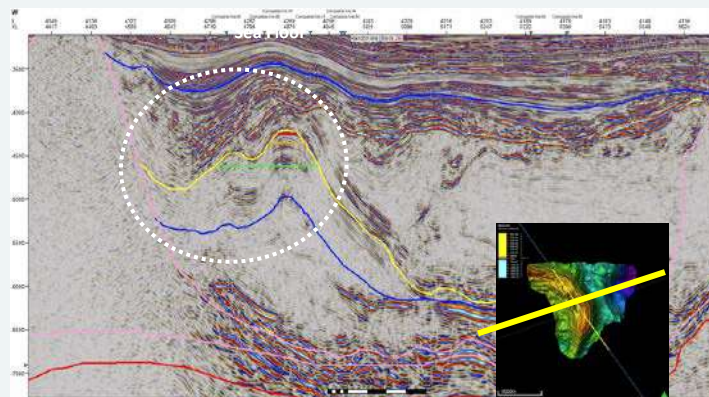
- **Seismic:** 2D ~ 2 303 Km & 3D: ~ 3 220 Km²
- **Wells drilled:** 1 exploration well
- **Exploration Opportunities** (Oil and Gas)
- **Post-salt:** 3 Leads



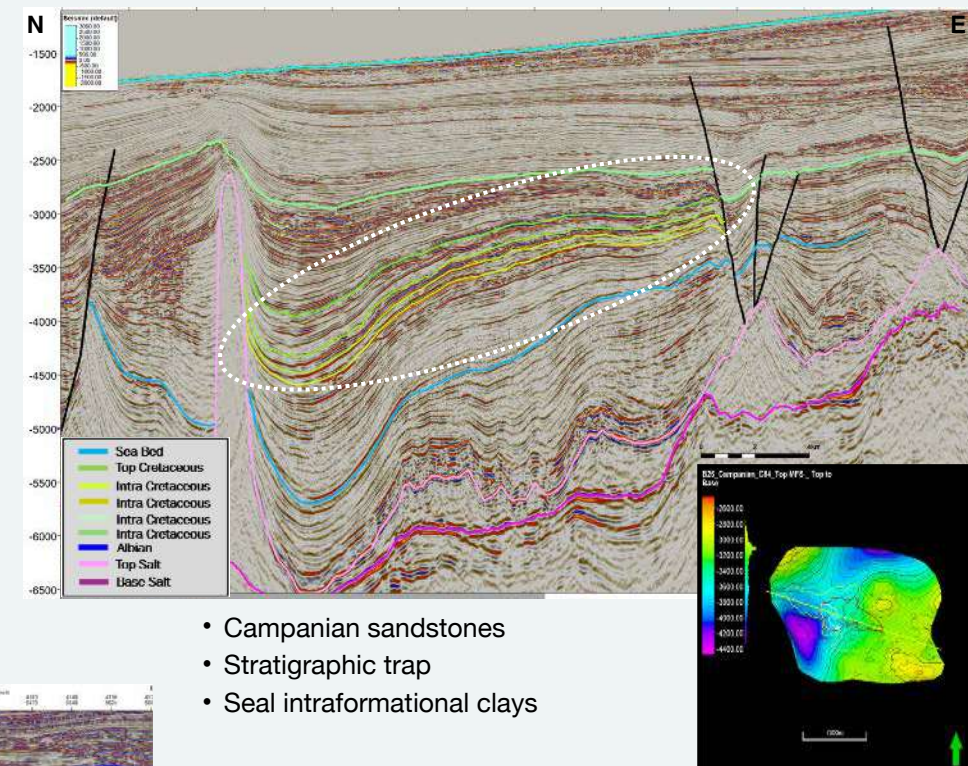
LEAD - FS(W51, L1) – POST SALT/ALBIAN



- Oolitic carbonates Fm. Binga
- Structural trap with 4-way closure



LEAD - LC(W53,L1) – POST-SALT/ CAMPANIAN



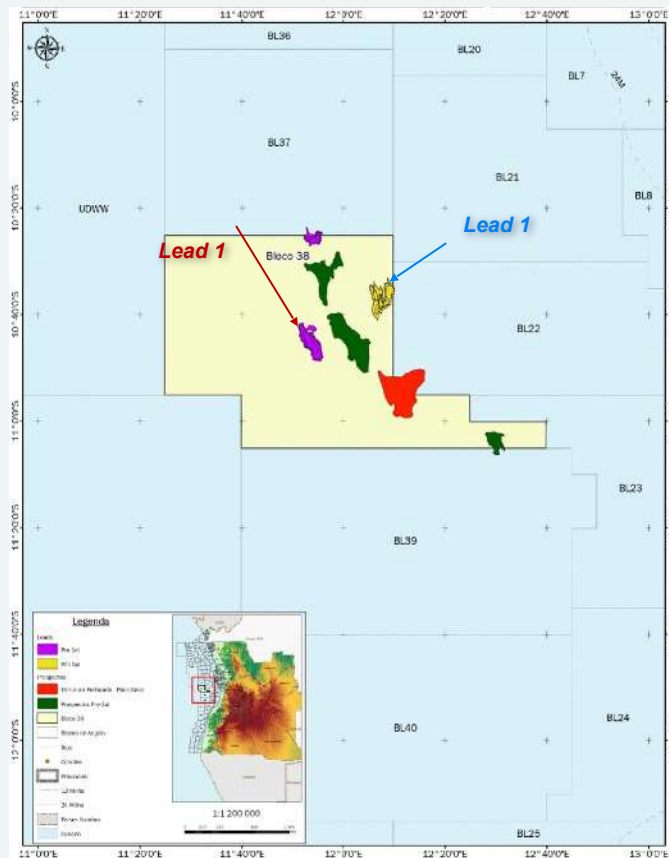
- Campanian sandstones
- Stratigraphic trap
- Seal intraformational clays

BLOCK 38 – PLAY CONCEPT

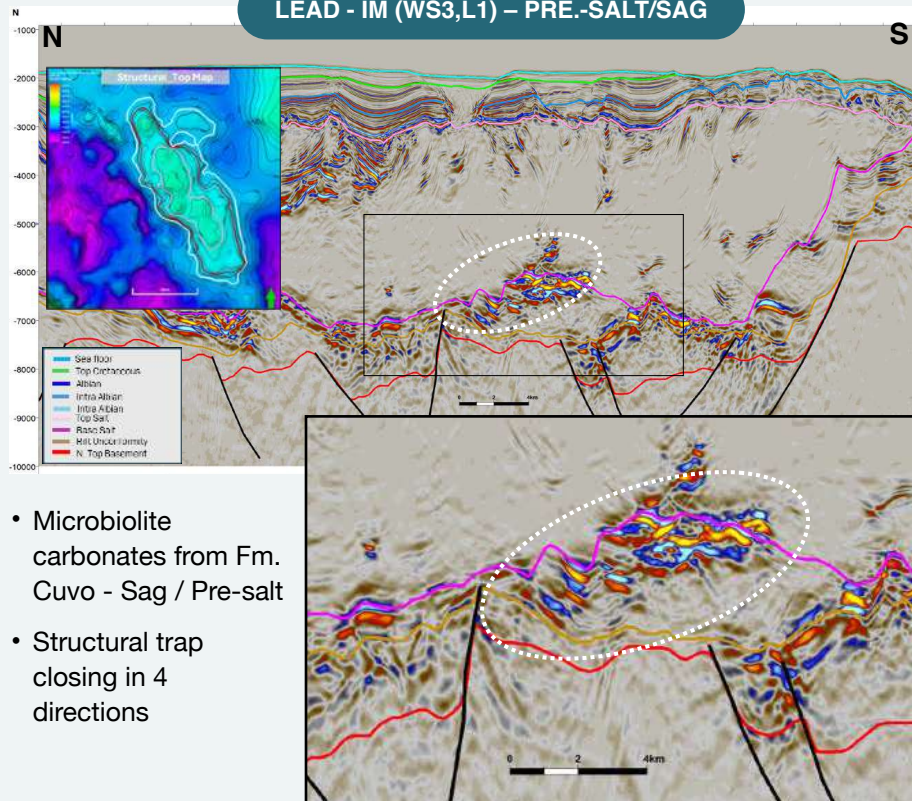
Technical Data Sheet

- **Location:** Offshore Kwanza Basin
- **Area:** 6 300 Km²
- **Water depth:** 1 200 – 2 500 m
- **Potential Data Gravimetry 100% Magnetometry 100%**

- **Seismic:** 2D ~ 2628.44 Km & 3D: ~ 4904.12 Km²
- **Wells drilled:** Jacaré-1 exploration well
- **Exploration Opportunities** (Oil and Gas)
- **Pre-salt:** 2 Leads
- **Post-salt:** 2 Leads

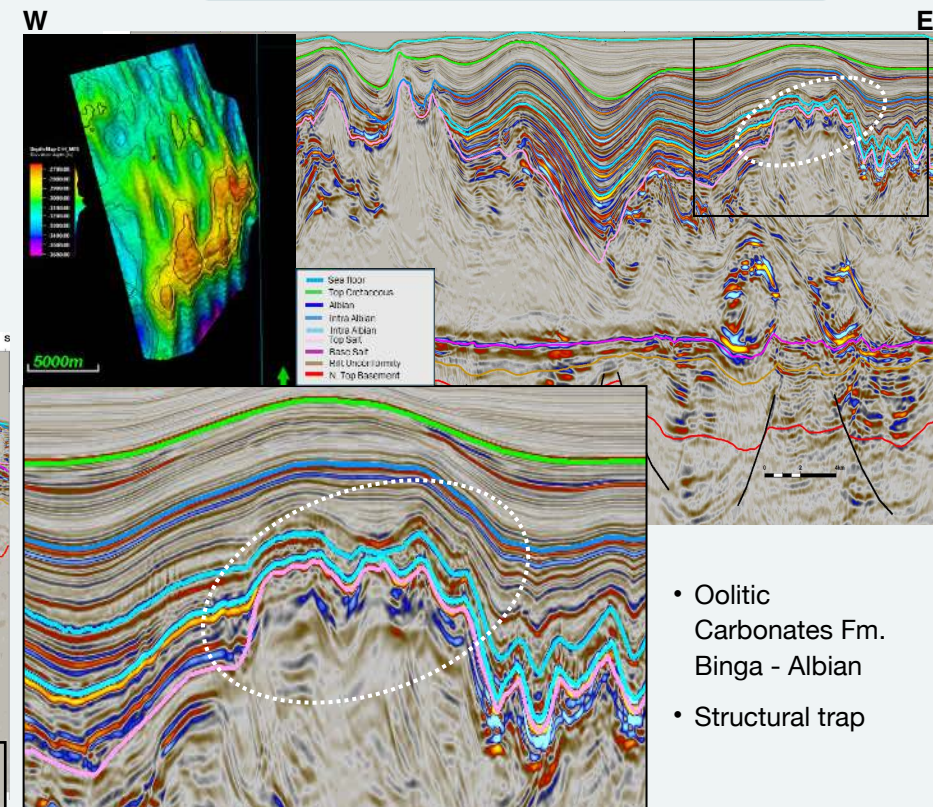


LEAD - IM (WS3,L1) – PRE.-SALT/SAG



- Microbiolite carbonates from Fm. Cuvo - Sag / Pre-salt
- Structural trap closing in 4 directions

LEAD - GB (WS2,L1) – POST-SALT/ALBIAN



- Oolitic Carbonates Fm. Binga - Albian
- Structural trap

WELL RESULTS

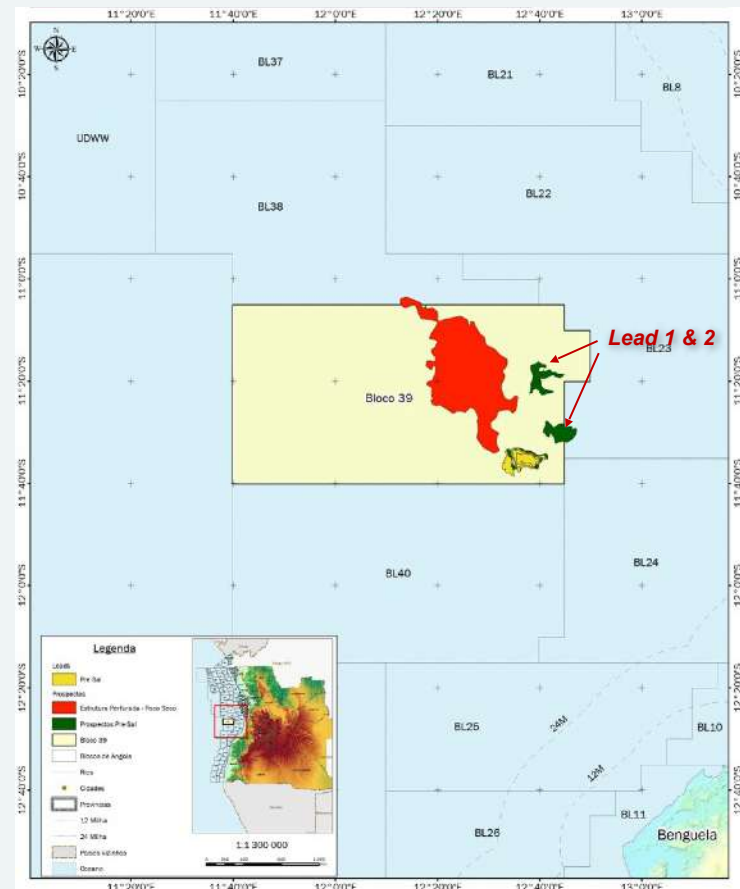
JACARÉ WELL -1

- Average porosity and permeability: 5% and 0.035mD.
- Source rock: TOC<1wt.% (5 877m to 6 216m)
- Presence of lacustrine organic matter / Type II and II/III kerogen
- Mature and post-mature Ro% and TAI.

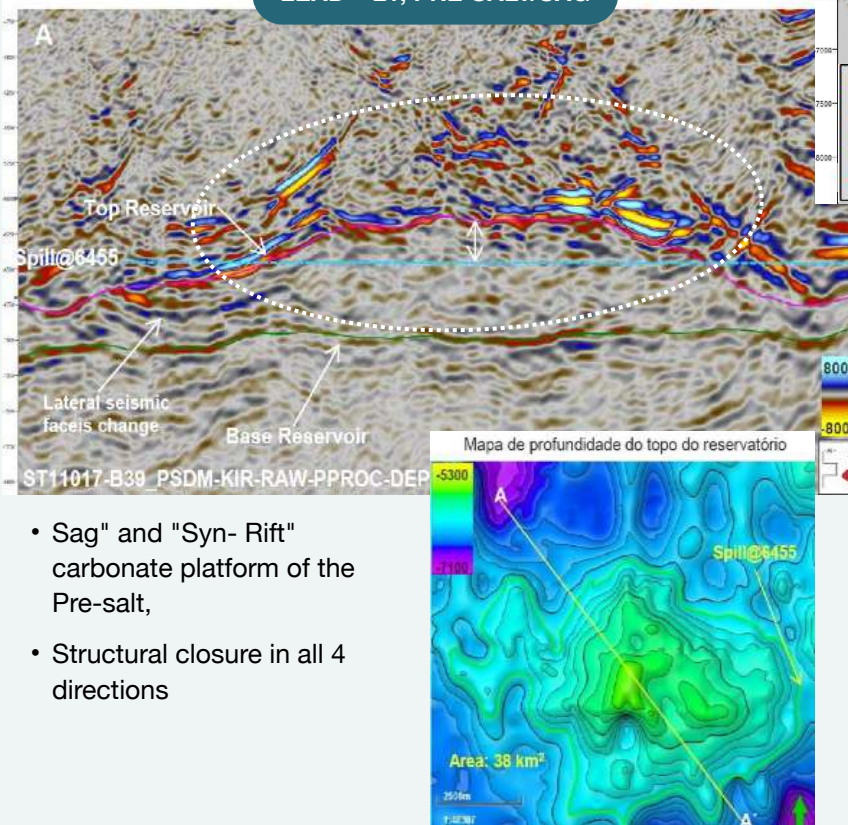
BLOCK 39 – PLAY CONCEPT

Technical Data Sheet

- **Location:** Offshore Kwanza Basin
- **Area:** 7 809 Km²
- **Water depth:** 1 200 – 3 200 m
- **Potential Data Gravimetry & Magnetometry** 100%
- **Seismic:** 2D ~ 3752.59 Km & 3D: ~ 5 186.49 Km²
- **Wells drilled:** Dilolo-1 exploration well
- **Exploration Opportunities** (Oil and Gas)
- **Post-salt:** 2 Leads



LEAD – L1, PRE-SALT/SAG



- "Sag" and "Syn- Rift" carbonate platform of the Pre-salt,
- Structural closure in all 4 directions

LEAD – FS (WS1,L2) – PRE-SALT/ SAG

