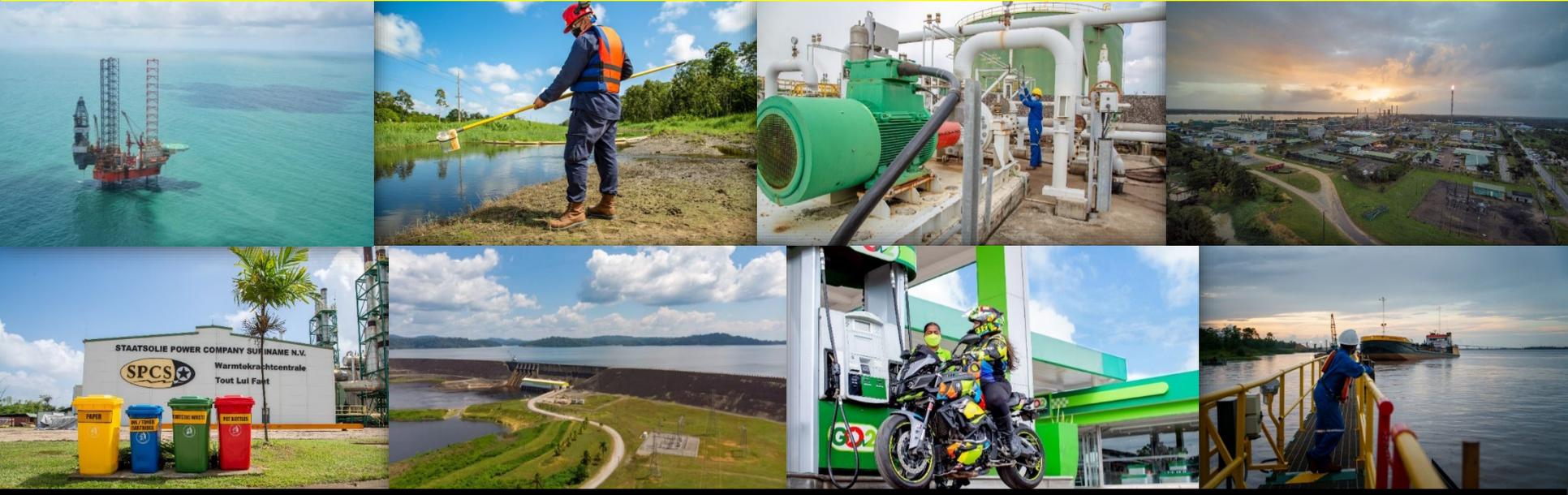


Creating value and unlocking opportunities in the Offshore



Patrick Loys Brunings
August 2022



Confidence in our own abilities



**EXPLORATION
SUCCESS**



**Expand Basin
Knowledge**

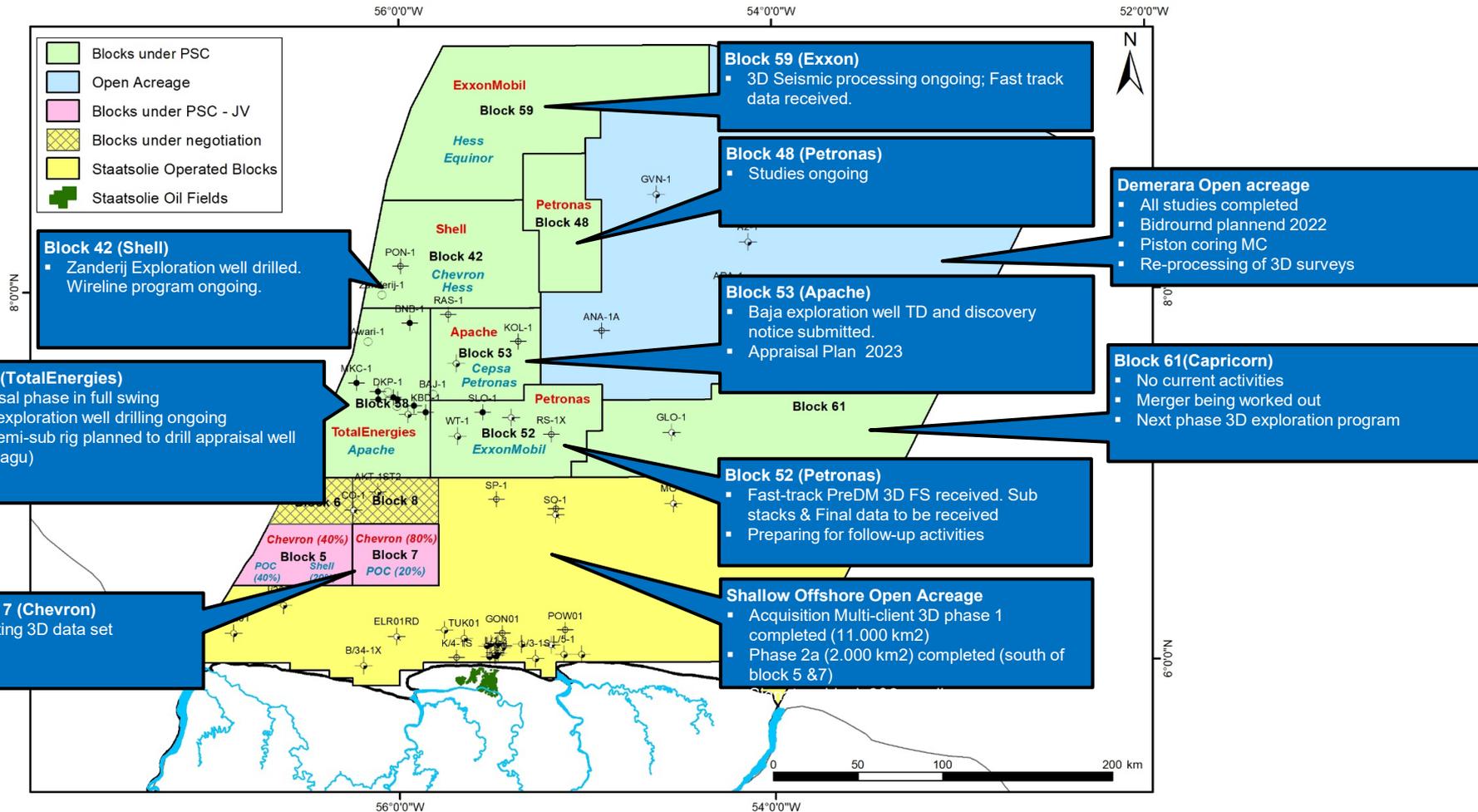


Generate data

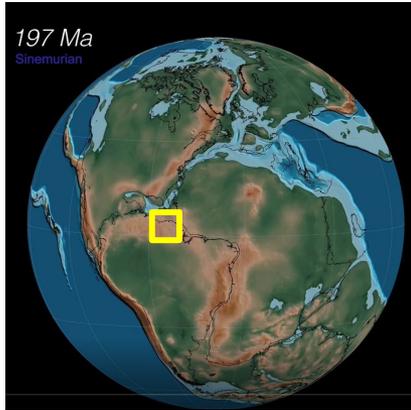


Strategic partnerships

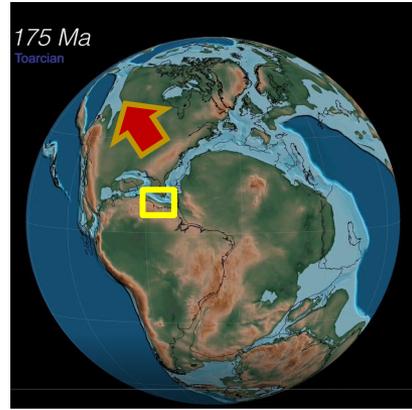
CURRENT EXPLORATION & APPRAISAL ACTIVITIES



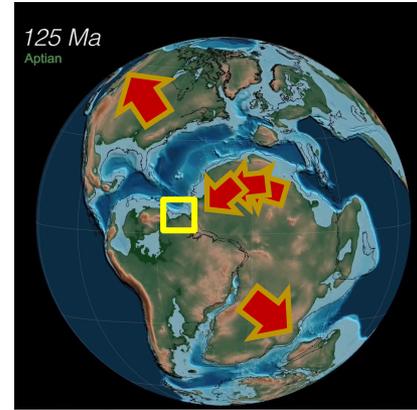
Evolution of the Guiana Basin



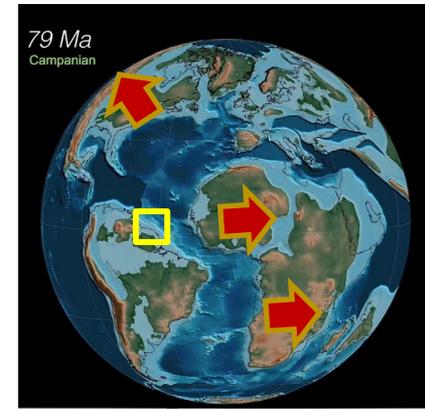
Early Jurassic
Pre-Kinematic
CAMP Magmatism



Middle Jurassic
Central Atlantic Rift
Phase
and Passive Margin I
development



Early Cretaceous
Equatorial Atlantic
Rift Phase



Upper Cretaceous
Drift and Passive
Margin II
development

Suriname in a unique geographic position related to major tectonic events in terms of structural elements, sedimentary processes, source rock-, reservoir- and trap formation, resulting in **different provinces**.

Provinces

Deep Basin Province:

- Proven province (discoveries) **golden lane**
- Canje source rock mature.
- Mainly stratigraphic plays.
- Activities: Exploration and Appraisal activities ongoing in Suriname.
- Production in Guyana.

Demerara Province:

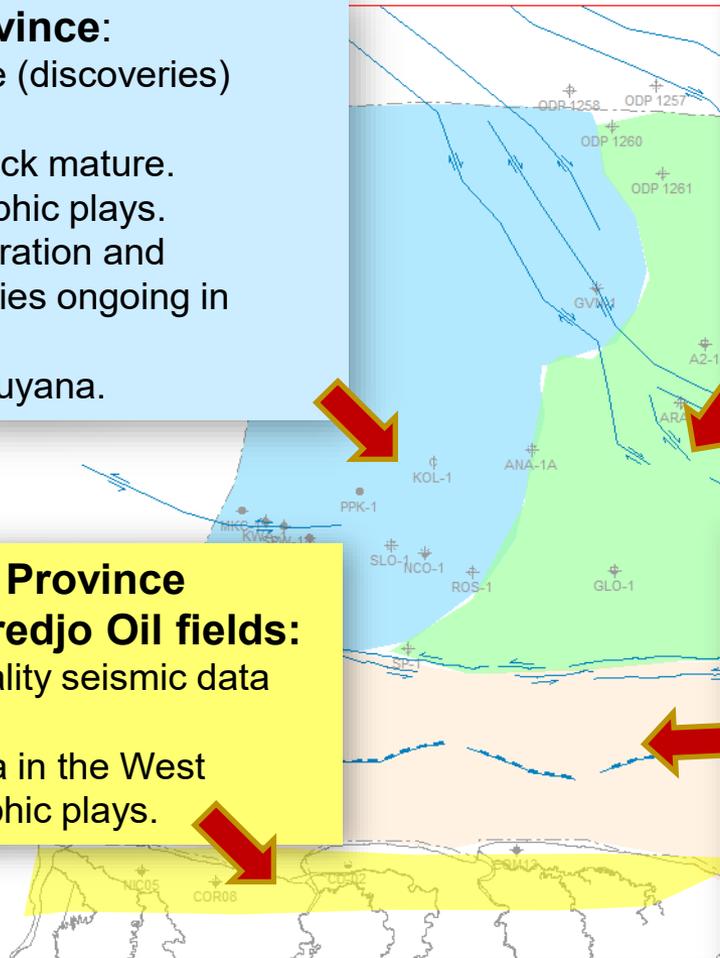
- Grossly underexplored in terms of wells drilled
- Part from stratigraphic plays also structural elements
- Finalizing basin studies to de-risk in terms of charge/migration and reservoir.

On shore Province outside Tambaredjo Oil fields:

- Lack of high-quality seismic data and no 3D data
- Limited well data in the West
- Mainly stratigraphic plays.

Shelf Province:

- Lack of high-quality seismic data apart from Block 5
- Conducting multiclient 3D seismic data acquisition to de-risk trap. Contract flexible to extend to other areas
- Mainly stratigraphic plays.
- Basin studies and seismic interpretations to de-risk charge/migration.
- 80% still open acreage

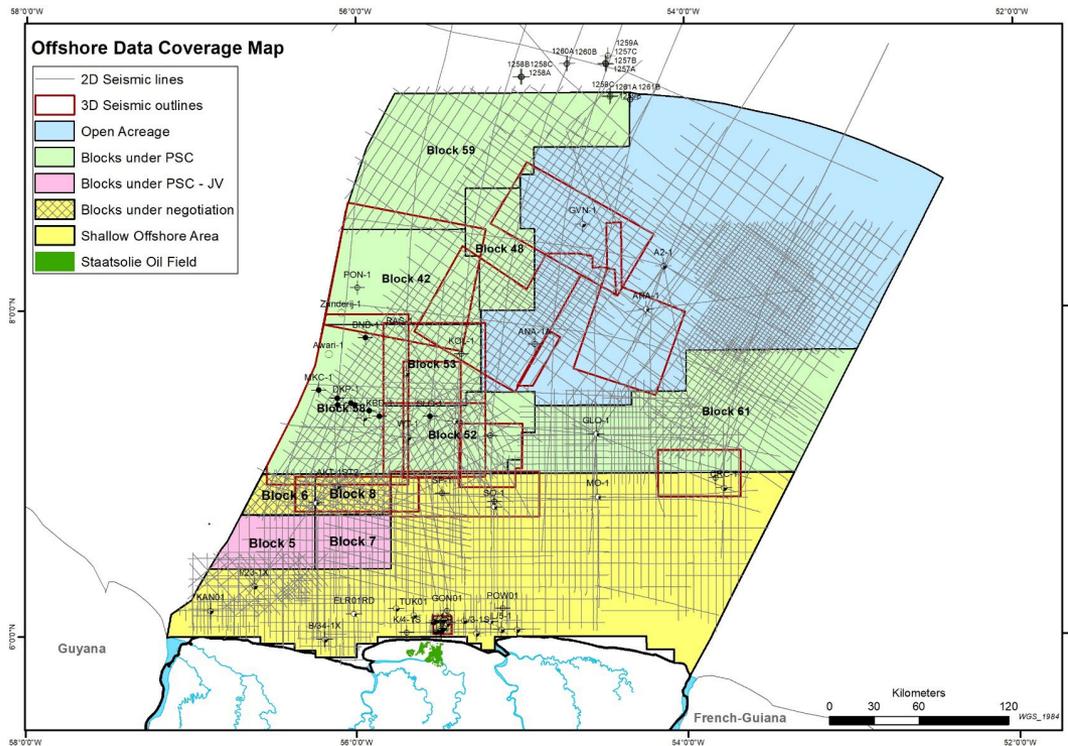


Building blocks for value creation

- Maximize value of existing data in the basin
- Generate new data
- Develop basin knowledge through basin wide studies
- Internalize knowledge of IOCs and International Service Providers to further expand knowledge
- Share basin knowledge to make all parties conducting petroleum activities successful
- Actively participate in Offshore activities
- Offer opportunities to invest (Multi Clients surveys, Bid Round, Open door, Farm-in)
- Become the operator in some of the Assets (Blocks)
- Develop skilled local resources pool



Data in the Basin - Seismic Mega merge project



Offshore data available:

- 17 Gravity & 19 Magnetic datasets.
- 2D/3D Seismic data (25630 sqkm 3D and 113963 km 2D seismic)
- 59 wells (excl. ODP wells). Well data may include: logs, rock and fluid samples, Petrophysical analysis, biostratigraphy and geochemical data and reports, PVT, Source rock extraction data).

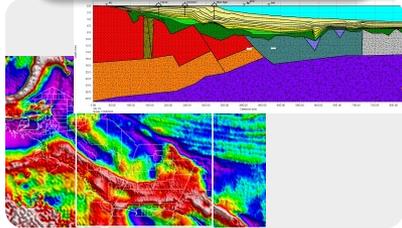
Seismic Mega merge project

- Tender & Select company for mega merge
- Conduct project

Basin Studies and Open Acreage Evaluation Workflow

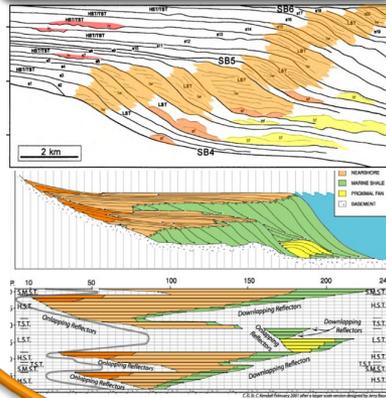
Gravity & Magnetics update Project

- Updated Gravity and Magnetic 2D Models (ION)
- Interpretations of Structural trends, Crustal architecture, Regional tectonics, sedimentary lithology and Igneous bodies.



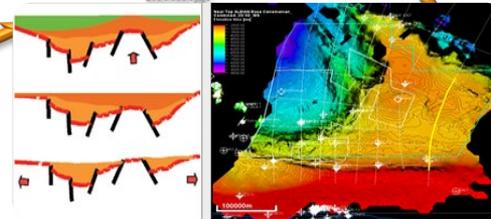
Sequence Stratigraphy Project

- Review of the Biostratigraphy
- A chronostratigraphic chart
- A sequence stratigraphic framework



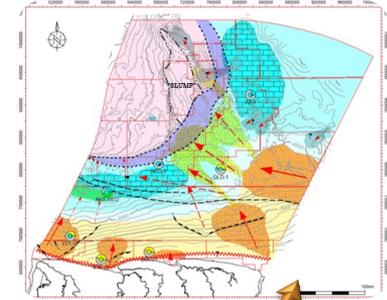
Structural Reconstructions Project

- Restored Selected Hero lines (ION) with detail description of the structural and stratigraphic history.
- Depositional trends, Erosion maps, Paleo-structure map.
- Paleo Heat flow estimates from structure-tectonic framework to predict maturation location and



Update/build new GDE Maps

- Updated GDE maps
- Facies maps

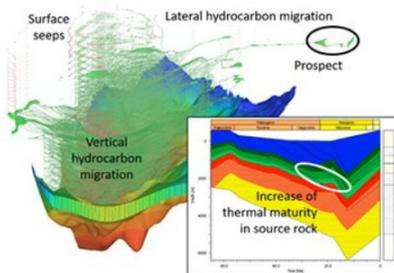


Basin Focus (Understanding PS) 2022

Basin Studies and Open Acreage Evaluation Workflow

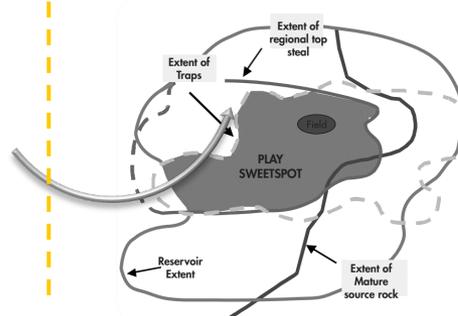
Petroleum Systems Modelling

- Review of the new Oil and Source rock Geochem data.
- Source rocks, hydrocarbon generation and adsorption modeling
- Hydrocarbon expulsion migration – accumulation modeling.
- Build a PSM calibrated with all data (new discoveries, outputs from new basin studies) to help quantify the location and timing of petroleum expulsion from source rock(s), volumes and composition of the products, and migration pathways.
- PS events chart(s)



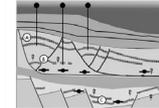
Play Mapping

- Play inventory
- Play Common Risk Segment Maps (Reservoir, Seal, Source Rock, Migration, ..)
- Play Sweet Spots Maps



Building play optionality into the Venture Plan

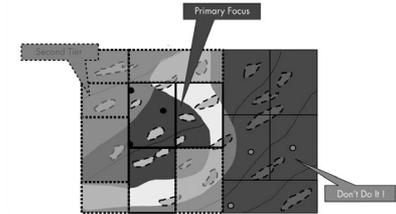
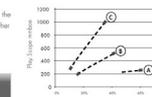
A typical basin venture will contain several plays and often each of these or different stages of understanding and hence risk maturity. Ideally, Venture Plans should be built with a clear view of the play scope or ability to deliver DRE volumes together with the information needs of each of the plays, key decision points and an understanding of the possible interrelationships between plays.



In this schematic example, Play A is proven and mature, B is technically proven but still poorly understood and C is largely conceptual but with significant scope.

The variety of these plays requires a different approach for the evaluation plans for each.

Play Stage vs Pk6



Lead Portfolio

- Lead Portfolio for the Open Acreages in the Basin.

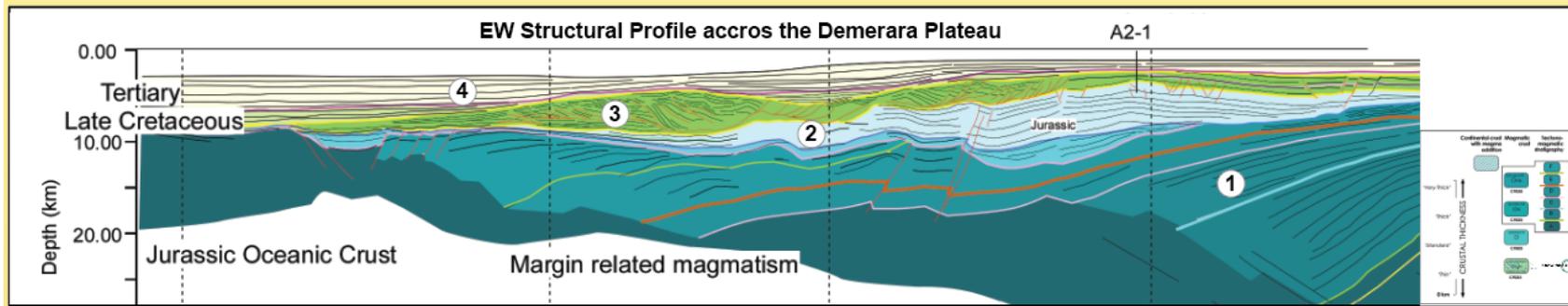
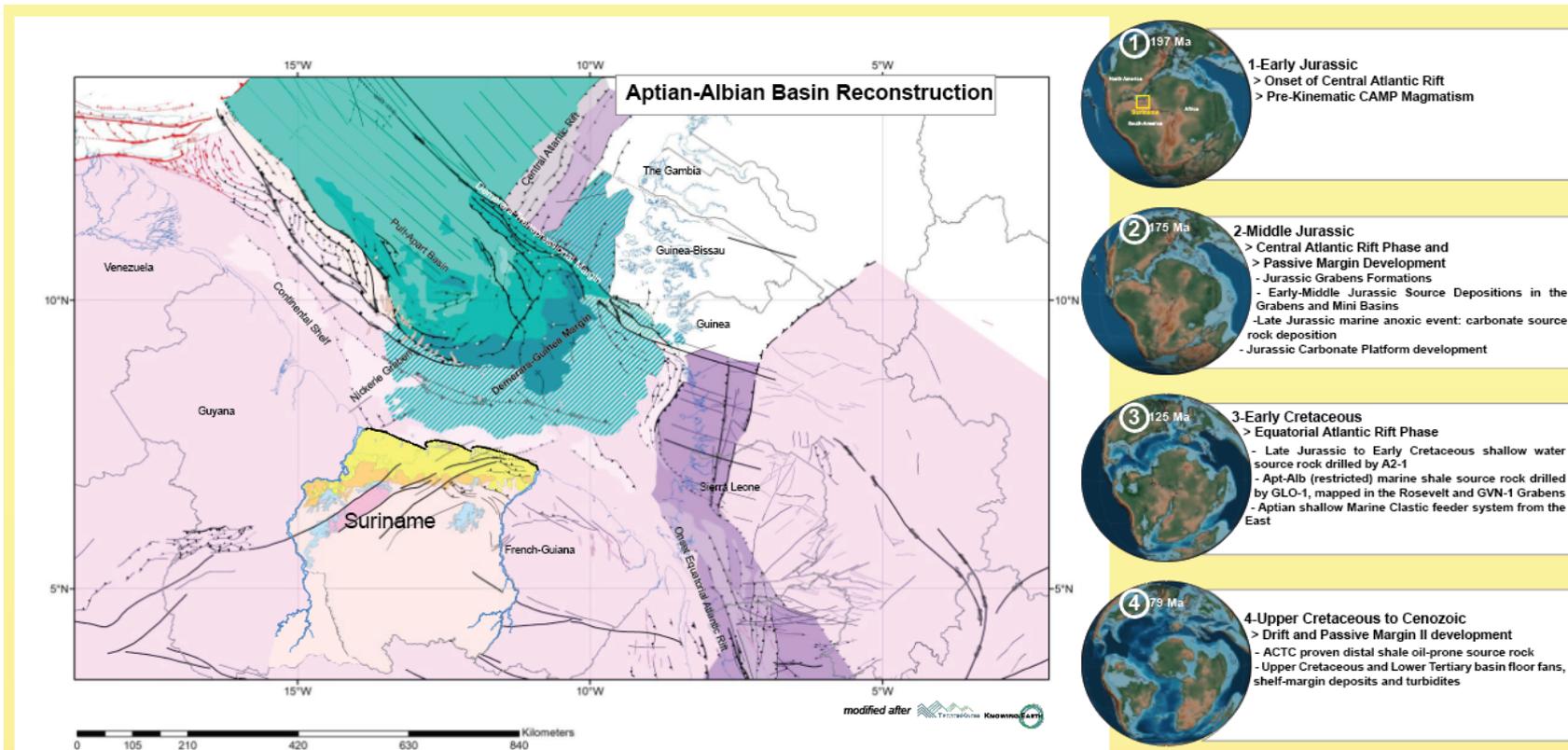
Prospect Portfolio

- Mature the top ranked Leads to Prospects (if needed) with geological models, volume calculations, risks and uncertainties estimates.
- Prospect Portfolio

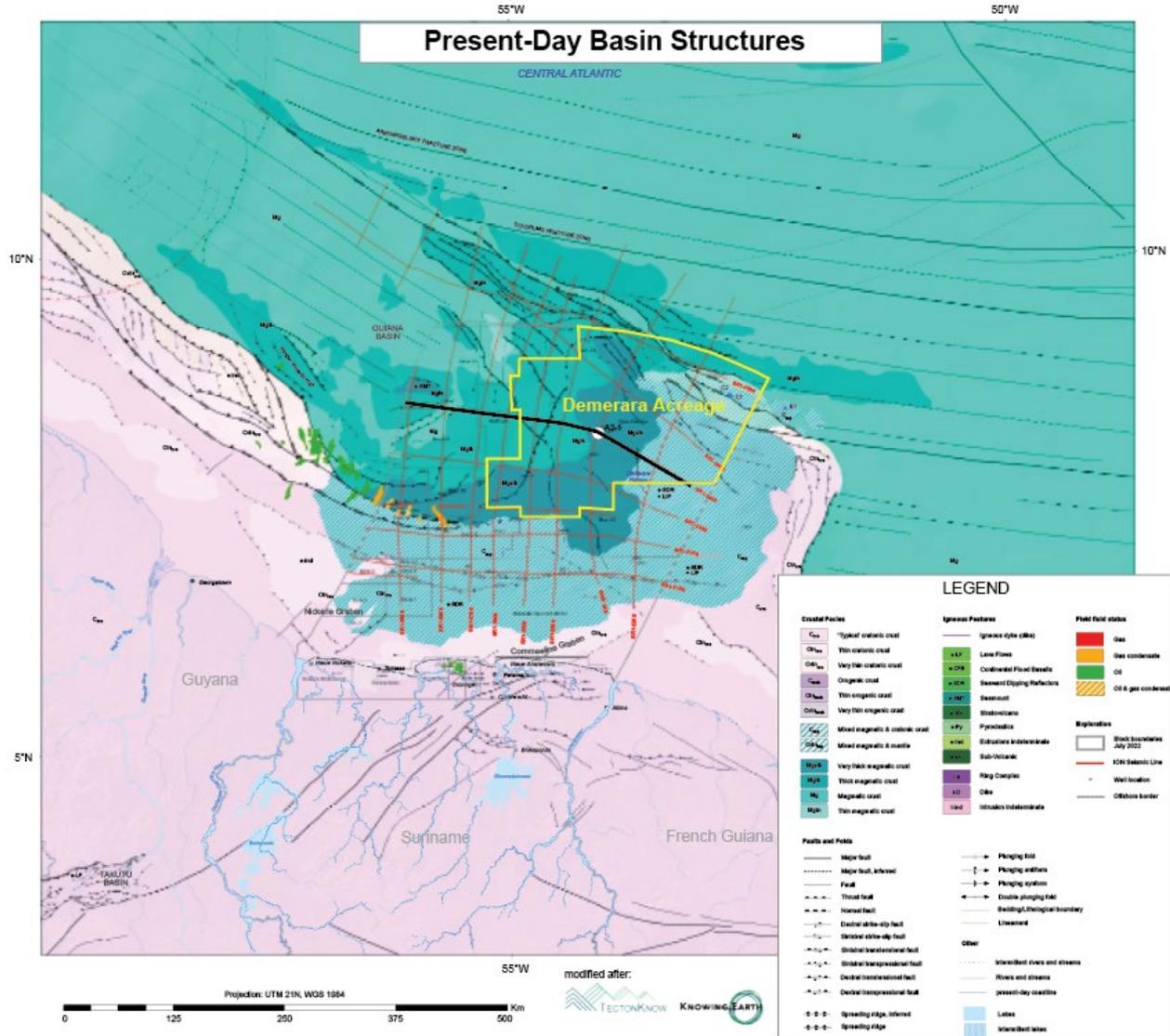
Basin Focus 2022

Play Focus (Understanding Plays) 2023

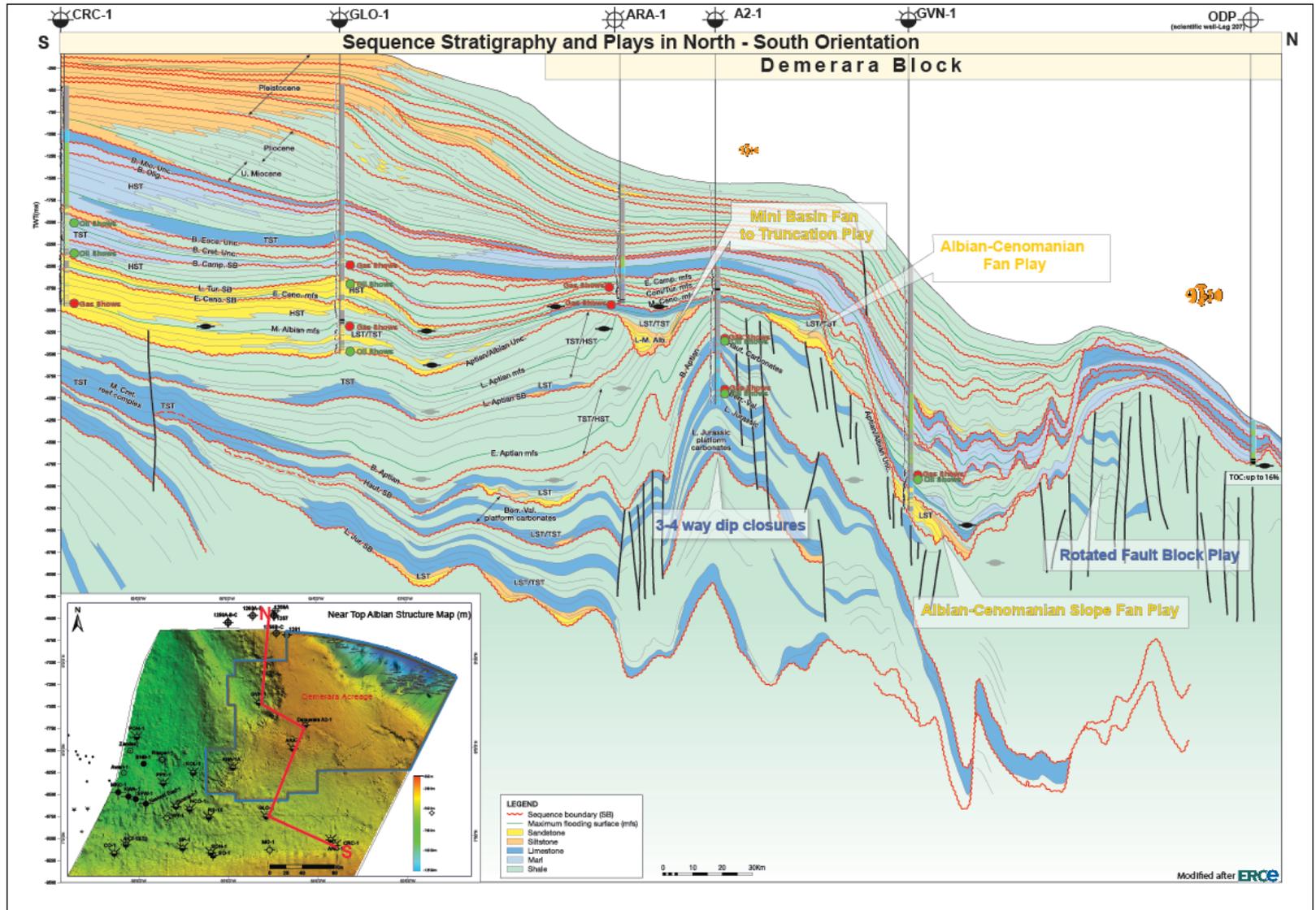
Preliminary results Basin Studies



Preliminary results Basin Studies



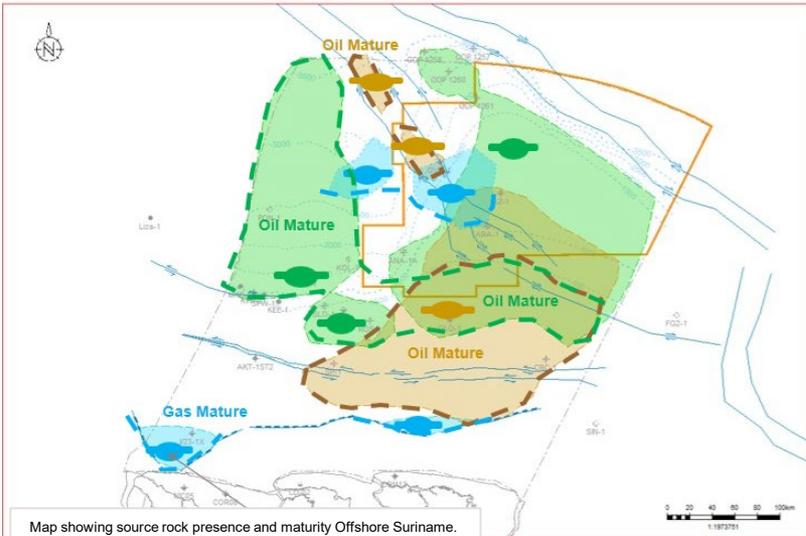
Preliminary results Basin Studies



Basin Studies results in final phase

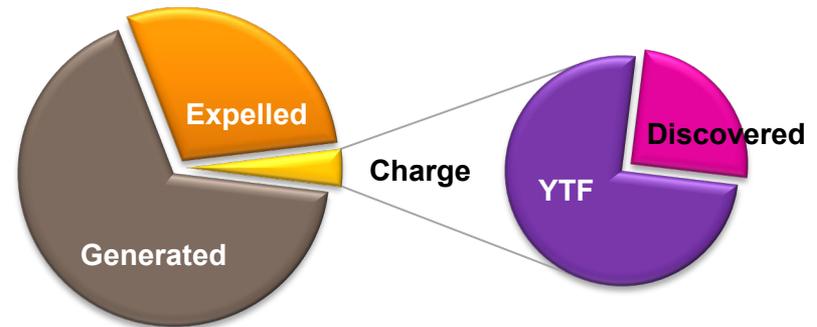
- Gravity & Magnetic update Project:
- Sequence Stratigraphy Project:
- Structural Reconstruction Project: 
- Geochemical Database Update Project:
- Better understanding of the **structural** and **stratigraphic evolution** that has improved the **gross depositional environmental mapping** and is allowing better prediction of reservoir/seal, and source rock presence in the Basin.
- Geochem studies have provided new insights on the oil and gas analysis, and source **rock** type and is **significantly improving the maturity and migration modeling and timing.**

Significant upside HC potential



- Critical inputs into the PS model will decide the predicted volumes and phase estimation more precise.
- Models run in the Basin were based on different input parameters and therefore differ in volumes and phase.
- The basin studies just presented attempt to more accurately predict the input parameters so we can better estimate hydrocarbon volumes and phases for the Basin.
- With each critical well result (discovery/dry) the PSM should be updated.

(billions bbls)	Oil Generated	Oil Expelled	Oil Charge
Cretaceous Source Rocks	831	29 - 300	3 - 29
Jurassic Source Rocks	356	13 - 134	1 - 13
Total	1,187	42 - 434	4 - 42

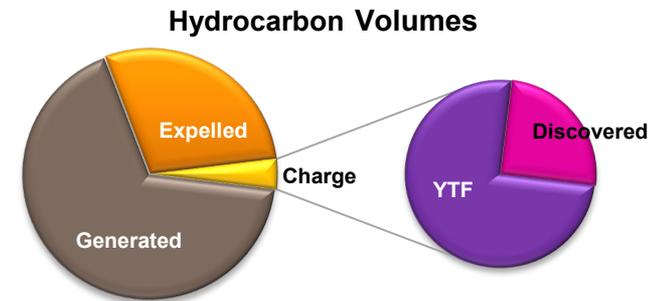


Basin Studies Update

Petroleum Systems Modelling Project

This Petroleum System (PS) Model will be updated with all new insights from the Basin Studies and will allow to more accurately predict the input parameters for better estimation of the HC volumes & phase and charge & migration. These new insights are:

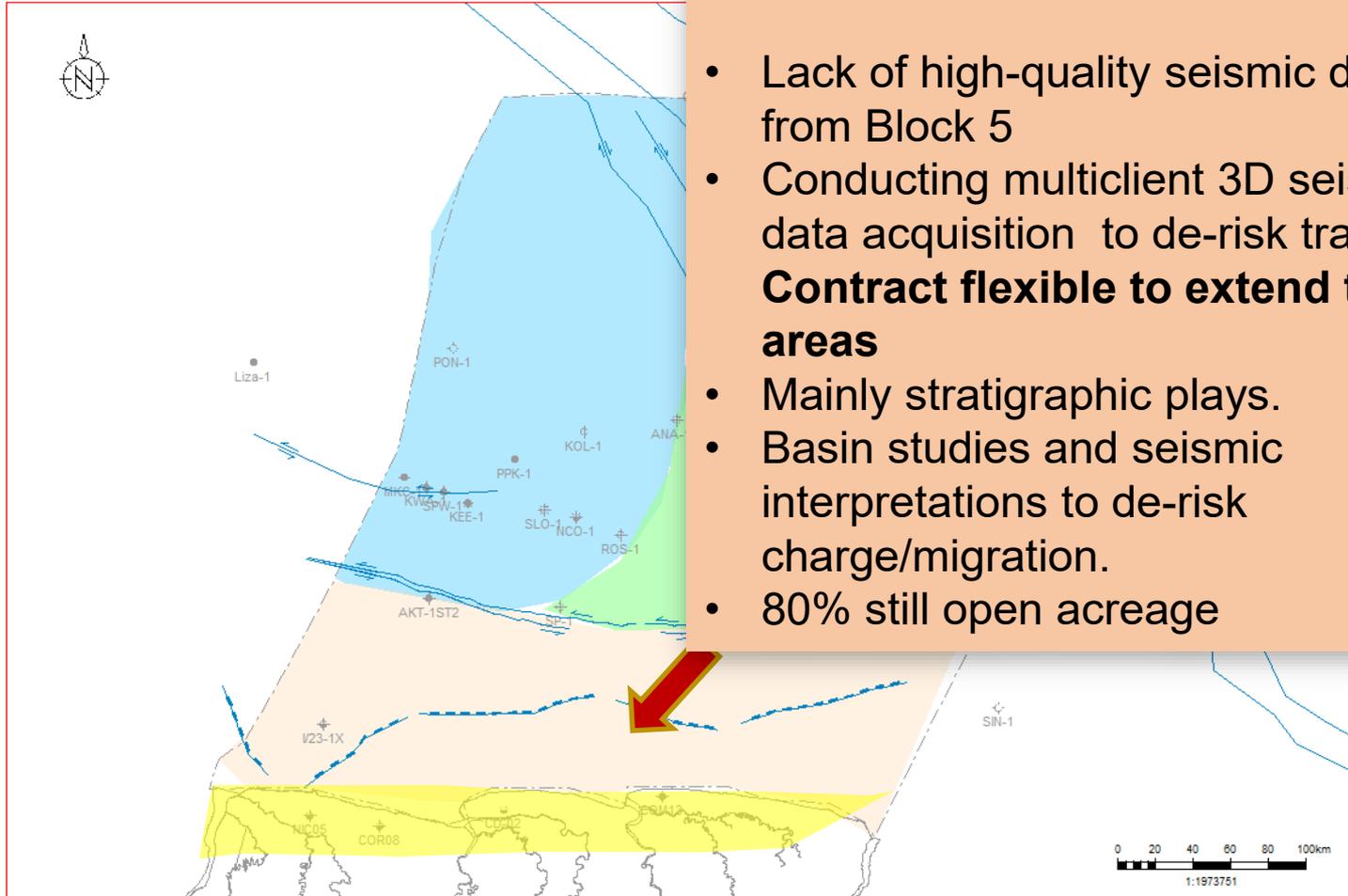
- New Paleo-reconstructed depth surfaces and erosion estimates.
- New Paleo-Heat flow input from updated crustal model.
- Updated GDE maps for litho-facies distribution (Reservoir – Seal – Source Rock).
- New multiple source rock facies and varying maturity trends input from oil, gas and source rock analysis.
- New well data.



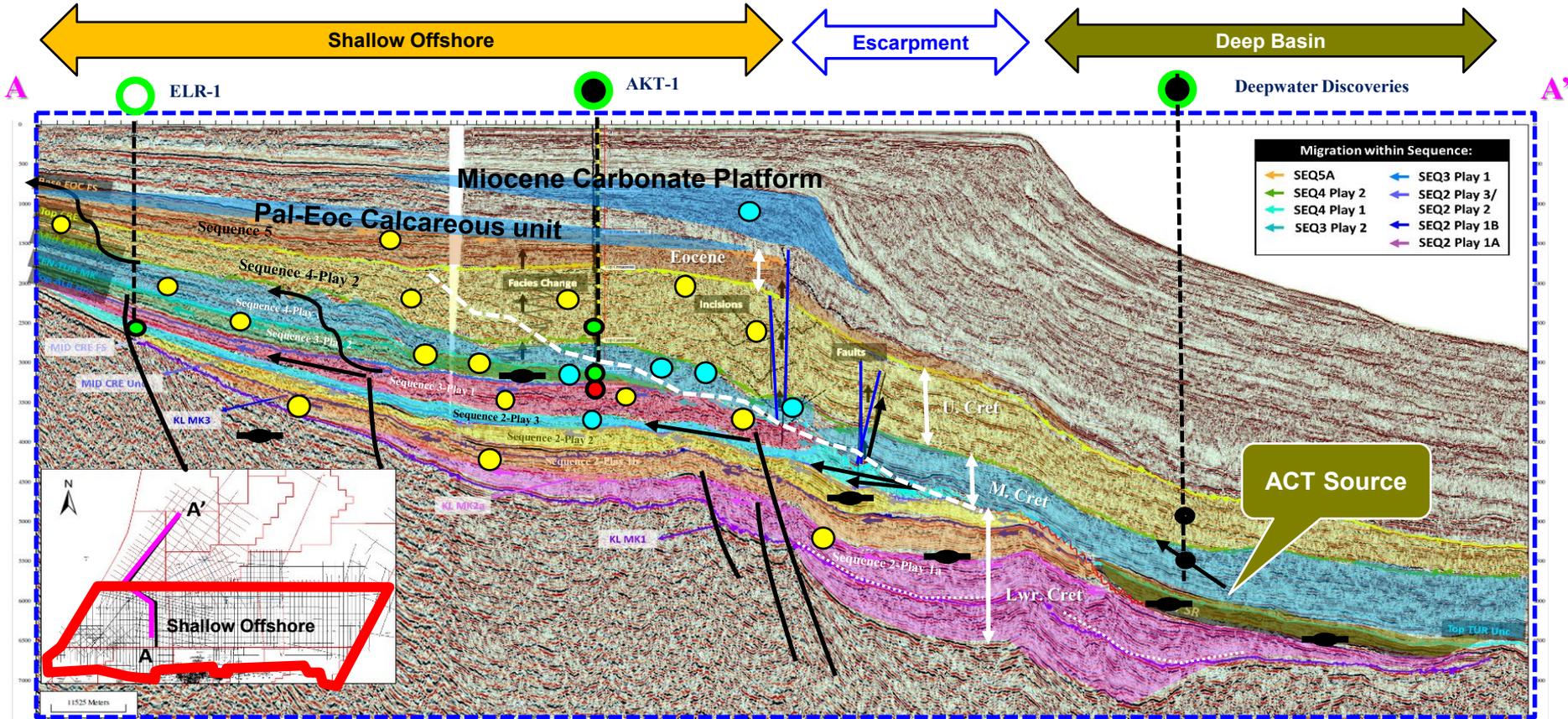
Shelf Province

Shelf Province (Shallow Offshore):

- Lack of high-quality seismic data apart from Block 5
- Conducting multiclient 3D seismic data acquisition to de-risk trap.
Contract flexible to extend to other areas
- Mainly stratigraphic plays.
- Basin studies and seismic interpretations to de-risk charge/migration.
- 80% still open acreage



Regional Subsurface Structural-Geo Context



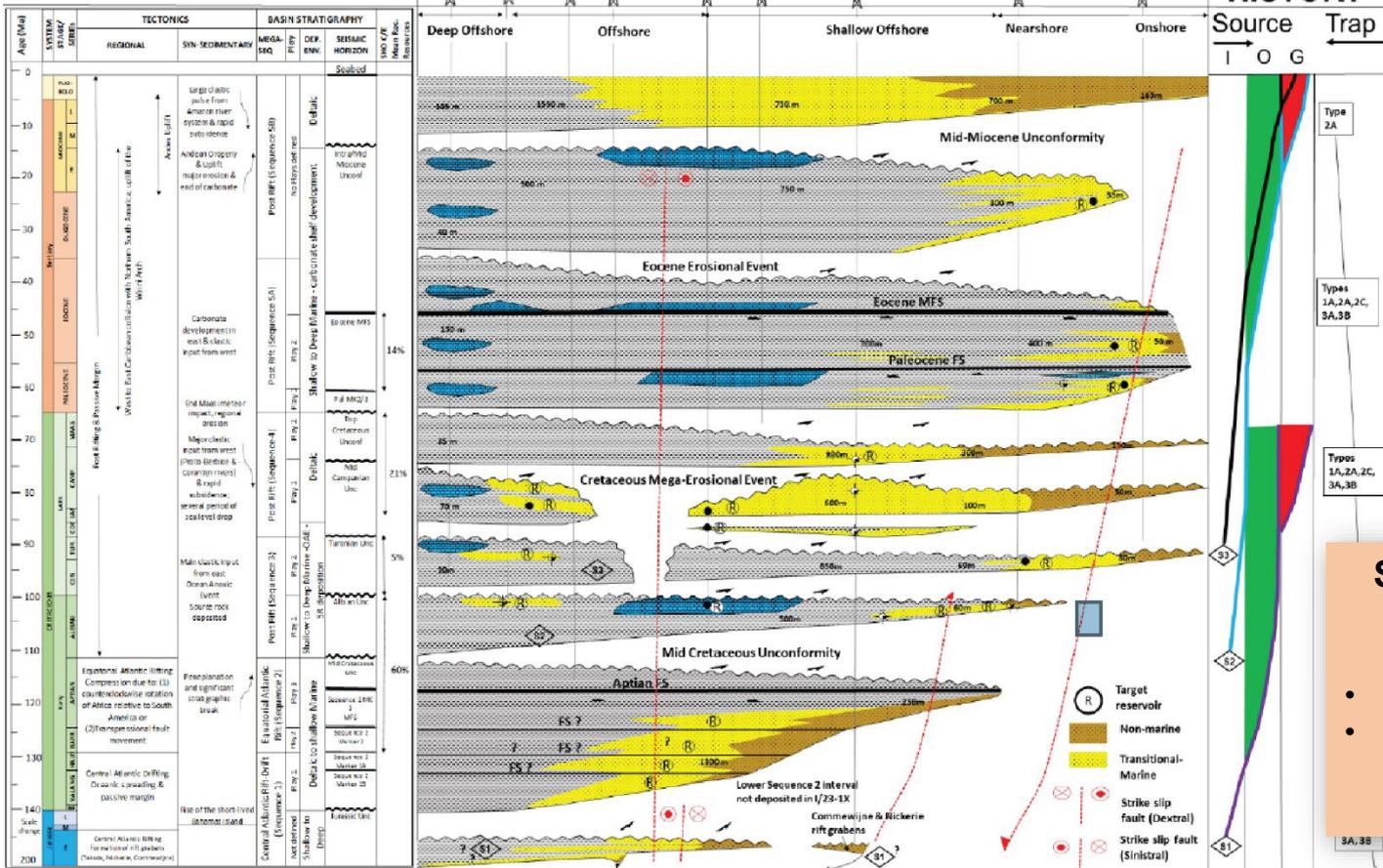
Shelf Province

STAATSOLIE

TECTONICS / BASIN STRATIGRAPHY

CHRONOSTRATIGRAPHY

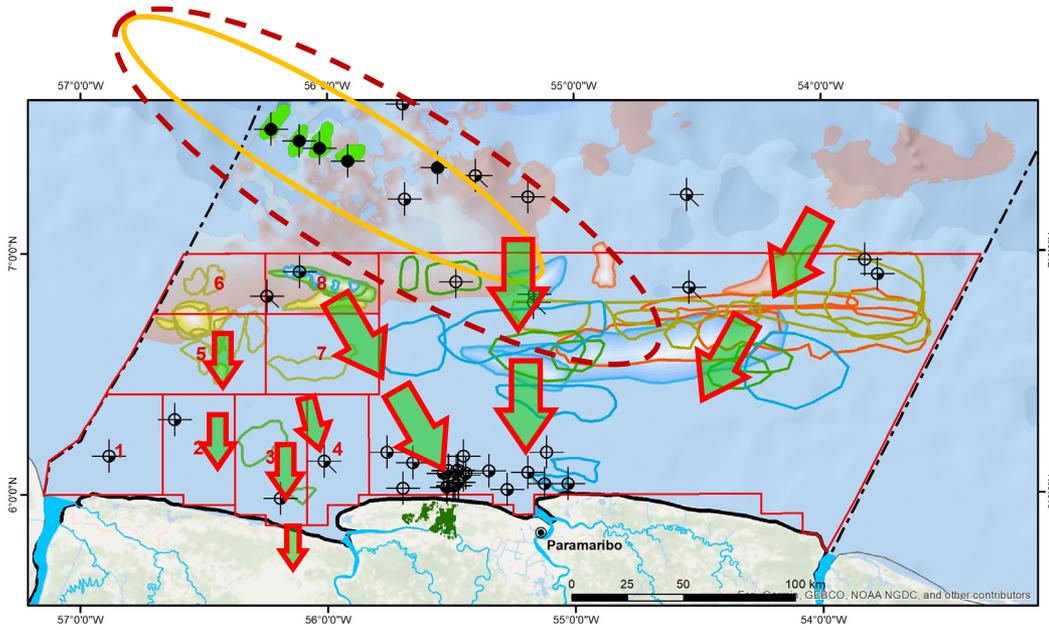
SOURCE AND TRAP HISTORY



Shelf Province (Shallow Offshore):

- Mainly stratigraphic plays.
- ACT source dominate source rock but older source rocks also present

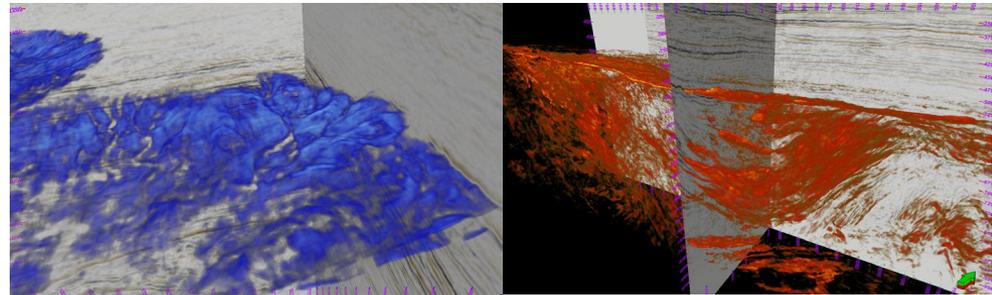
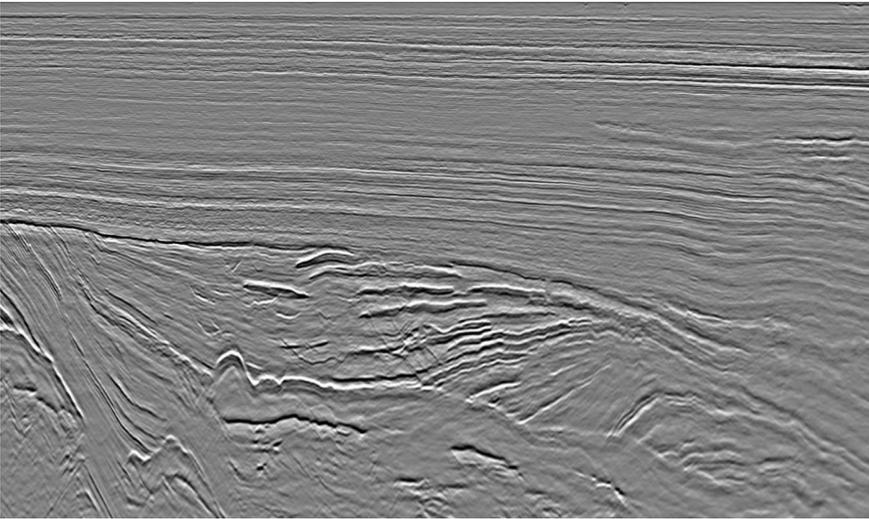
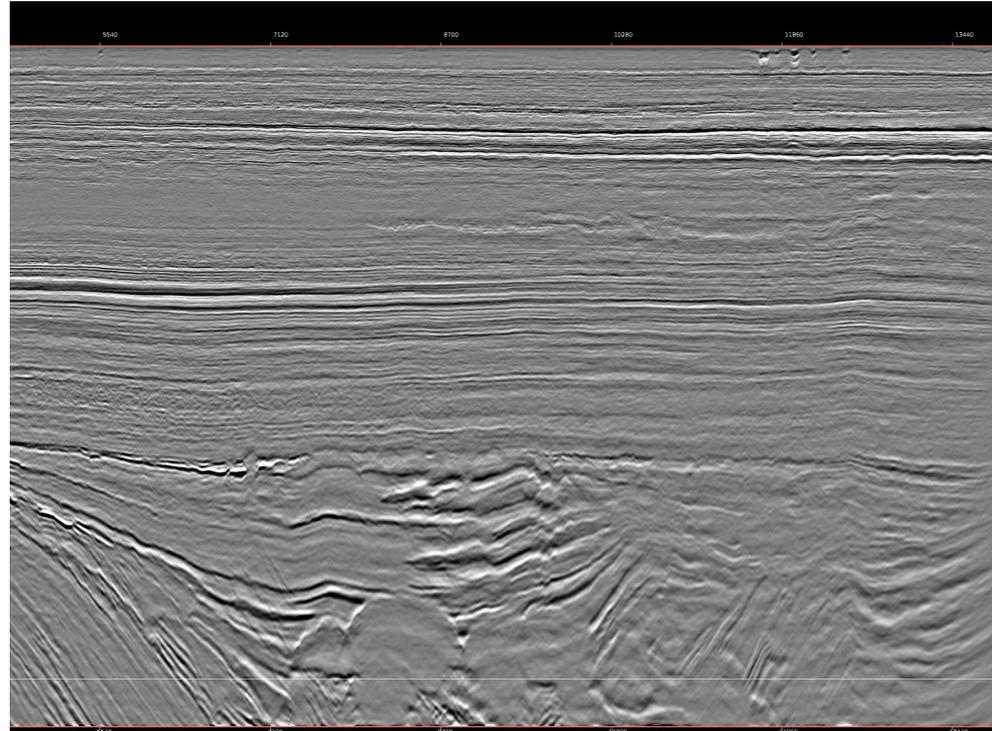
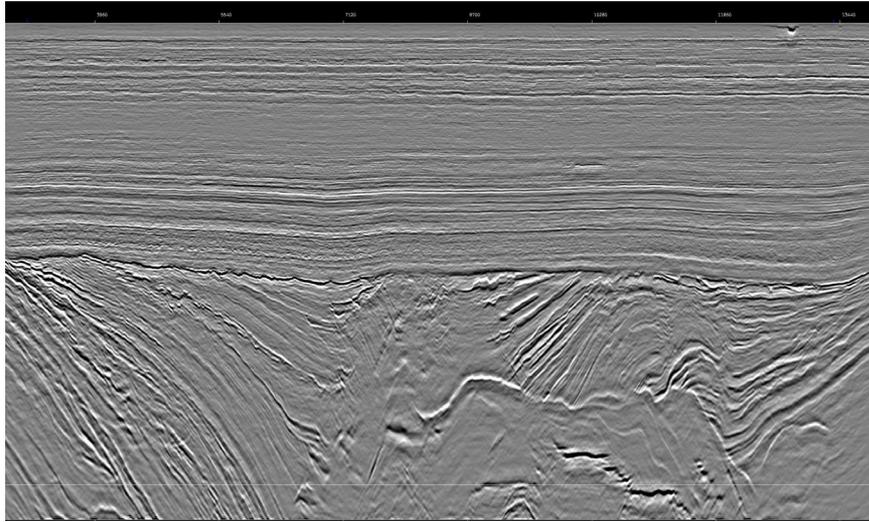
Opportunities between multiple discoveries and known oil fields



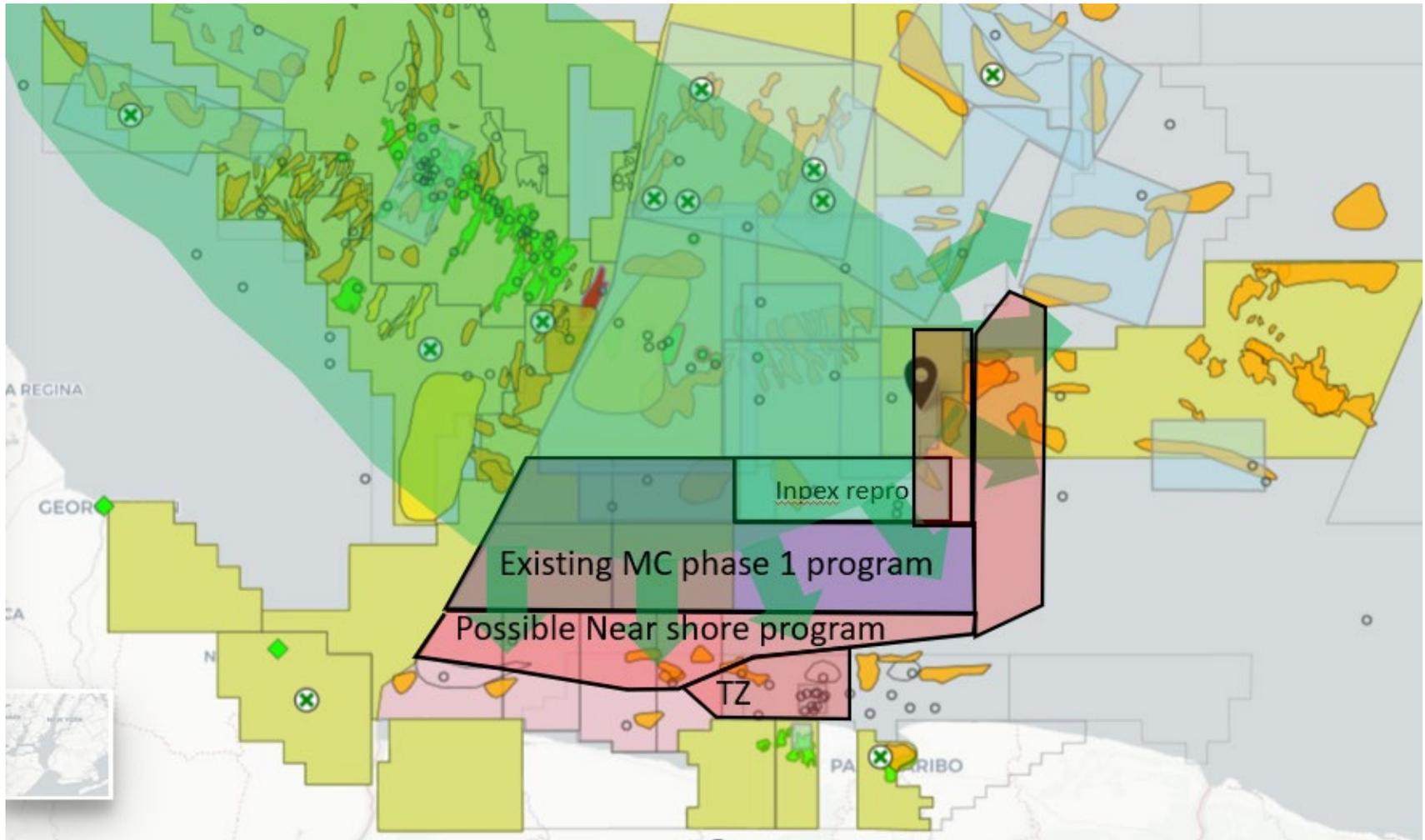
Most data is 2D and limited well data but new high-quality 3D is being acquired is will further de-risk the SHO.

- Up-dip of and underlain by world-class Cenomanian-Turonian source kitchen.
- Up-dip of recent significant discoveries
- Migration paths pass through the acreage to charge the onshore fields
- Possible further extension of Golden lane far into Shallow Offshore area.
- Analogue fields supports potential in the SHO
- Potential second source rock in the East might open up a total new area in the SHO-East.

Images Multi Client 3D Data – fast track processed



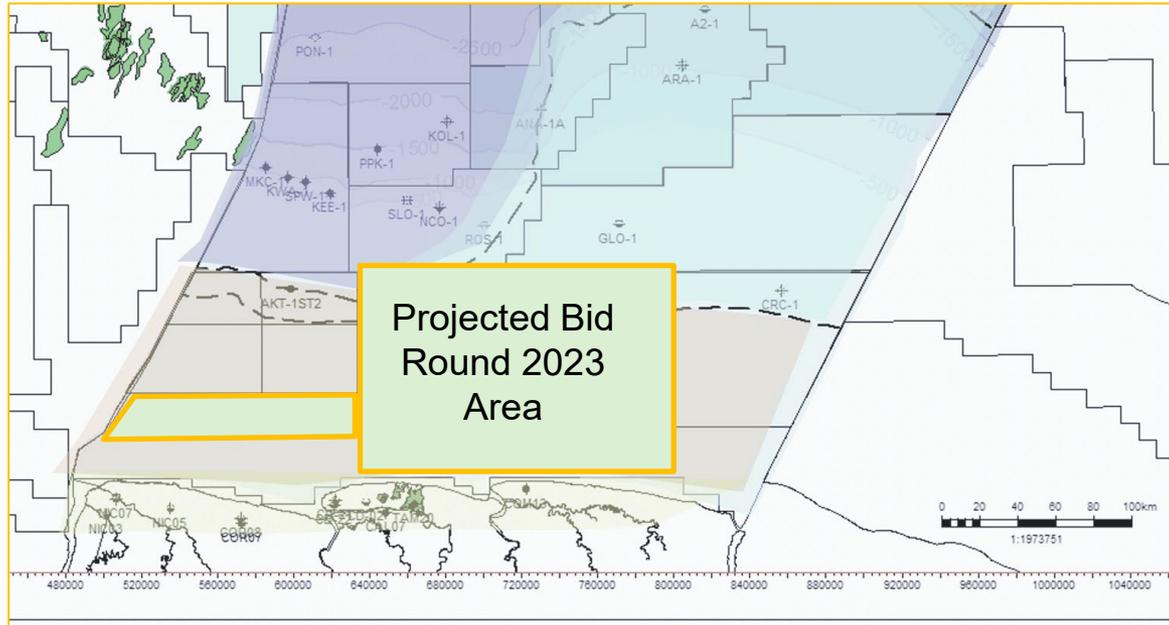
Programs and possible programs



Summary Shallow Offshore

- The Shallow Offshore remain a vast interesting and prolific area due to the many leads and prospect identified on 2D data, supported by analogue & conjugate fields and confirmed by early new high-quality 3D data.
- The proximity to the coast and shallow water depths (<100m) makes the area even more commercially interesting
- Almost 70% of the area will shortly be covered by high quality 3D data
- **The central area of the SHO continues to be prolific and will be offered in a coming Bid round by the end of 2023.**

Shallow Offshore Bid Round 2023

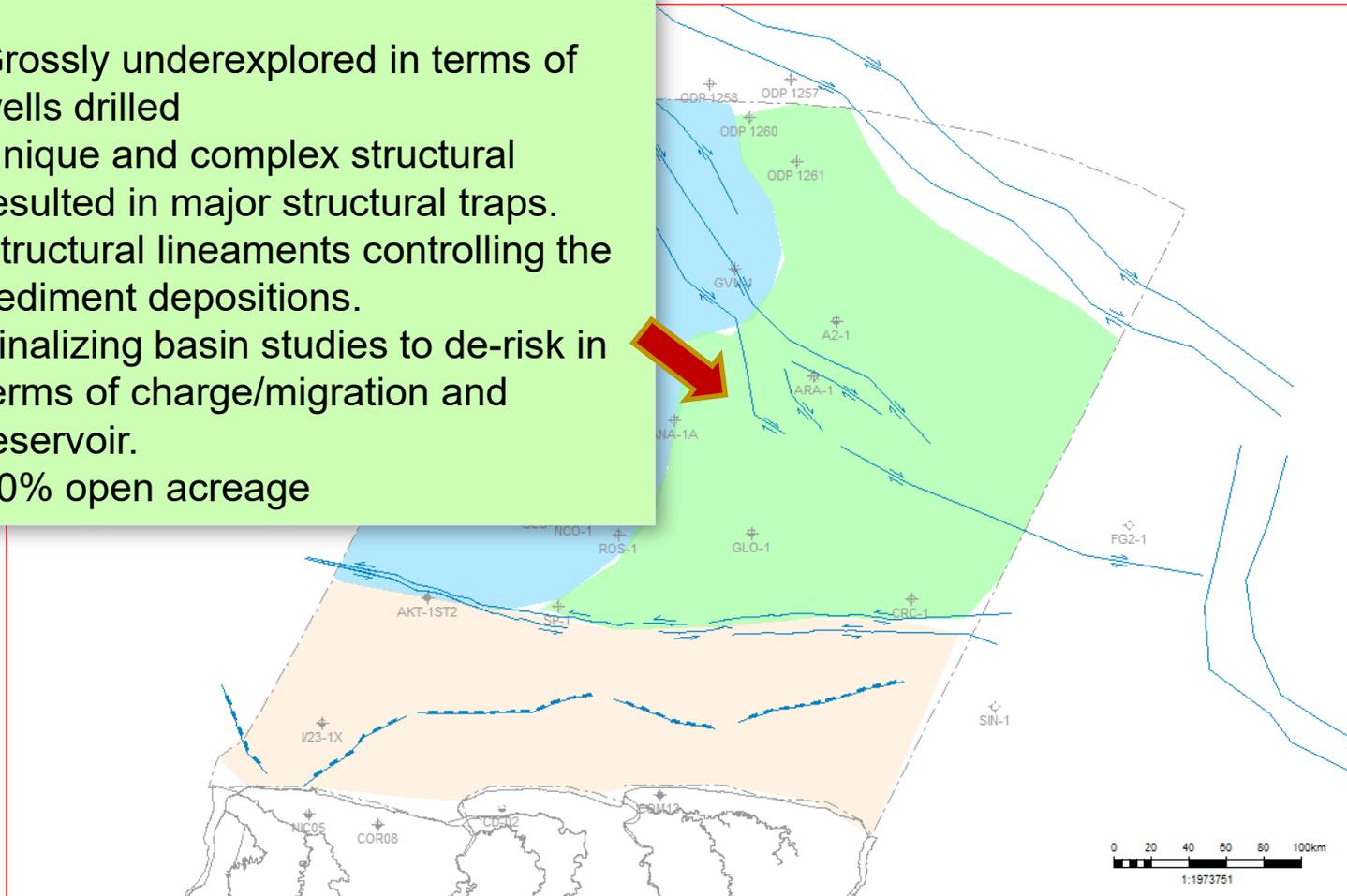


- More than 10 blocks will be offered
- Block Geometry will be geological driven
- Fiscal terms will be designed to match the economics of the blocks
- High Quality 3D data available for most of the area that can generate drillable prospects
- Expected launch Q4 2023

Demerara province

Demerara Province:

- Grossly underexplored in terms of wells drilled
- Unique and complex structural resulted in major structural traps.
- Structural lineaments controlling the sediment depositions.
- Finalizing basin studies to de-risk in terms of charge/migration and reservoir.
- 80% open acreage

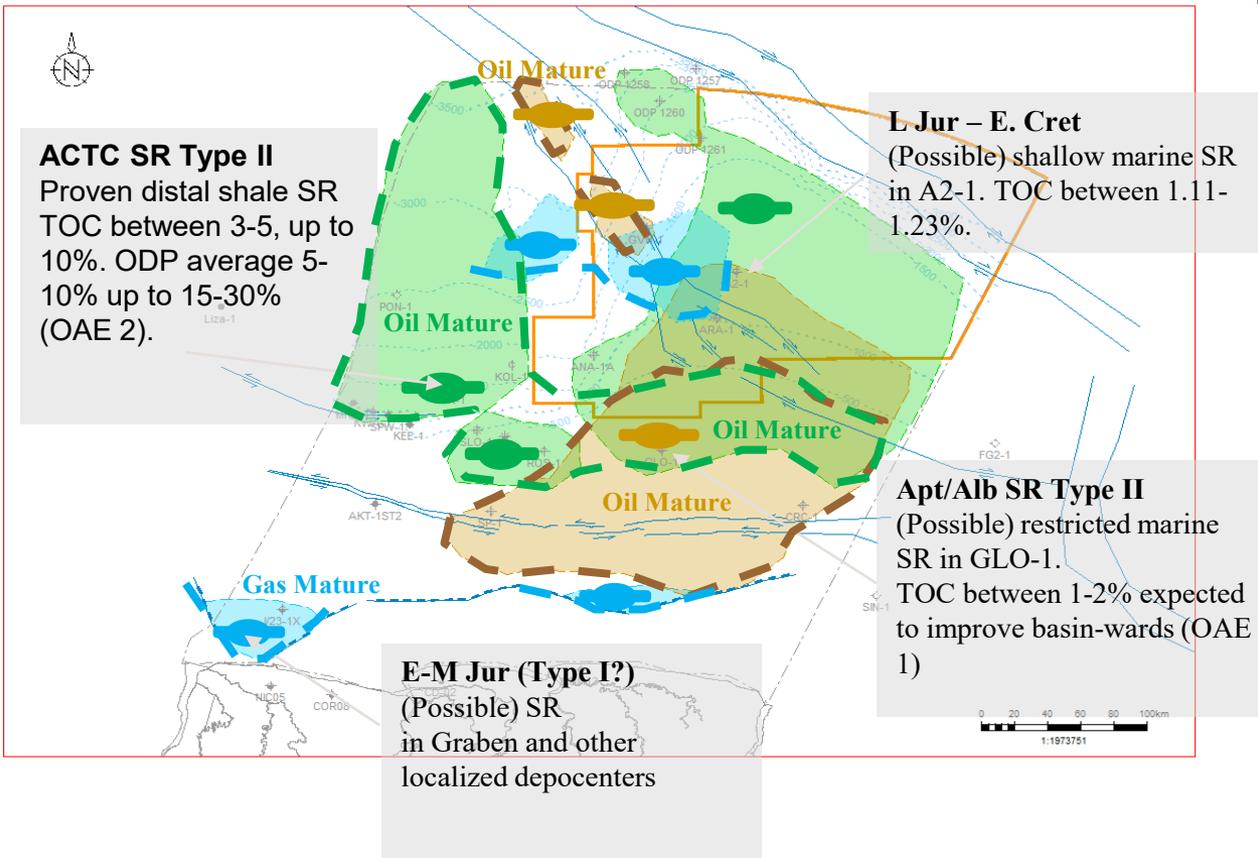


Regional Geological Perspective

Source Rock Presence and Charge potential

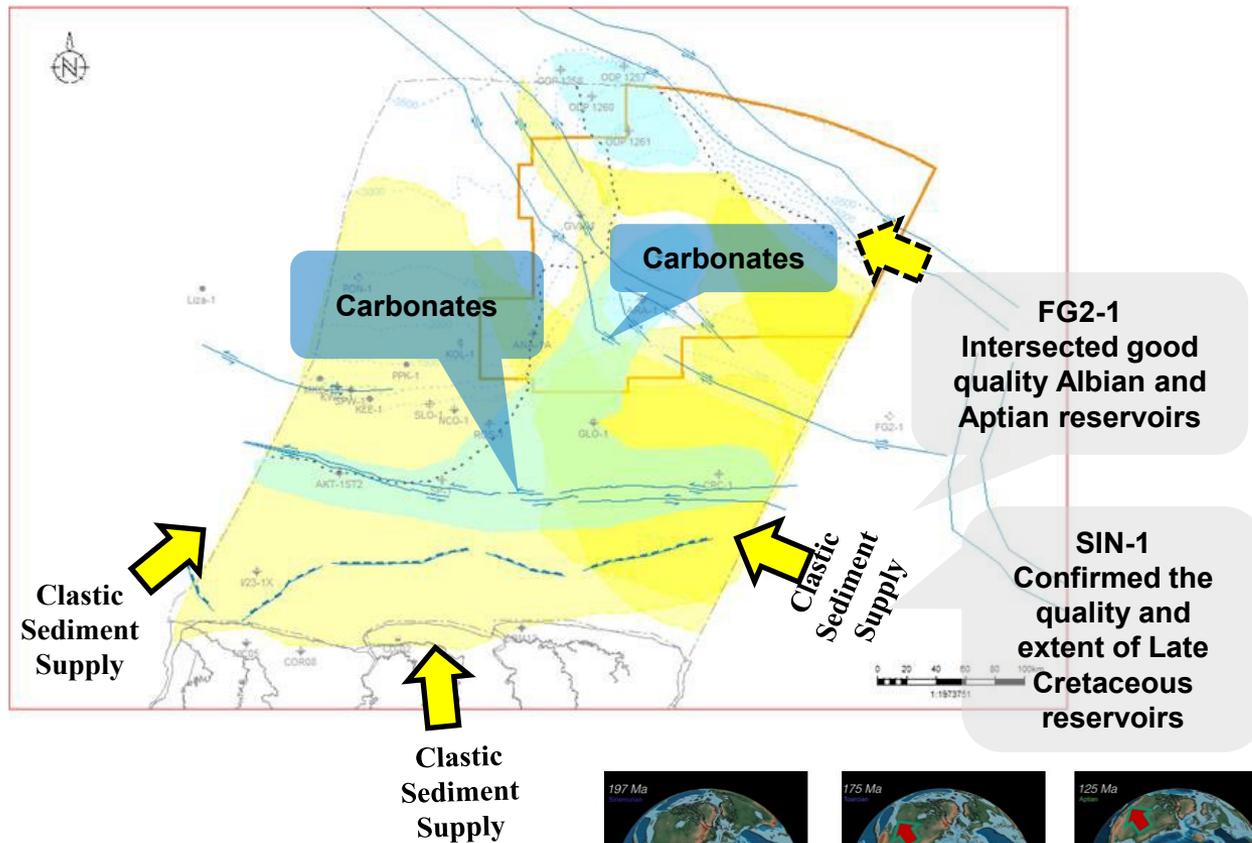
Source Rock (SR) presence in the Basin:

1. Albian-Coniacian distal marine SR. 
2. Aptian/Albian restricted Marine SR 
3. Late Jurassic to Early Cretaceous shallow marine SR
4. Late Jurassic anoxic marine carbonate SR (Analogue)
5. Early - Middle Jurassic restricted SR (Grabens/ reconstructed localized depocenters) 

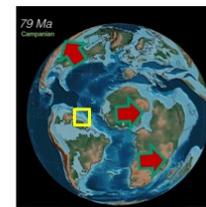
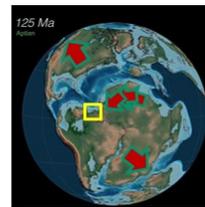


Regional Geological Perspective

Facies: development of seal and reservoir

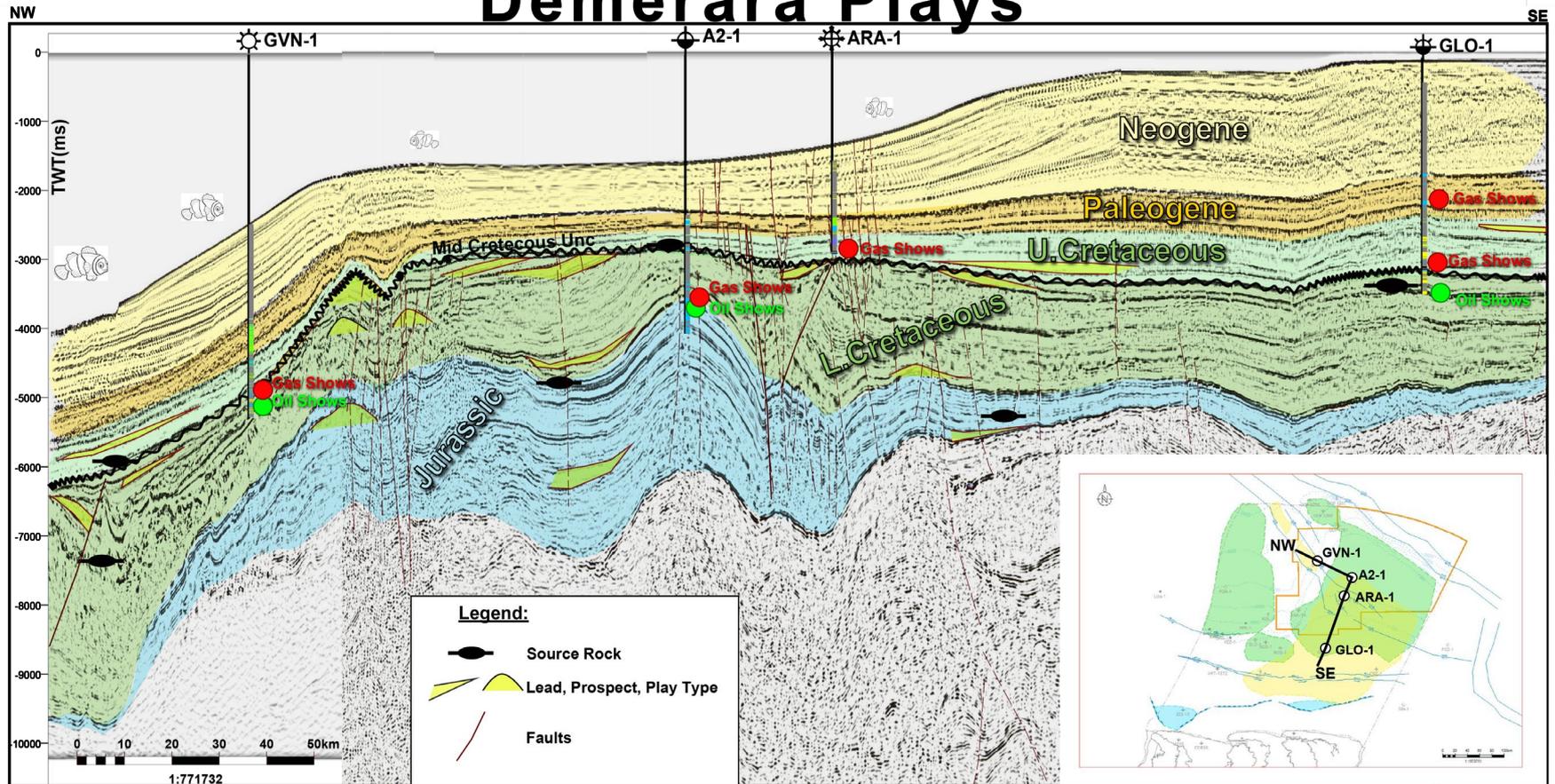


- The basin fill consists of mainly clastics deposited during transgressive and regressive cycle
- During episodic switch-off of the sand supply carbonate build-ups were formed.
- Sediment provenance from the Guiana Shield and from the African continent pre-EA phase.



Petroleum Systems

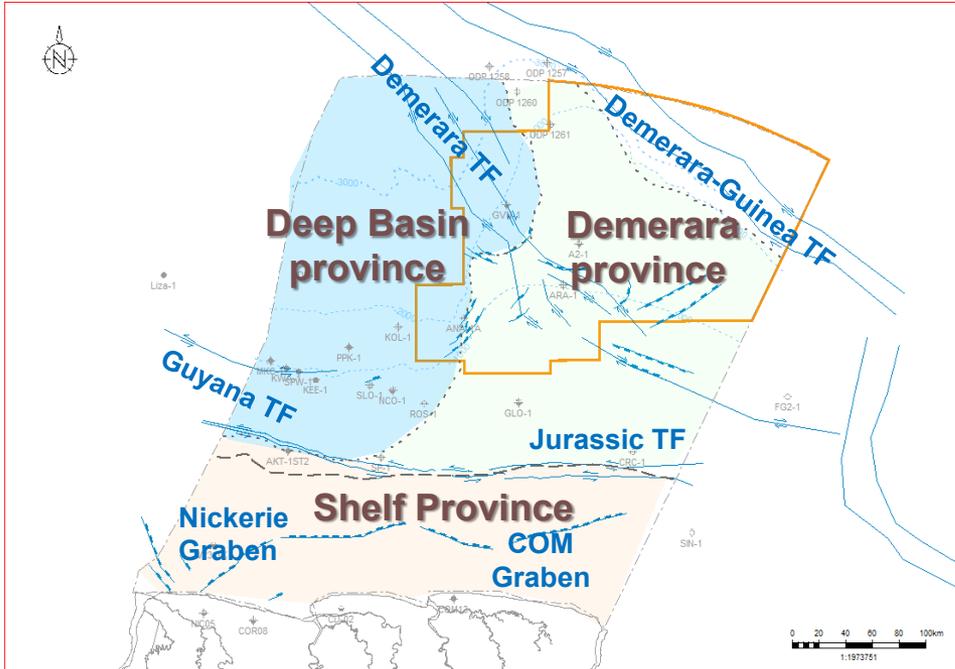
Demerara Plays



Summary Demerara

- The Demerara open acreage has at least 5 potential source rock intervals.
- The 3 high potential plays in the area are: Upper Cretaceous Play, Early Cretaceous Play and the Late Jurassic Play.
- The acreage is extended with untested play potentials and unique structural trapping styles that are not present elsewhere
- Heat flow studies are providing more information on source rock maturity location and timing
- Better understanding why wells drilled harbored non-commercial results
- **The area is eligible for further exploration and will be offered in a Bid Round in mid Q4 of 2022**

Upcoming Demerara Bid Round



- Staatsolie intends to launch the Bid round in Q4 2022
- Fiscal terms will be designed to match the economics of the blocks
- Envoi Ltd incl. Zebra contracted to lead the marketing and promotion of Demerara BR

More information will continue to be announced at:

- www.staatsolie.com

- www.envoi.co.uk/projects/active-projects



Final Key Take-aways

- After the success in the Deep-water Province in the West, the Onshore, Shallow Offshore and Demerara provinces are the **next prolific** areas to be offered.
- **New basin studies** and 3D high quality data, provides **better understanding** of the subsurface in these area
- After the acquisition, processing, evaluations of the Shallow Offshore 3D data and incorporating the basin studies, a **bid round will be conducted in 2023** in mainly the SHO Central area.
- The new insights from the basin studies are such that the **Demerara province will be offered in a Bid Round in Q4 2022**



We are in a mission.... Join us!!!



To learn more, visit us at the Staatsolie Booth



Confidence in our own abilities