

OFFSHORE KWANZA BASIN EXPLORATION HISTORY



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.

1968

1990

2002

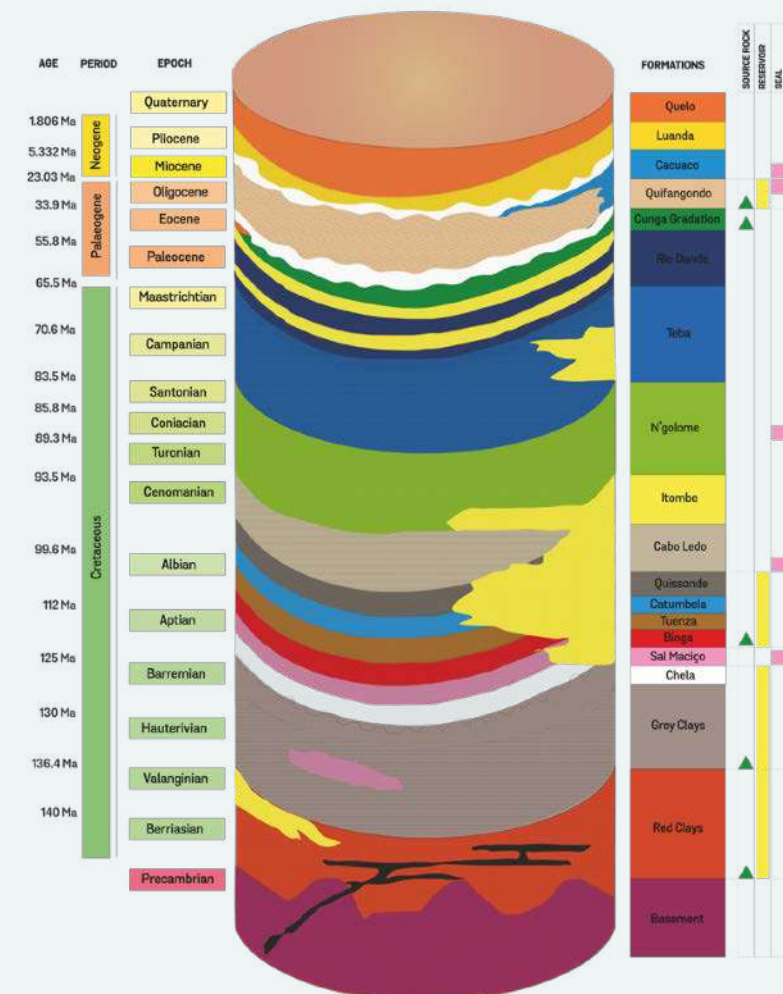
2015

2006 - 2015

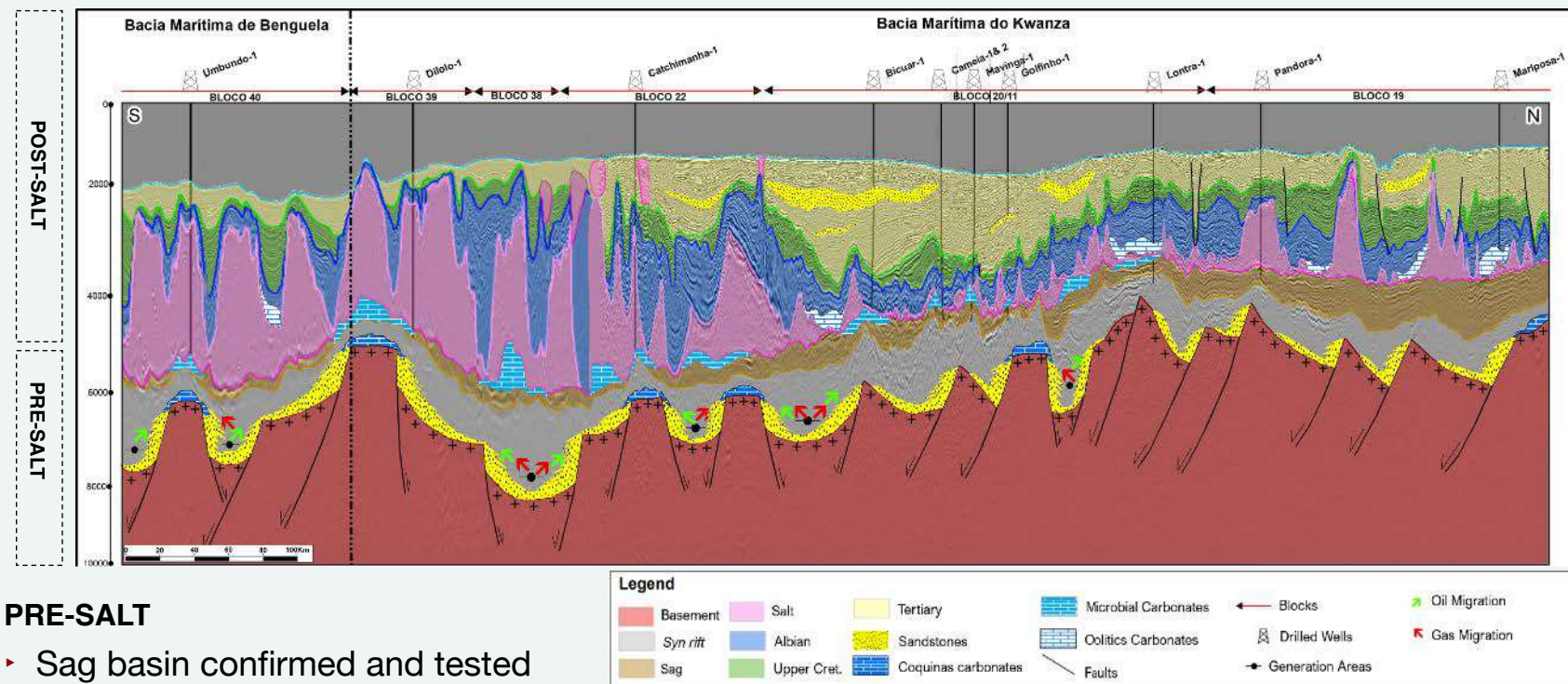
- Block 8: Maersk acquired 1,200 km² of 3D seismic in 2006..;
- Block 9: Between 2009 and 2016, Cobalt acquired 2,501 km² of 3D seismic and drilled a Loengo-1 exploration well;
- Block 23: first pre-salt discovery with the Azul-1 exploration well, followed by the Cameia-1 well on Block 21, the Katambi-1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

OFFSHORE KWANZA AND BENGUELA BASIN'S E&P HISTORY

PETROLEU M SYSTEM



GEOLOGICAL MODEL



PRE-SALT

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

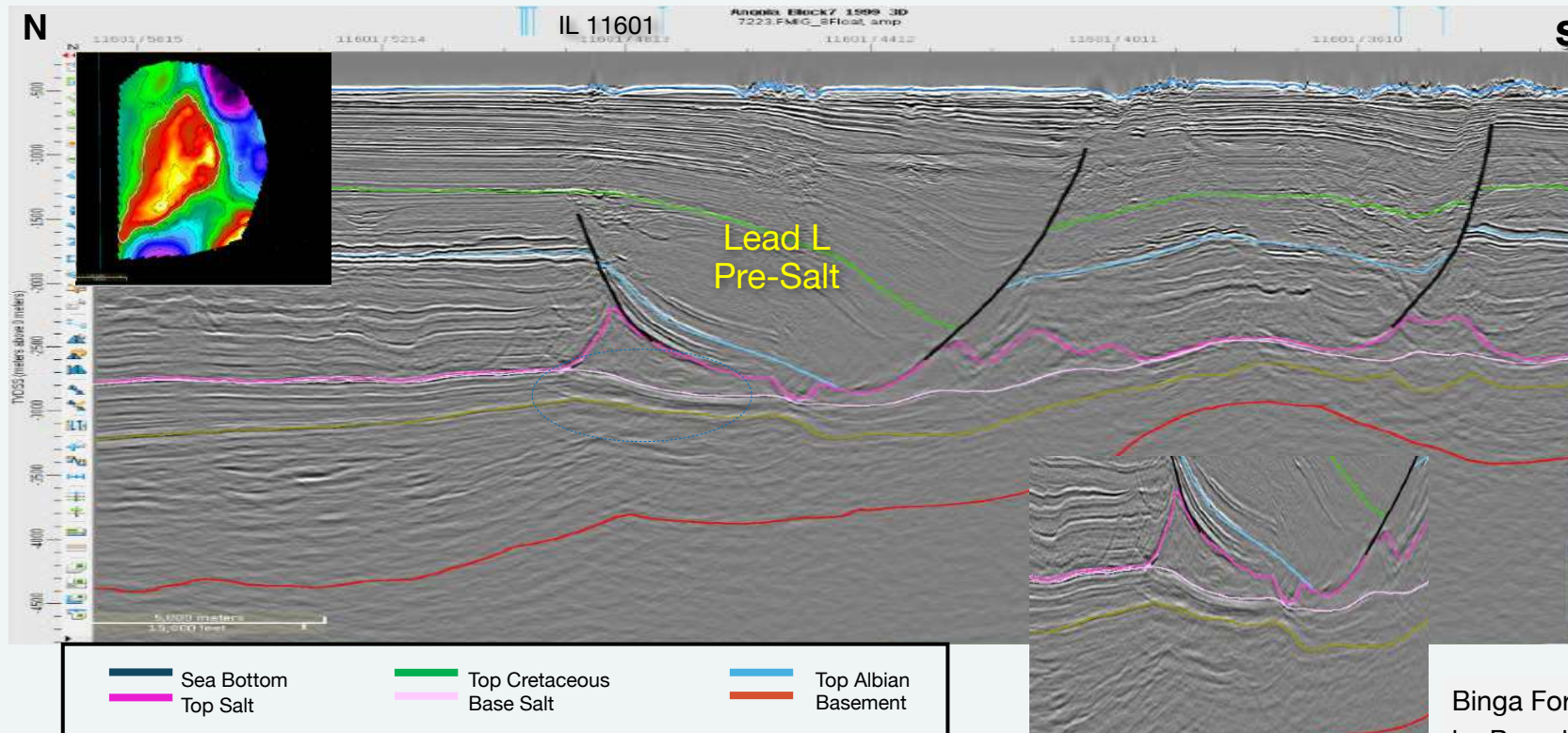
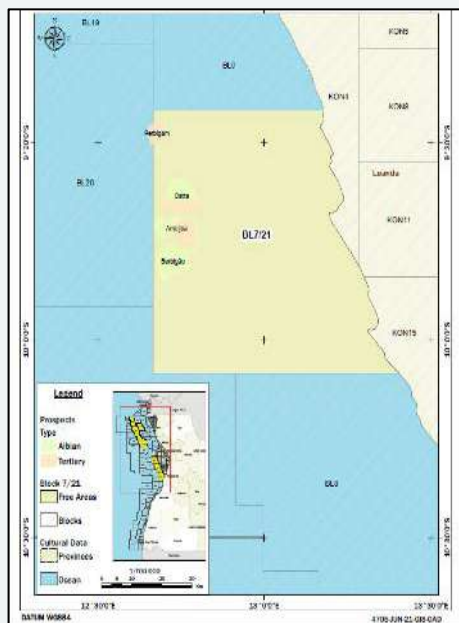
POST-SALT

- ▶ Tertiary troughs

BLOCK 7 OFFSHORE KWANZA BASIN

PLAY CONCEPT

OTHER OPPORTUNITIES



Seismic:

- 2D: 5 816 km
- 3D: 1 557 km²

Drilled Wells:

- 9 exploration wells

Lead L – Pre-Salt

- Objective: Sag microbial carbonates and sandstones
- Trap: Combined
- Seal: Evaporites (Massive Salt Formation)
- Source Rock: Shale from Cuvo Formation.

EXPLORATORY POTENTIAL

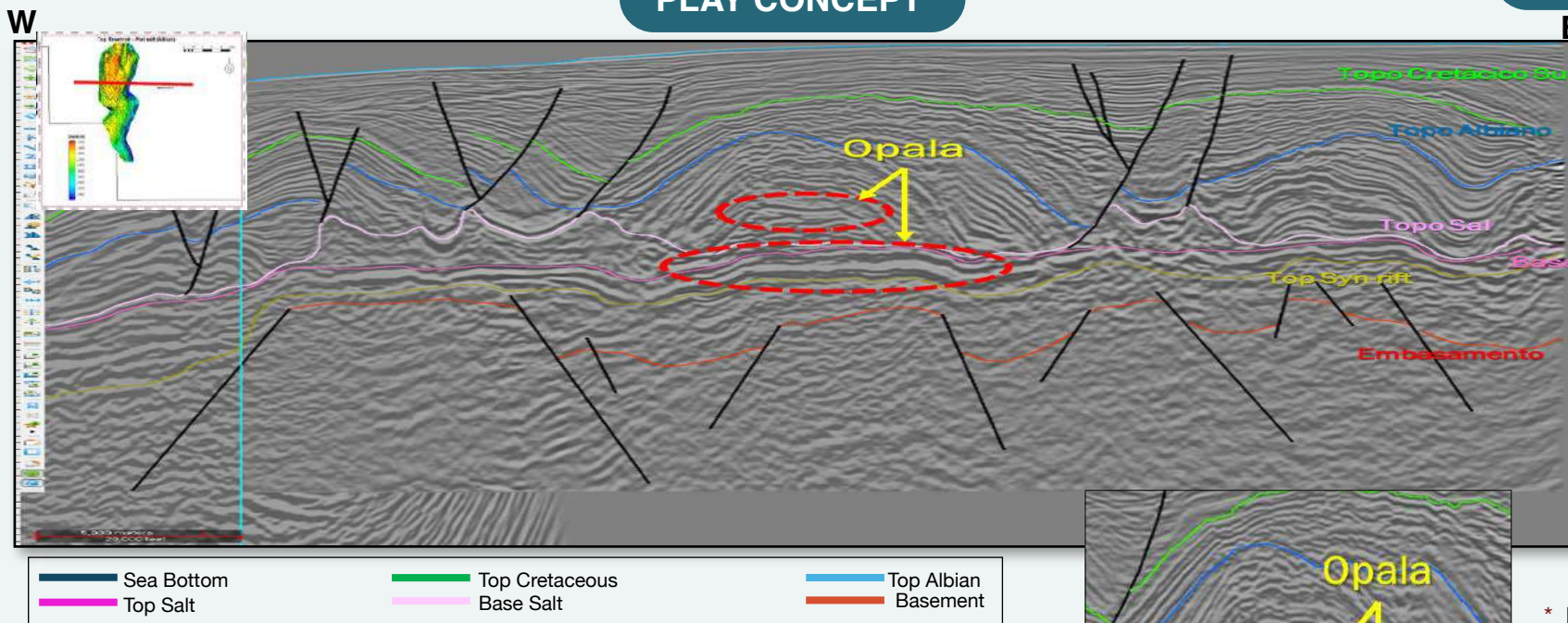
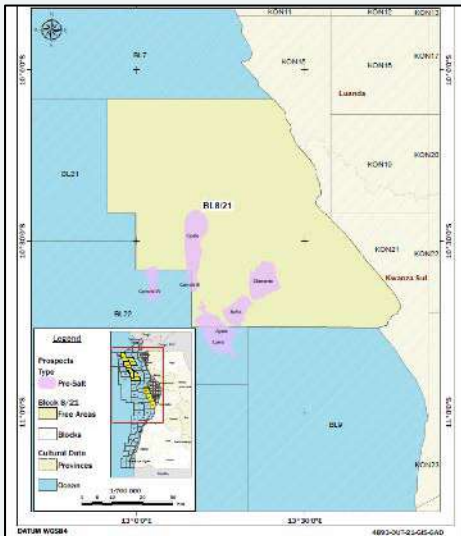
Prospect	Objective
Ameijôa	Albian Tertiary
Ameijôa West	Albian Tertiary
Berbigão	Albian Tertiary
Berbigão North	Albian
Perbigam	Tertiary
Ostra	Albian Tertiary

Binga Formation reservoir crossed by Porcelana-1, Navalha-1 and Voluta-1 wells show signs of residual oil, demonstrating the existence of a petroleum system in the Block.

BLOCK 8 OFFSHORE KWANZA BASIN

PLAY CONCEPT

OTHER OPPORTUNITIES



Seismic:

- 2D: 5 376 Km
- 3D: 4 744,1 Km²

Drilled Wells:

- 2 exploration wells

Well Status:

- Wells with oil shows (Amestista-1* and Berílio-1ST1)

OPALA Prospect

- Area: 463 km²
- Objective:
 - Primary (66 km²) Post-Salt, Albian carbonates
 - Secondary (397 km²) Pre-Salt, Sag microbial carbonates and sandstones

- Trap: Stratigraphic, 4-way closure pinchout structure
- Seal:
 - Clays and marls from the upper Cretaceous
 - Massive Salt

EXPLORATORY POTENTIAL

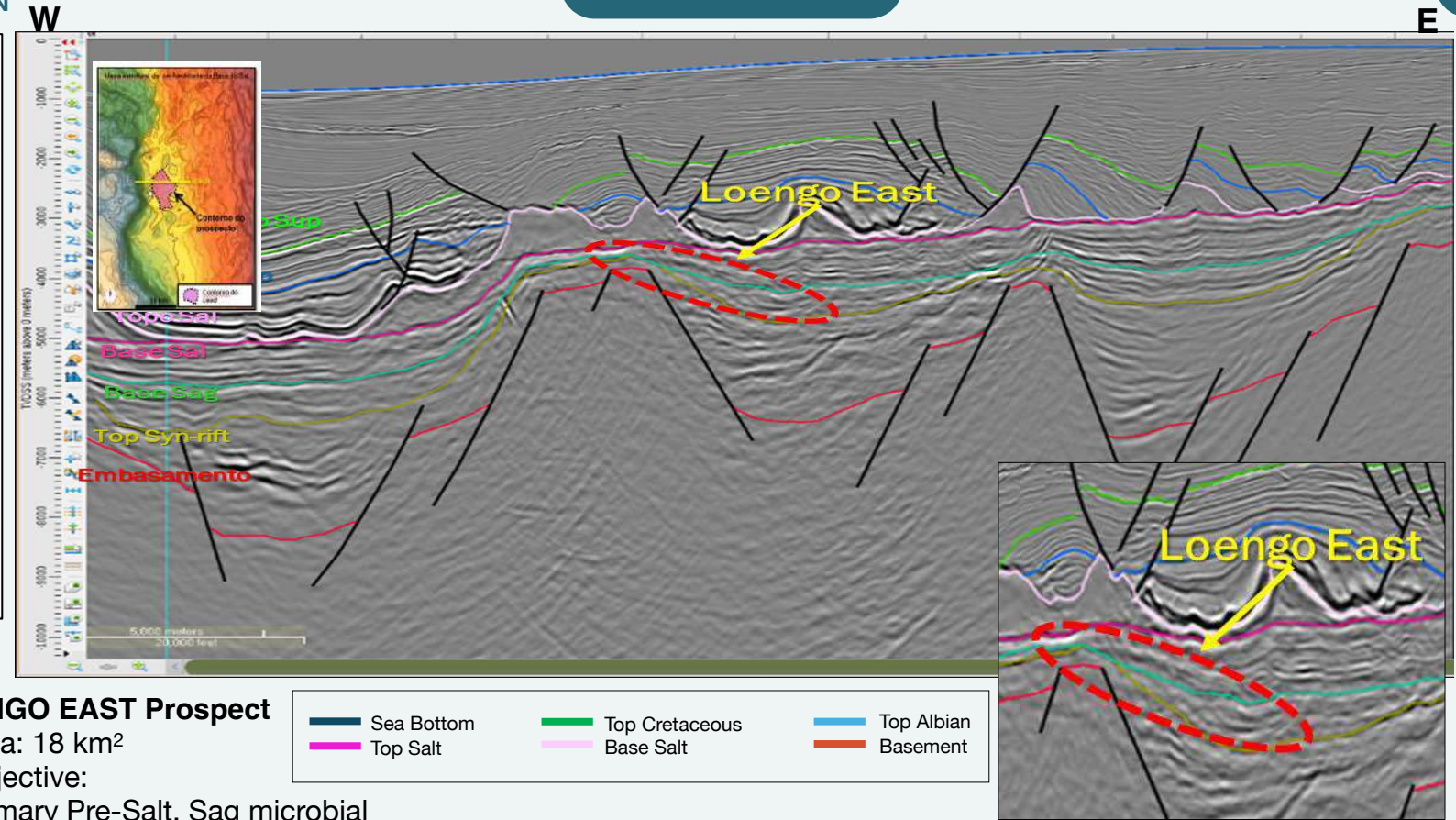
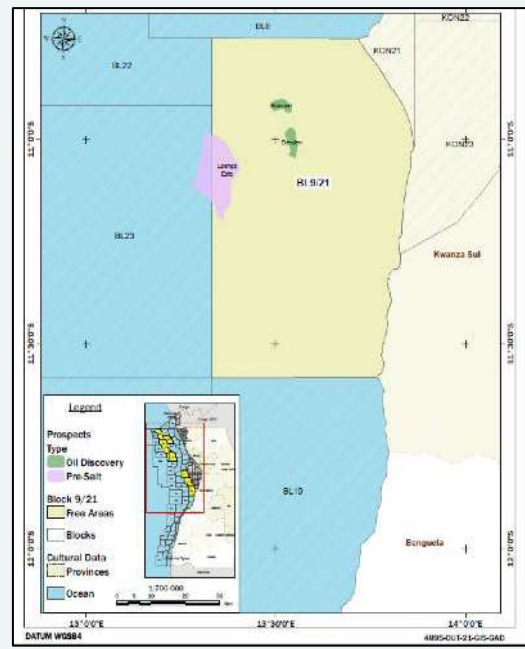
Prospect	Objective
Ágata	Pre-Salt
Diamante	Pre-Salt
Safira	Pre-Salt
Opala	Pre-Salt
	Post-Salt

* Based on the petrophysical and geochemical data from the Ametista-1 well, it was possible to assess the good porosity in the Albian reservoirs and good source rock maturity from the Cenomanian and Turonian ages, which suggests a functional petroleum system.

BLOCK 9 OFFSHORE KWANZA BASIN

PLAY CONCEPT

OTHER OPPORTUNITIES



Seismic:

- 2D: 9 310 km
- 3D: 2 602 km²

Drilled Wells:

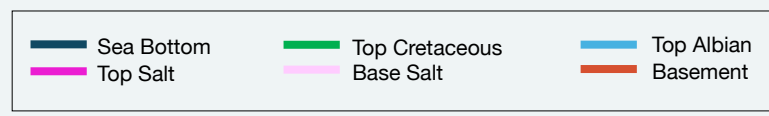
- 8 exploration wells

Well Status:

- 5 wells with oil shows

LOENGO EAST Prospect

- Area: 18 km²
- Objective:
Primary Pre-Salt, Sag microbial carbonates and sandstones
Secondary Pre-Salt, sandstones at the flanks of the horsts

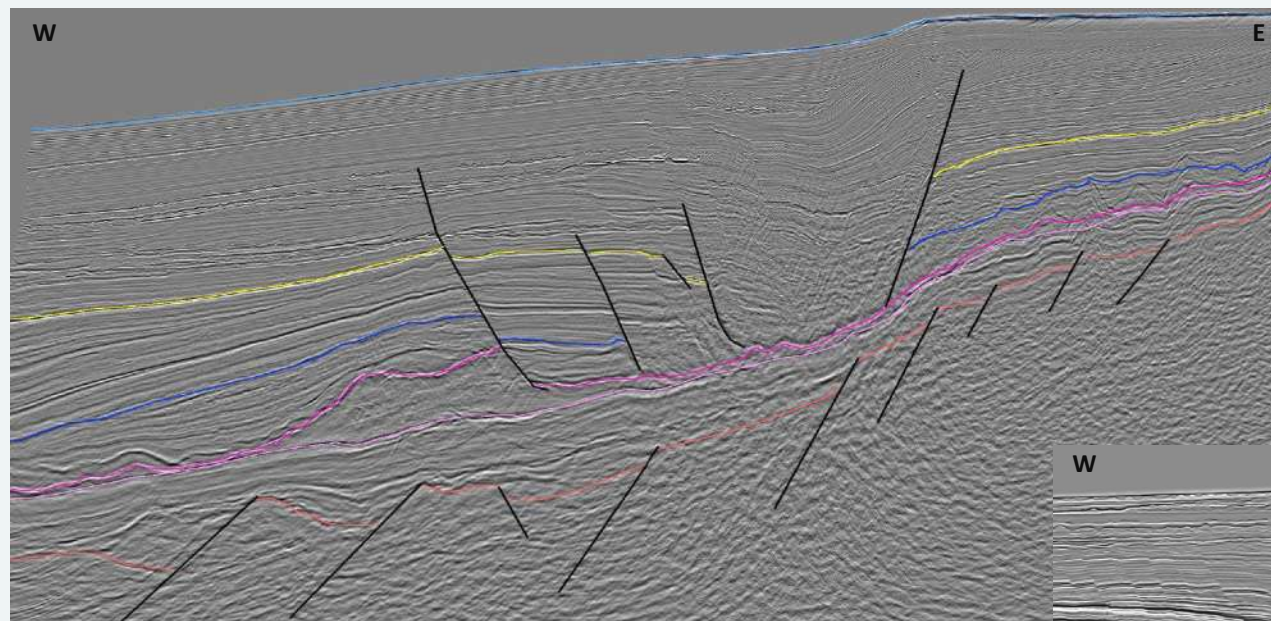
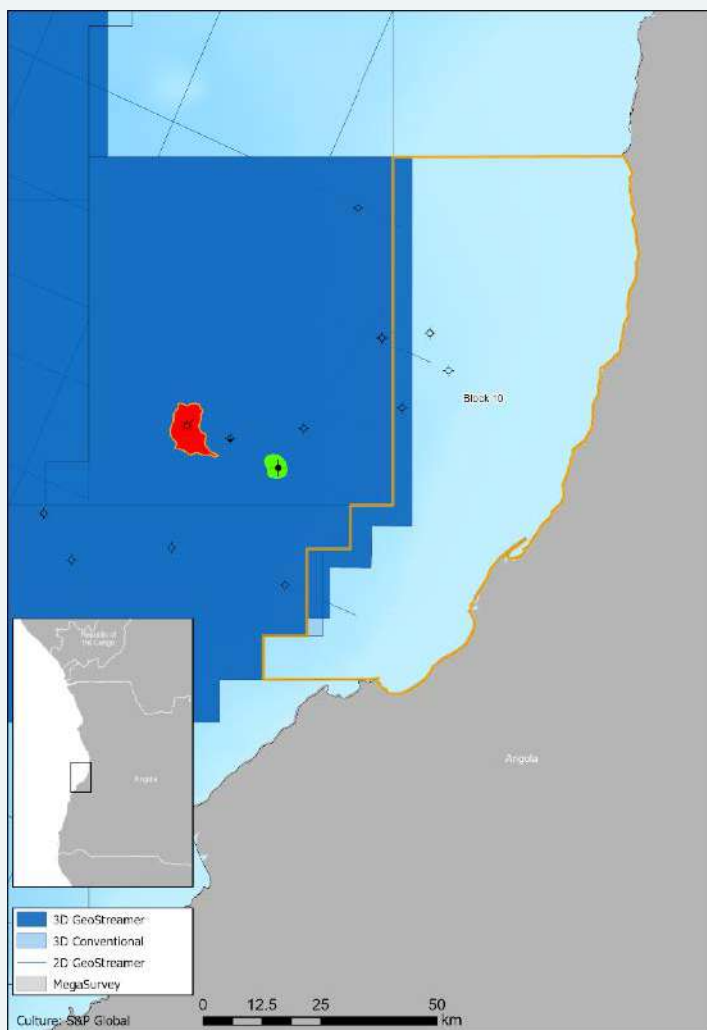


- Trap: Stratigraphic, 4-way closure pinchout structure
- Seal:
 - Salt (Massive Salt)
 - Intraformational shales (Cuvo Formation)
- Source Rock: Lacustrine shales (Cuvo Formation)

EXPLORATION POTENTIAL	
Prospect	Objective
Loengo East	Pre-Salt (Sag and Synrift)

* According to Decree 6/18 on Exploration in Marginal Fields, Dendém-1 well with 780 BOPD is subject to development.

BLOCK 10 OFFSHORE BENGUELA BASIN



AREA: 4 789 km²

Number of wells: 2

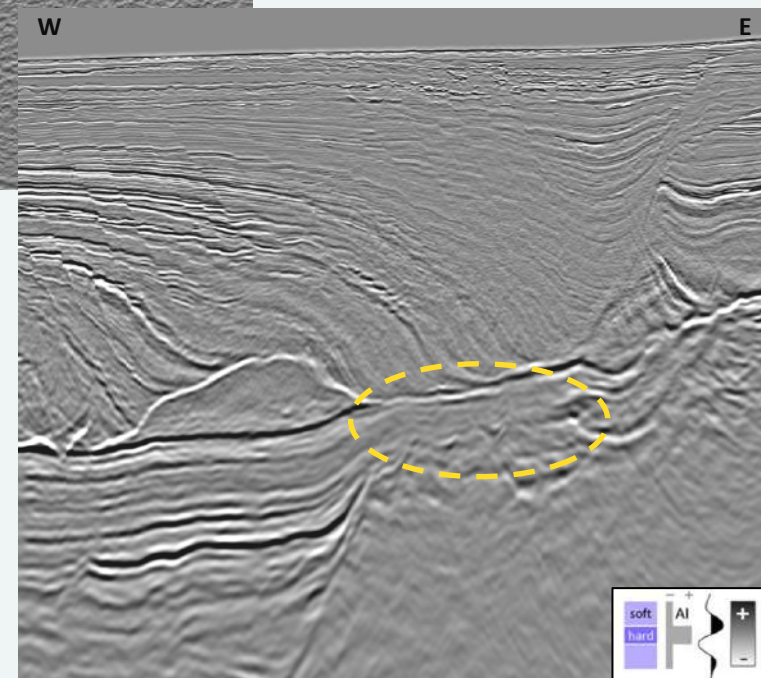
- Ngueve – 1
- Henda – 1
- Seismic 2D: 1 492 km
- Seismic 3D: 1 180,99 km²

Targets:

- Post-salt deepwater channels/fans
- Post-salt Albian rafted carbonates
- Pre-salt carbonates

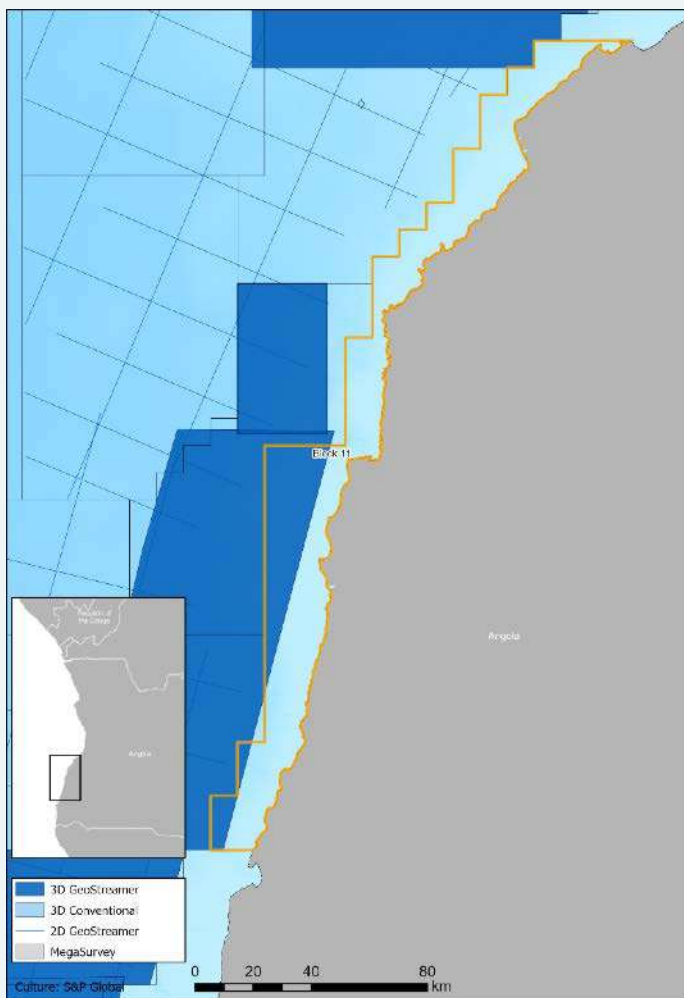
Example Play Concept

- Source: Bucomazi Fm lacustrine shales
- Reservoir: Pre-salt Toca carbonates
- Seal: Salt or Bucomazi Fm shales
- Trap: Structural and stratigraphic pinch-out onto basement highs

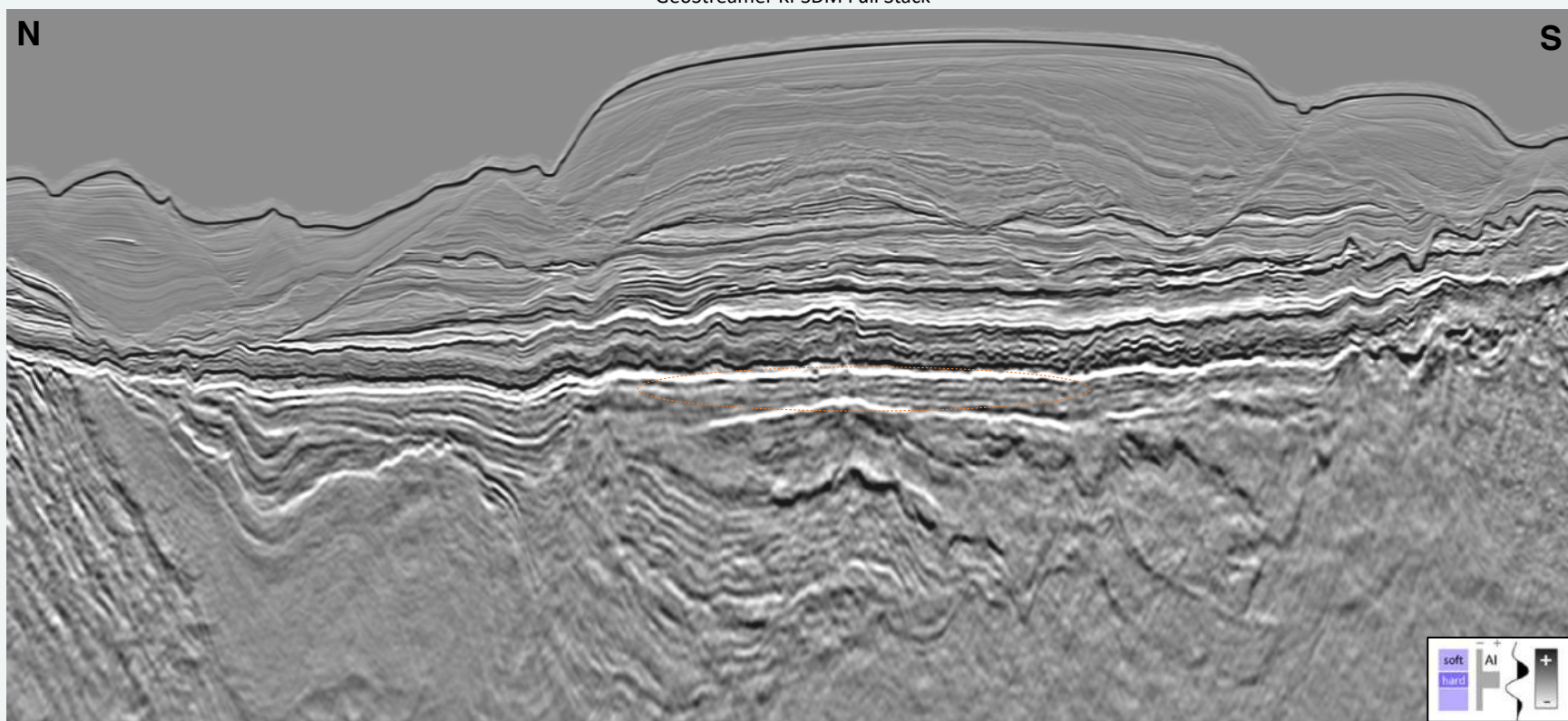


GeoStreamer KPSPDM Full Stack

BLOCK 11 OFFSHORE NAMIBE BASIN



GeoStreamer KPSDM Full Stack



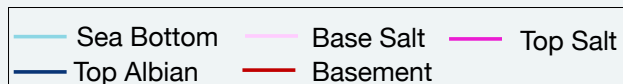
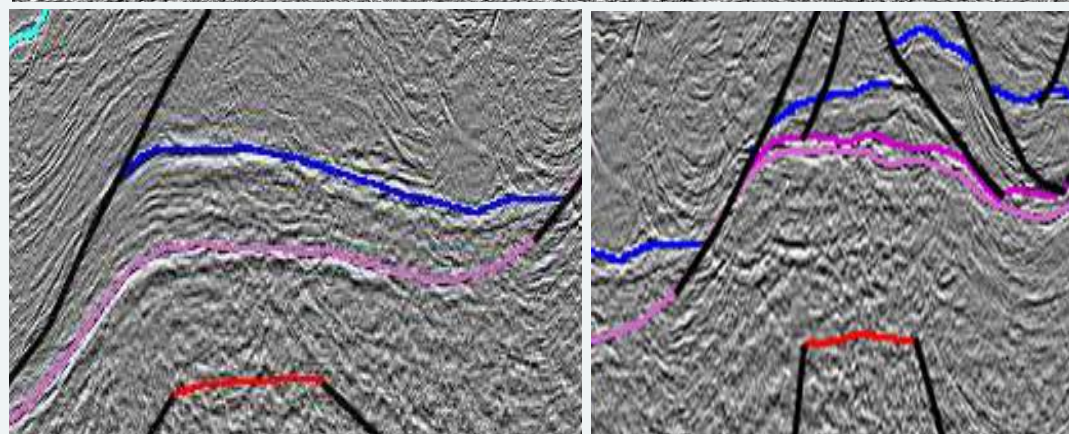
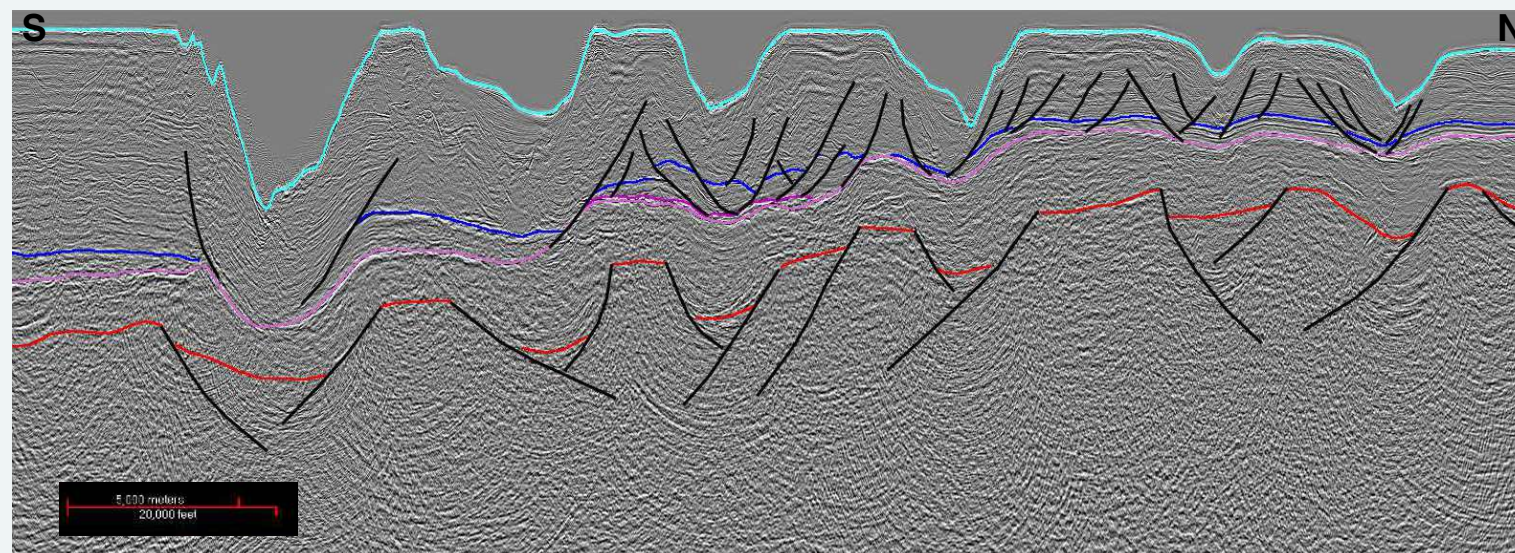
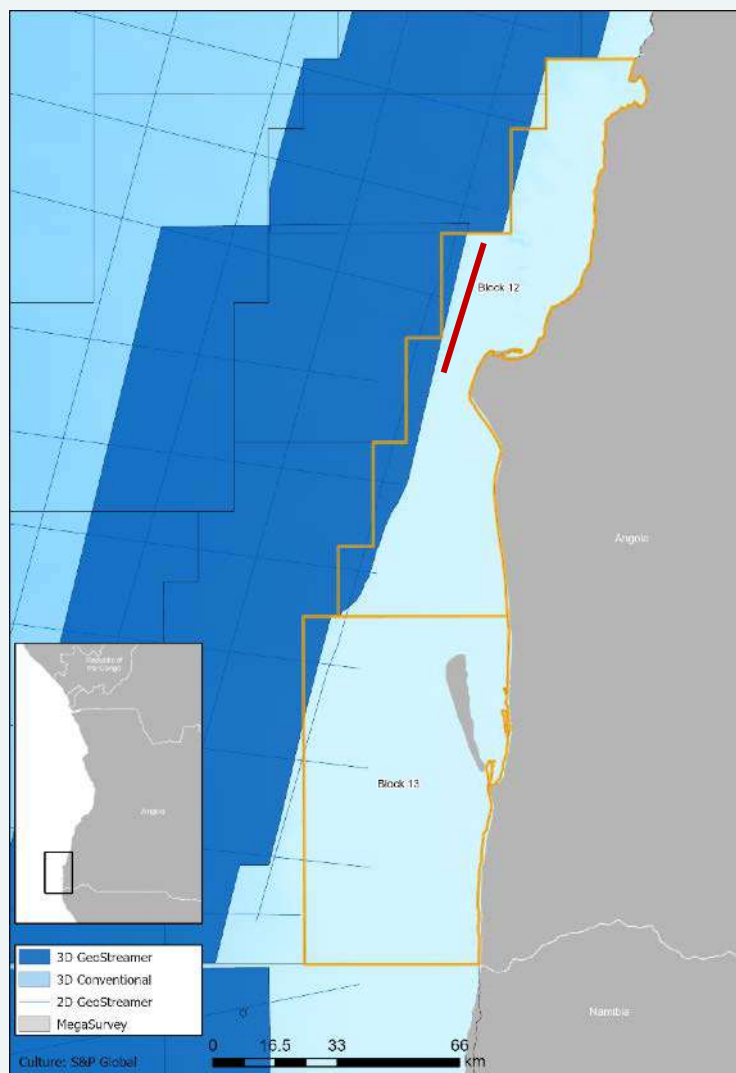
Targets:

- Post-salt deepwater channels
- Pre-salt structures

Example Play Concept

- Source: Bucomazi Fm equivalent lacustrine shales
- Reservoir: Pre-salt Toca carbonates

BLOCK 12 OFFSHORE NAMIBE BASIN



Pre-Salt

Lead-1:

- Source: Clays from Bucomazi equivalent formation
- Reservoir: Microbialites Carbonates
- Seal: Evaporitic layer
- Trap: Combined (Stratigraphic and Structural).

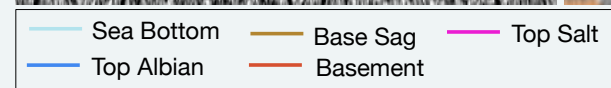
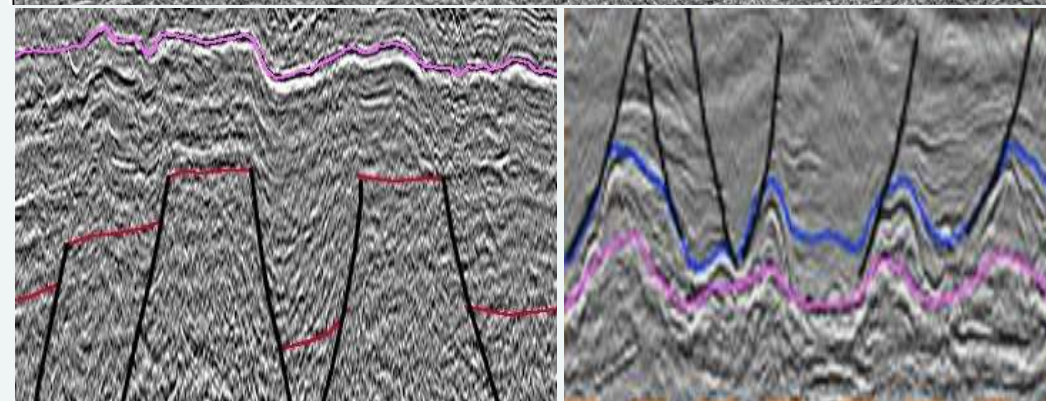
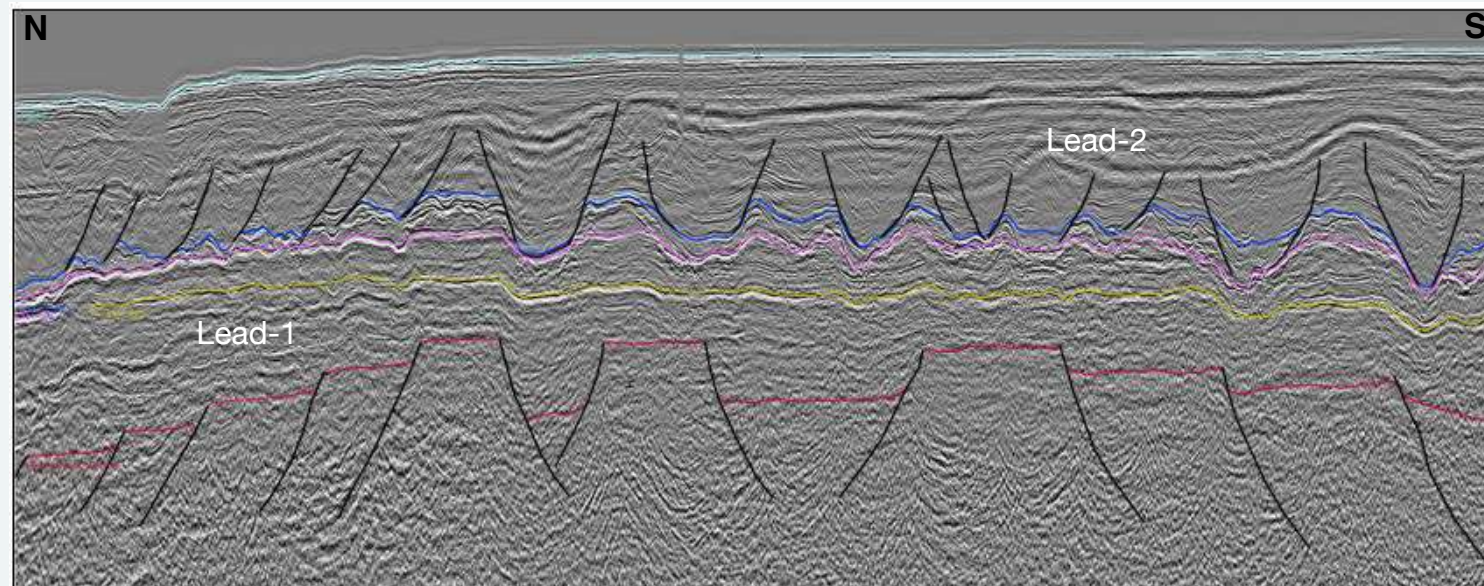
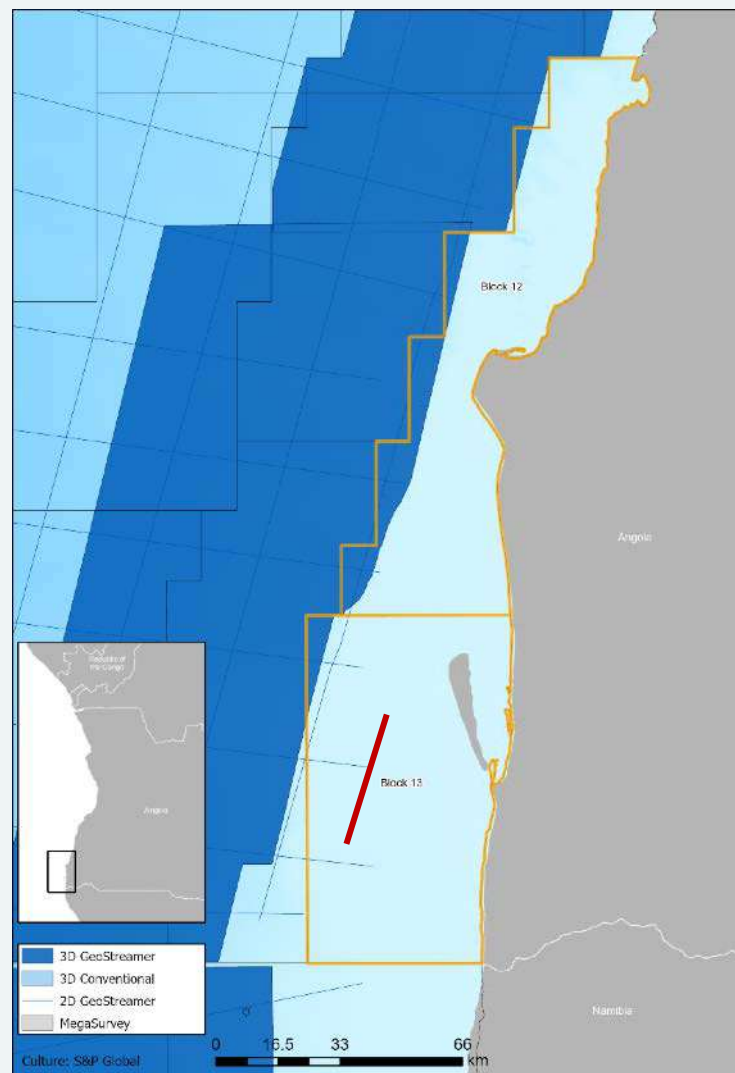
Post-Salt (Albian)

Lead-2:

- Source: Clays from Albian and/or Pre-salt level
- Reservoir: Oolites Carbonates/Sandstones
- Seal: Shales from Upper Cretaceous labe Equivalent formation
- Trap: Combined (Stratigraphic and Structural).

BLOCK 13

OFFSHORE NAMIBE BASIN



Pre-Salt (Sag)

Lead-1:

- Source: Clays from Bucomazi equivalent Formation
- Reservoir: Carbonates
- Seal: Evaporitic layer
- Trap: Combination (Stratigraphic and Structural)

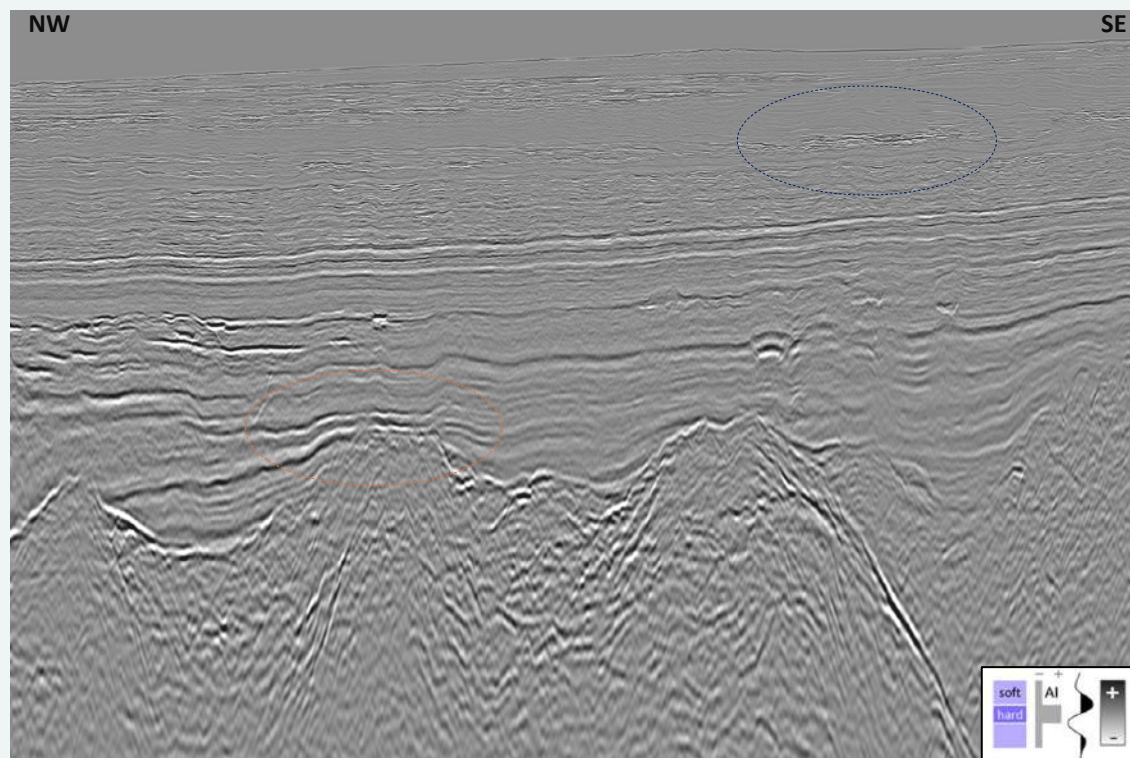
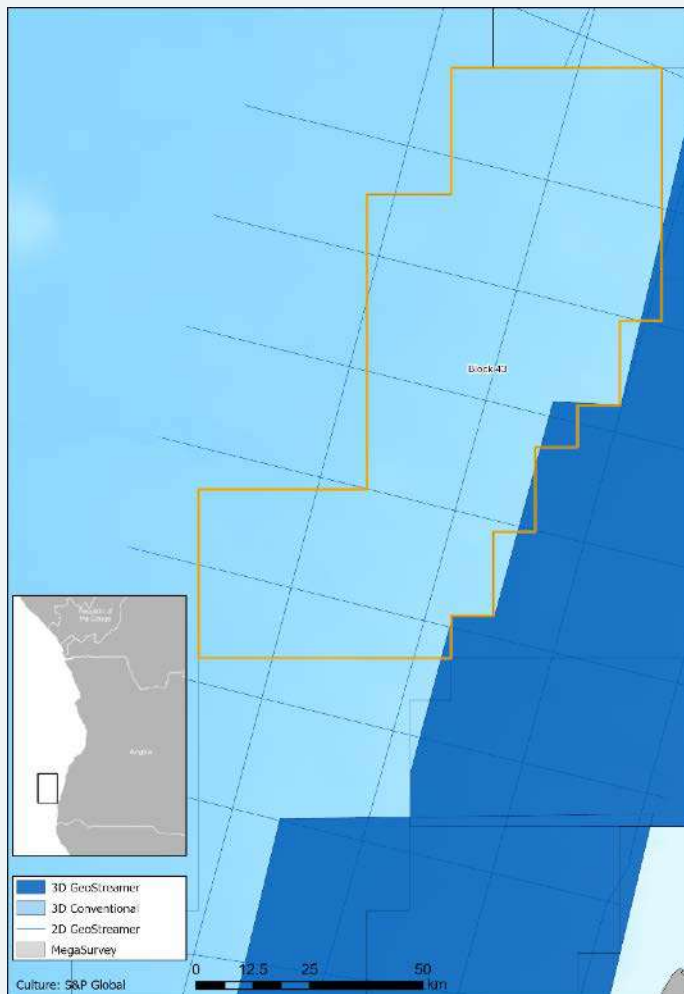
Post-Salt (Albian)

Lead-2:

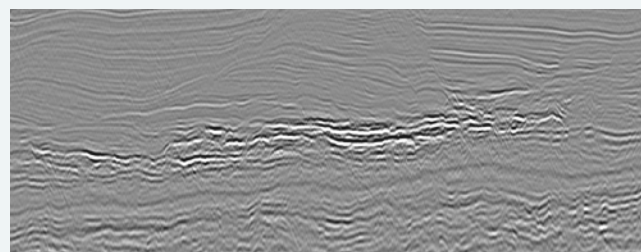
- Source: Clays from Albian and/or Pre-salt level
- Reservoir: Oolites Carbonates/Sandstones
- Seal: Shales from Upper Cretaceous in the labe eqt. formation
- Trap: Combination (Stratigraphic and Structural)

BLOCK 43

OFFSHORE NAMIBE BASIN



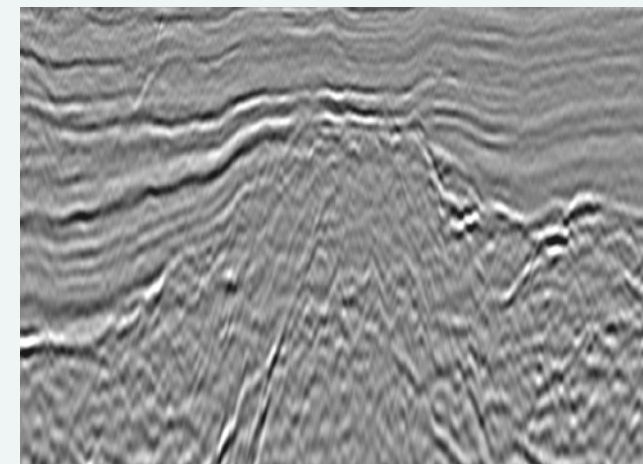
GeoStreamer KPSDM Full Stack



GeoStreamer KPSDM Full Stack

Targets:

- Post-salt deepwater channels/fans
- Pre-salt carbonates



GeoStreamer KPSDM Full Stack

Example Play Concept

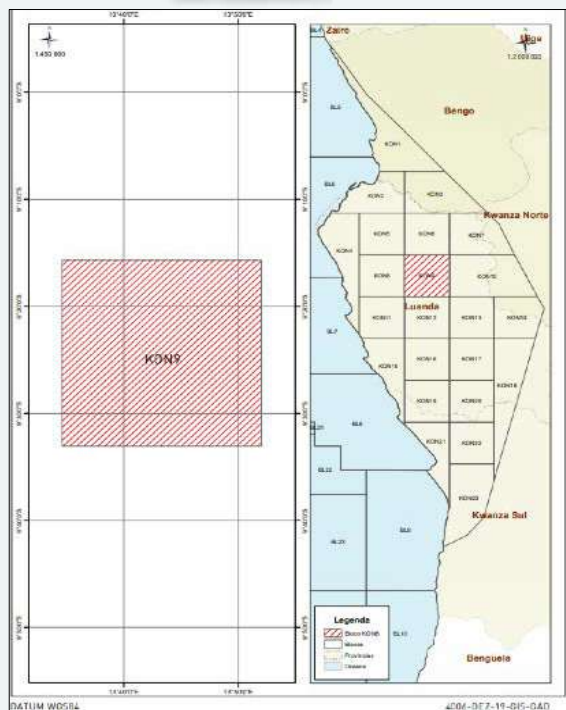
- Source: Pre-salt Bucomazi Fm lacustrine shales, Upper Cretaceous labe marine shales or localised Albian source facies
- Reservoir: Tertiary clastics
- Seal: Tertiary marine shales
- Trap: Stratigraphic

Example Play Concept

- Source: Pre-salt Bucomazi Fm lacustrine shales
- Reservoir: Pre-salt carbonates
- Seal: Bucomazi Fm shales
- Trap: Structural

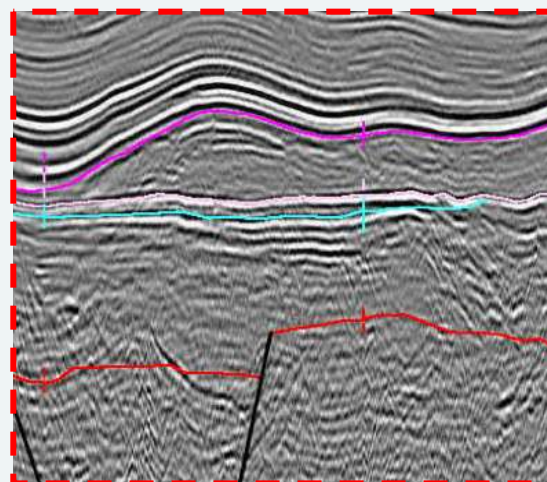
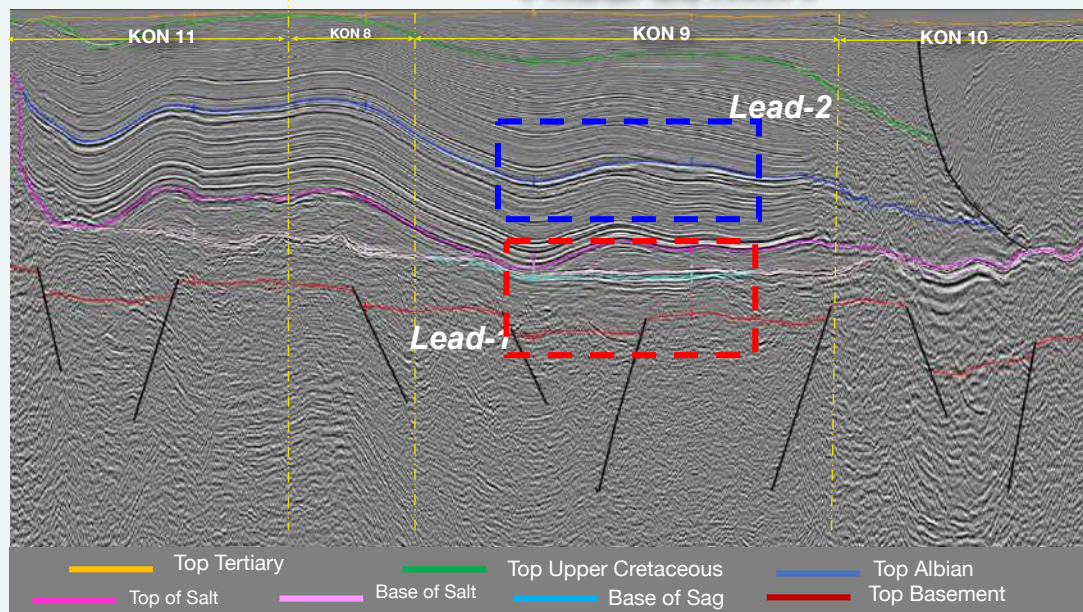
BLOCK KON9 ONSHORE KWANZA BASIN

Location



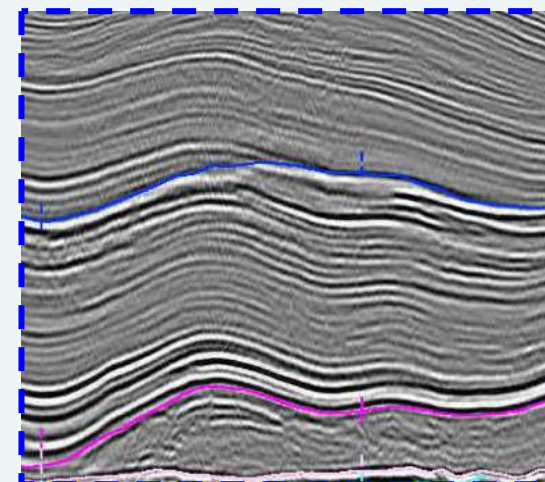
North: Block KON 6
East: Block KON 10
South: Block KON 12
West: Block KON 8
Area: 1 024 km²

PROSPECTIVITY



Pre-Salt Lead-1

- **Source-rock:** Shales of the Red Cuvo Fm. Vermelho
- **Reservoir:** Carbonates & Sandstones of the Chela Fm eq.
- **Seal:** Evaporites of the Sal Maciço Fm.
- **Trap:** Combined



Post-Salt Lead-2

- **Source-rock:** Shales of the Binga Fm.
- **Reservoir:** Oolitic Carbonates of the Binga Fm and Sandstones
- **Seal:** The salted Facies of the Tuenza Fm or the shales of the Quissonde Fm.
- **Trap:** Combined

EXPLORATION OPPORTUNITIES PERMANENT OFFER BLOCKS

