

CURRENT STATUS AND FUTURE PLANS SIERRA LEONE

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Presented by:

The Petroleum Directorate Sierra Leone



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A Getech Group company



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Sierra Leone- Overview



- **LOCATION:** West Africa bordering the North Atlantic between Guinea and Liberia
- **CAPITAL:** Freetown
- **POPULATION:** 7.1 Million (2015 census)
- **AREA:** 71,740 Sq. km.
- **COASTLINE:** 402 km
- **SEASONS:**
 - Rainy Season (May – Oct)
 - Dry Season (Nov – April)
- **NATURAL RESOURCES:** Iron Ore, Diamonds, Titanium, Bauxite and Gold



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PDSL- What we do [Overview continued]



Pursuant to executive powers conferred by H.E the President, the Director General of the Petroleum Directorate administers the Petroleum Exploration and Production Act (PEPA), 2011 and reports directly to H.E the President.

The Petroleum Directorate under PEPA 2001 has a statutory responsibility for regulating the upstream oil and gas sector, and ensuring that all Operators conducting petroleum operations comply with the applicable Petroleum Legislation and any other regulation(s) or guideline(s) governing upstream oil and gas operations in Sierra Leone.



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PDSL- Mission & Vision [Overview continued]



Our Mission is to:

“facilitate the optimal exploration and development of Sierra Leone’s Potential Petroleum Resources for the long term benefit of its people, through the development of regulatory guidelines and monitoring contract compliance, having due regard for the economy, the environment, safety, technology, as well as balancing the interests of the nation and investor”

The Petroleum Directorate’s Vision is:

“To become a functionally and fiscally independent high-reliability regulatory agency capable of delivering its mission in a sustained way”



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Regulatory Framework- [Overview continued]



- All Petroleum Rights are vested in the State
- The Petroleum Directorate (PD) was created as successor to the PRU by Petroleum Exploration and Production Act (PEPA) 2011
- The PD is mandated to:
 - Regulate and promote petroleum exploration, development and production
 - Administer the licensing and participation of commercial entities in the sector
 - Encourage, monitor and enforce the standards of operation and code of practice for petroleum operations
 - Ensure efficient and safe petroleum operations



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Regulatory Framework (continued)



- Potential IOCs/group of IOCs need to register and incorporate local affiliate in Sierra Leone – Normally completed within 3 working days
- Contractual Relationship (Investor-State) governed by the PEPA – 2011
- Model Petroleum Agreement based on a Royalty-Tax (Hybrid) System
- Exploration Period is for 7 years (Flexible) with an initial exploration period of 3 years and 2 extensions for 2 years each
- Main Fiscal instruments are Royalty, Corporate Income Tax, and Petroleum Resource Rent Tax (PRRT)
- State Participation: Initial 10% (carried) through exploration. State can acquire an additional paying interest to be agreed by both parties
- Some Indirect Taxes may be applicable



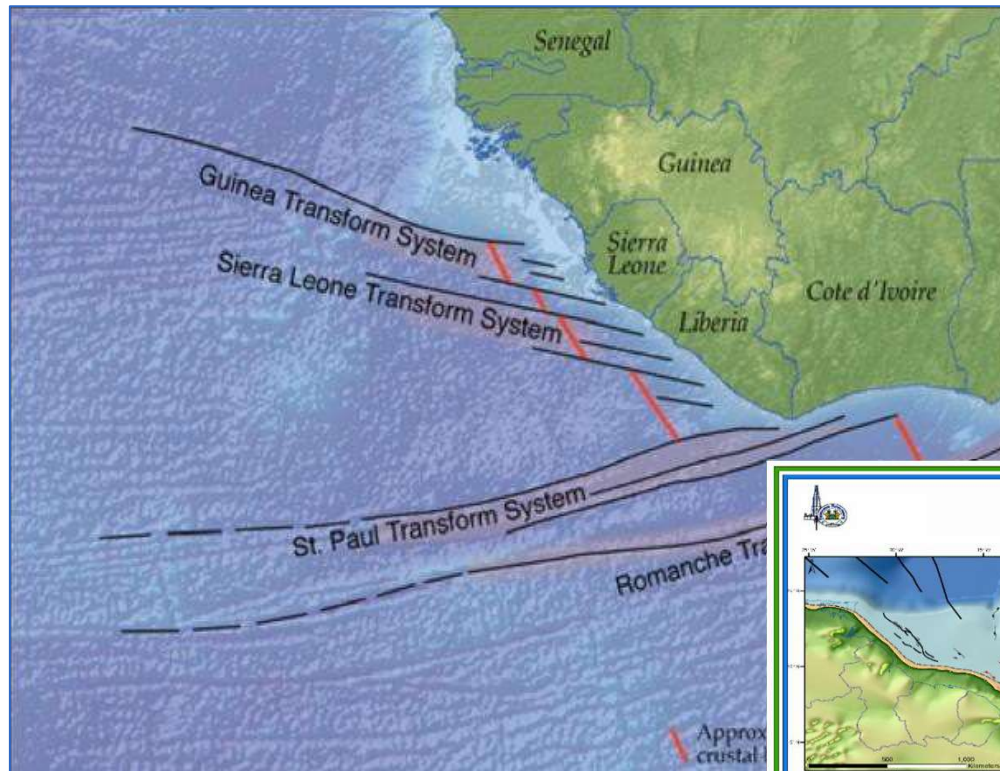
Regulatory Framework (continued)



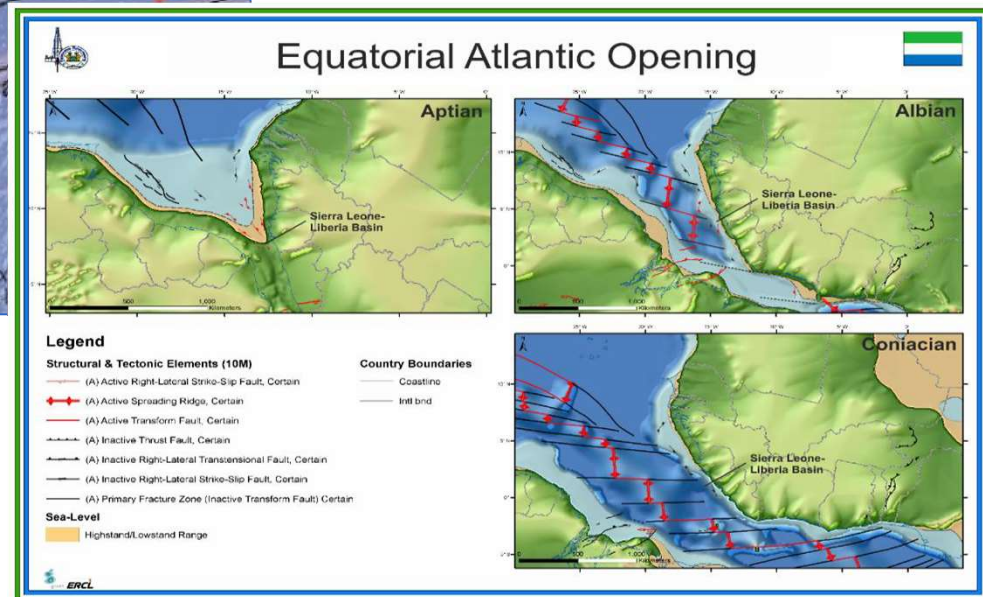
- Royalty Rate: 10% (Gross Production for Crude Oil); 5% Gross Production for Gas
- Corporate Income Tax Rate: 30%
- PRRT: Single tier taxed at 40% with a minimum accumulation (threshold) rate of 15%. However, this rate varies with the Corporate Income Tax rate to provide some cushion for investor if tax rate rises
- Surface (Area) Rental Fees
 - Initial Exploration Period: US\$ 40 per Sq.km p/a
 - 1st Extension Period: US\$ 60 per Sq.km p/a
 - 2nd Extension Period: US\$ 85 per Sq.km p/a
 - Development/Production: US\$ 110 per Sq.km p/a



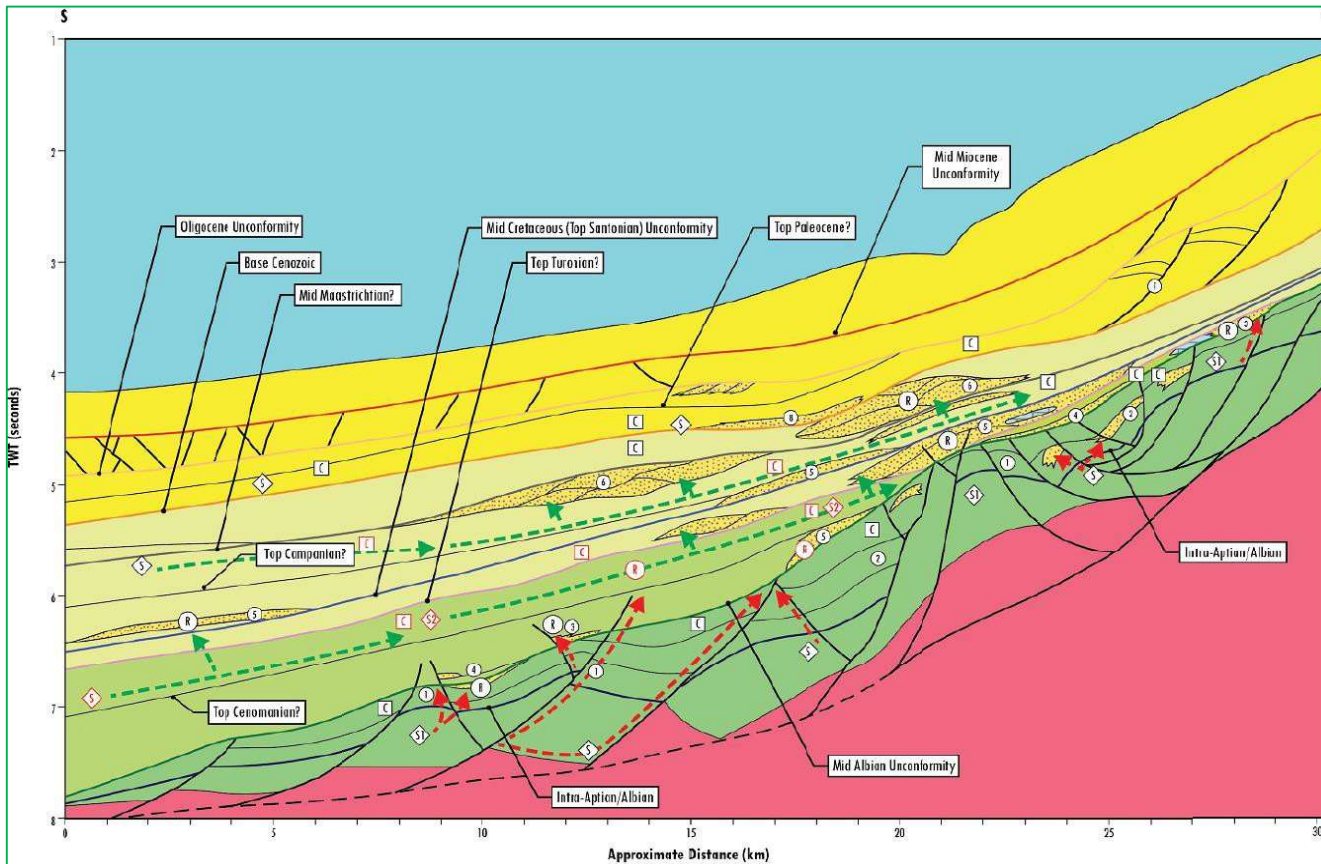
Sierra Leone- Regional Geology



- Forms part of the West African Transform Margin
- Formed during the initial stages of rifting
- Basin development associated with the opening of the South Atlantic Ocean during the Early Cretaceous
- Basin segmented by transform faults



Sierra Leone- Geoseismic Cross-section



SOURCE ROCK:

- Aptian to early Cenomanian.
- Late Cretaceous, Cenomanian-Turonian shales

RESERVOIR:

- Potential reservoir sequences include the Aptian, Albian, Cenomanian, Maastrichtian and Paleocene to Eocene.

TRAPS:

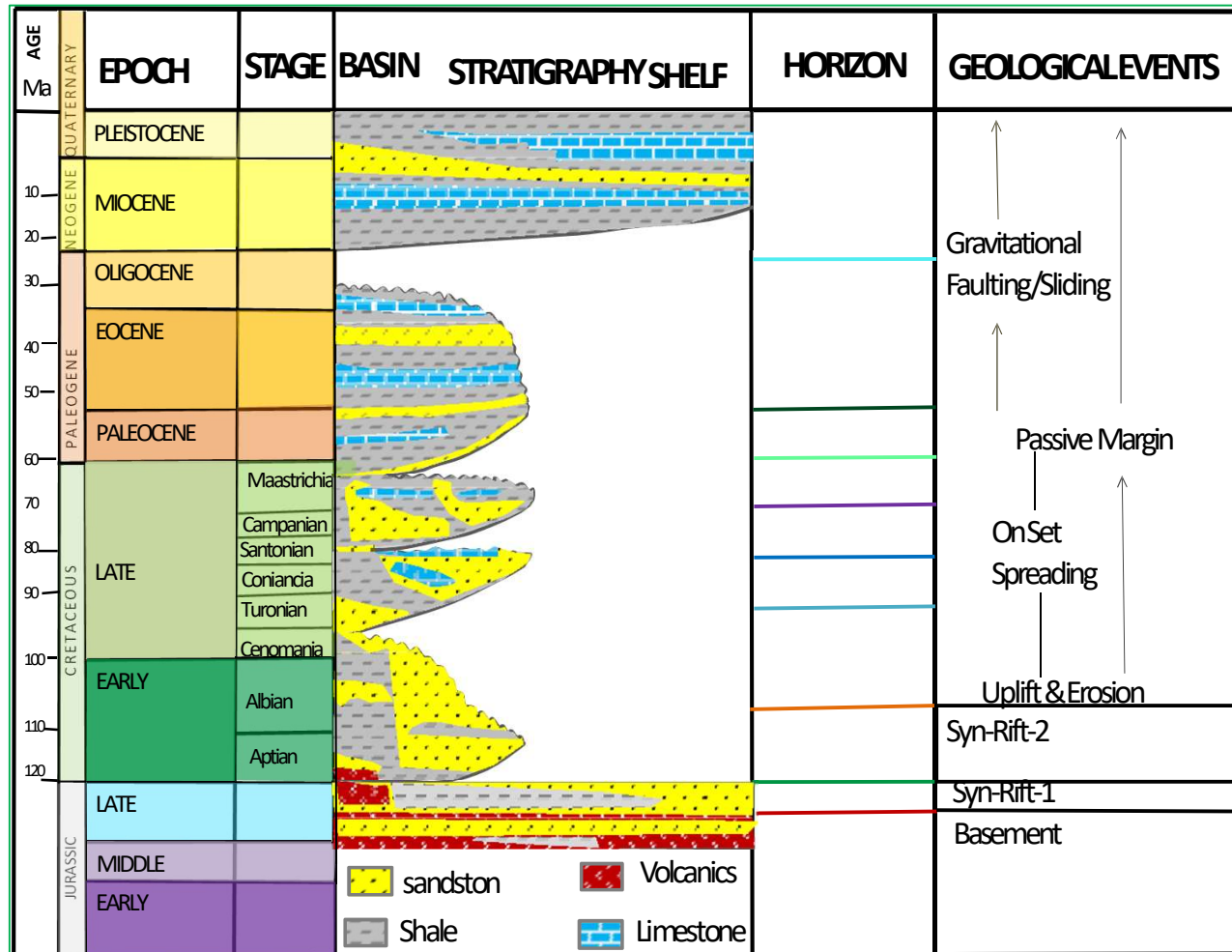
- Stratigraphic, structural or a combination exists in Cretaceous to recent strata

SEAL:

- The seal can be lateral, transformational shales or regional hemi-pelagic shales.



Sierra Leone- Stratigraphy



- Pre-rift Jurassic/ Triassic sediments
- Early cretaceous rifting (Aptian-Albian)
- Late Cretaceous to recent drift sequence of clastic deep water turbidites



Exploration History



- Exploration began in the early eighties
- Initial work focused on shallow waters with 2D seismic & gravimetric surveys offshore
- Subsequent drilling of 2 offshore wells encountered hydrocarbon shows.
- A-1 in 1982 (Mobil) and A1-2 in 1985 (Amoco) were drilled in the country's inner shelf, in water depths of <100m
- The wells penetrated significant thickness of reservoir quality Sandstone – Early to Late Cretaceous.
- Wells provided evidence of enough sedimentary cover and source rock types to spur on further exploration
- More exploration work followed with the acquisition of speculative 2D data (5,800 Sq. km.) by TGS-NOPEC between 2000 – 2001, which sparked the current cycle of exploration
- Sierra Leone's offshore coast was divided into 7 exploration blocks following acquisition of this data.



Exploration History (continued)



- 2001: PEPA 2001 passed by Parliament to govern petroleum operations. Established the Petroleum Resources Unit (PRU) to regulate and monitor petroleum operations
- 2003: First Bid Round held. 4 offshore exploration blocks were offered and awarded to bidding Companies
- 2004: Second Bid Round held. 1 exploration block was awarded. Repsol Exploration acquired 3-D Seismic data (2003 – 2004)
- 2006: 1 exploration block awarded through Direct Negotiation
- 2012: Third licensing round- **8 Blocks Awarded**
- **A total of 8 wells have been drilled, (6 wells between 2009 to 2013 with 4 discoveries).**



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Prospectivity Synopsis



- Oil and Gas discoveries
 - Four Cretaceous Discoveries

- Deep water
 - Structural plays associated with Sulima plateau
 - Cretaceous pinch out play

- Shallow water
 - Cretaceous tilted fault blocks
 - Two wells drilled in 1980's by Amoco & Mobil (oil shows)

- Onshore
 - Tilted fault blocks
 - Rumoured seeps on Sherbro Island



Sierra Leone- Discoveries



Venus – B1 (2010, License Block SL-07)

Water Depth: 1800m, TD: 5636m in Albian
Hydrocarbons: ~14m of pay in Cretaceous good reservoir quality sand (channel/fan), penetrated several source rock intervals, and several good reservoir quality intervals all way down to TD.

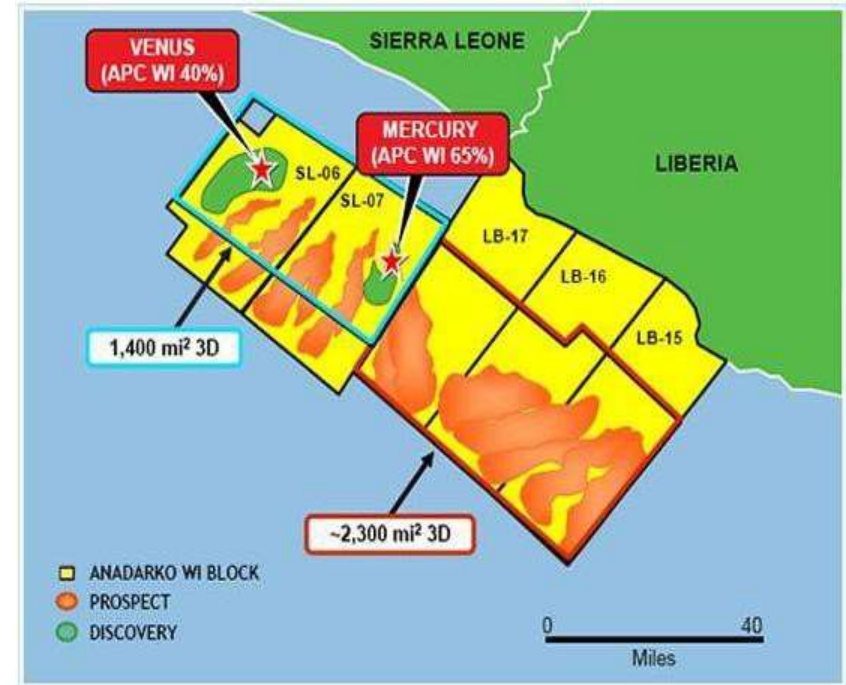
Mercury – 1 (2011, SL License Block SL-07)

Water Depth: 1600m, TD: 4862m in Albian
Oil in two Cretaceous fan systems, 34.7m of 34° – 42° API oil in the primary objective and 6.4m of 24° API oil in a shallower secondary objective.

Savannah-1X (2013, License Block SL05/11)

Water Depth: 2153, TD 4737m

The well intersected ~3m oil pay in the primary objective and encountered an OWC

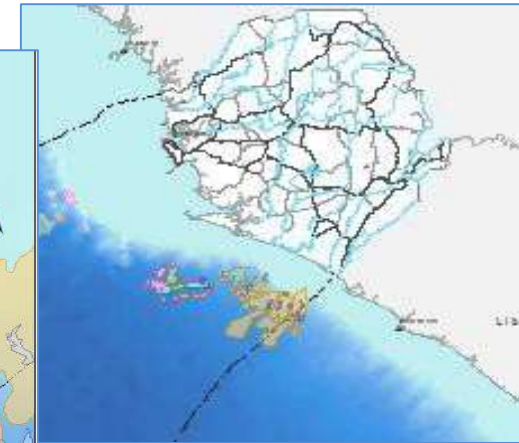
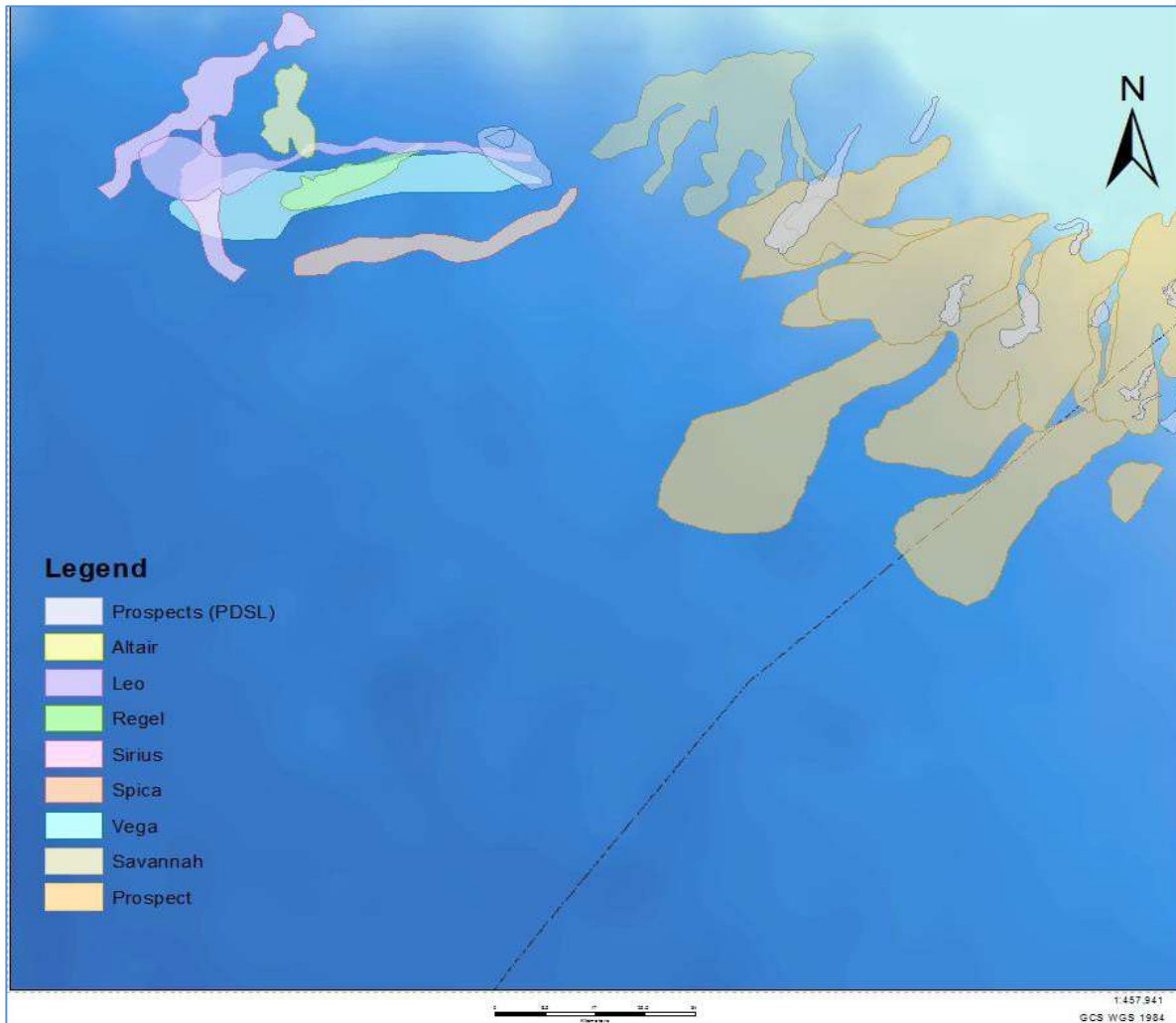


Jupiter-1 (2012 License Block SL-07B-11)

Water Depth: 2,199m, TD: 6465m

The well intersected 30m of hydrocarbon pay in the primary Upper Cretaceous objective and did not encounter a hydrocarbon water contact.

Sierra Leone- Prospects and Leads



- Deepwater prospects and leads offshore
- Prospects and leads mostly targeting stratigraphic plays

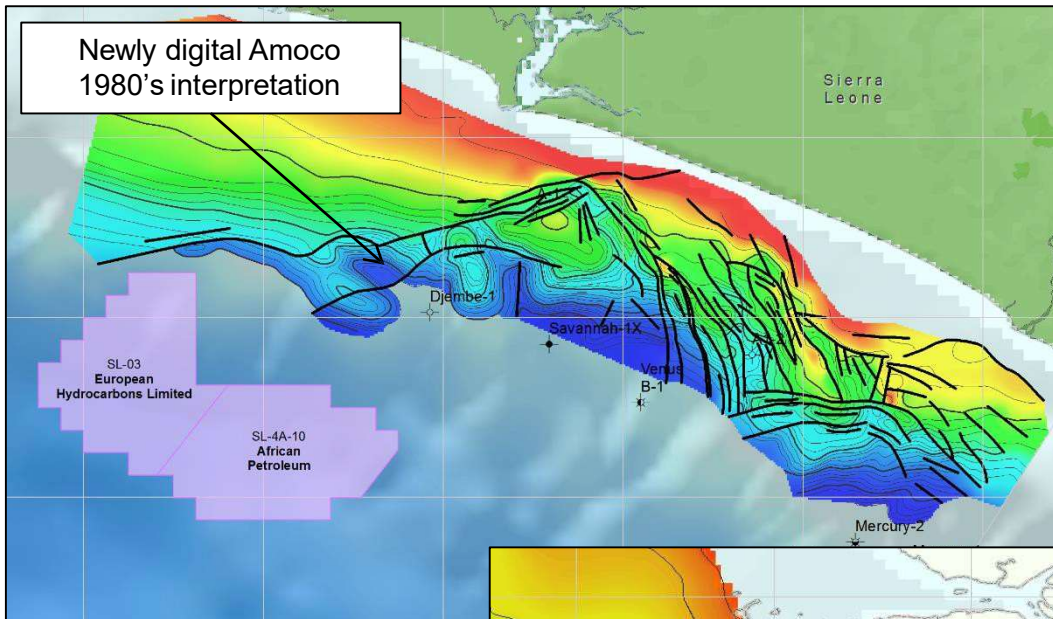


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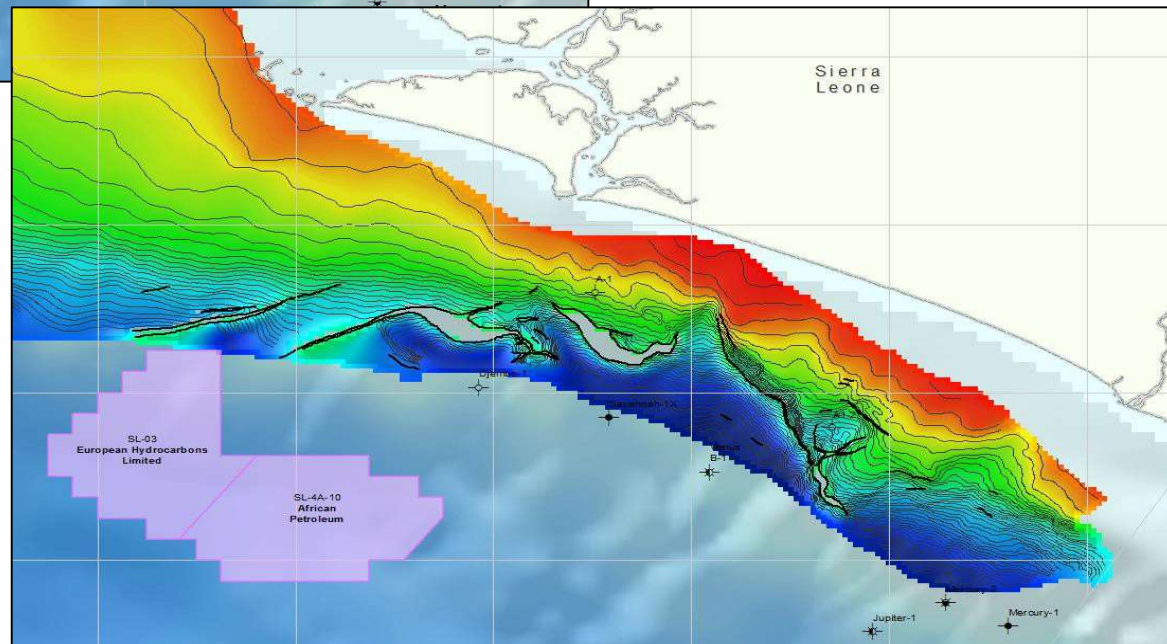
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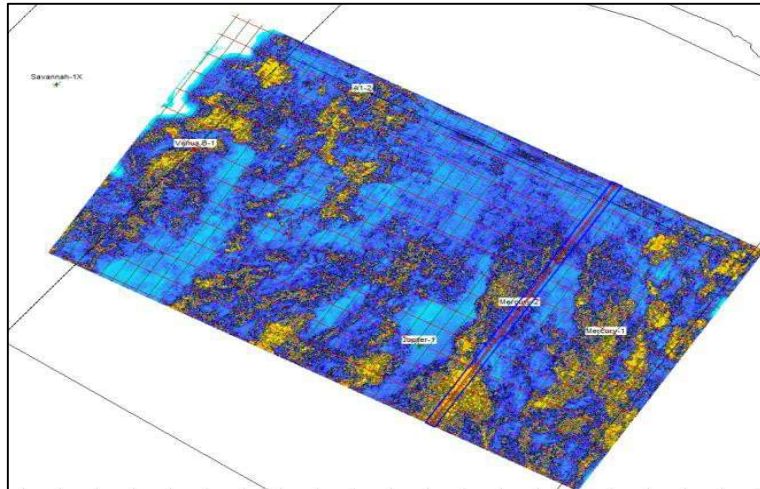
Shallow Water Prospectivity



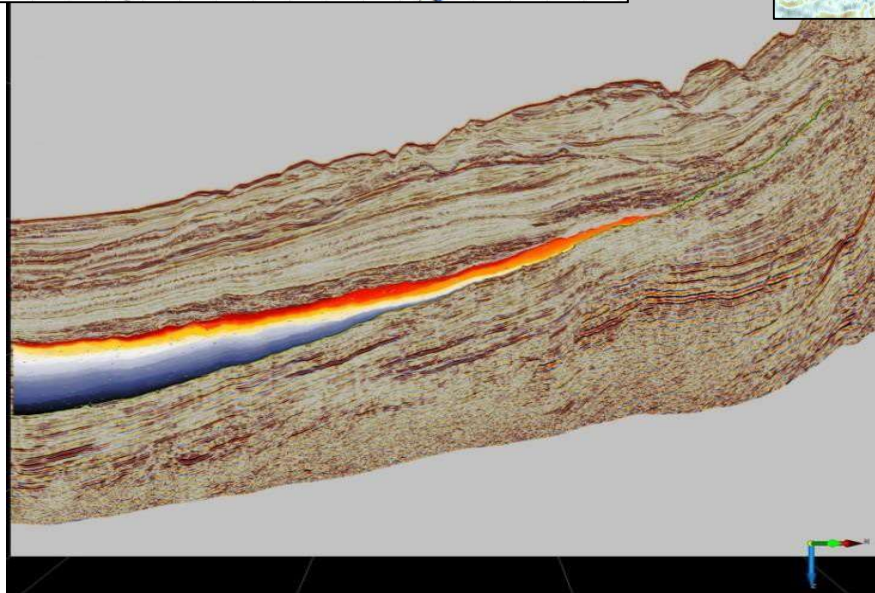
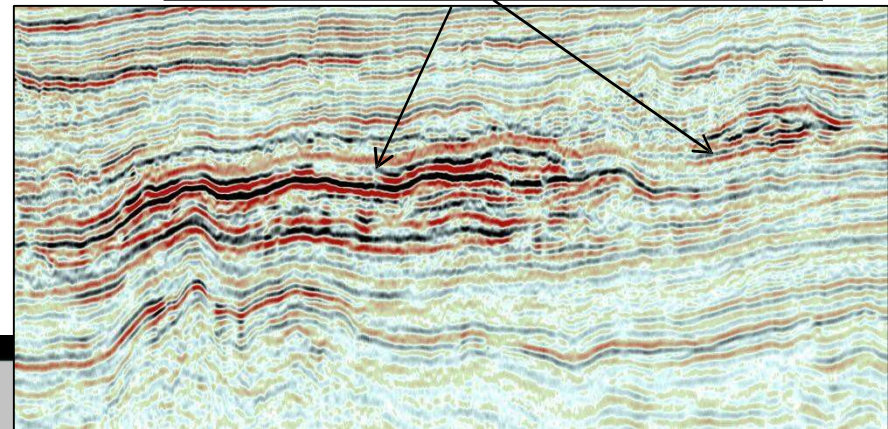
- Rifted fault blocks present in proximal offshore of Sierra Leone
- Targets are up dip of deep water discoveries & provide significant prospectivity with reduced drilling costs



Deep Water Prospectivity



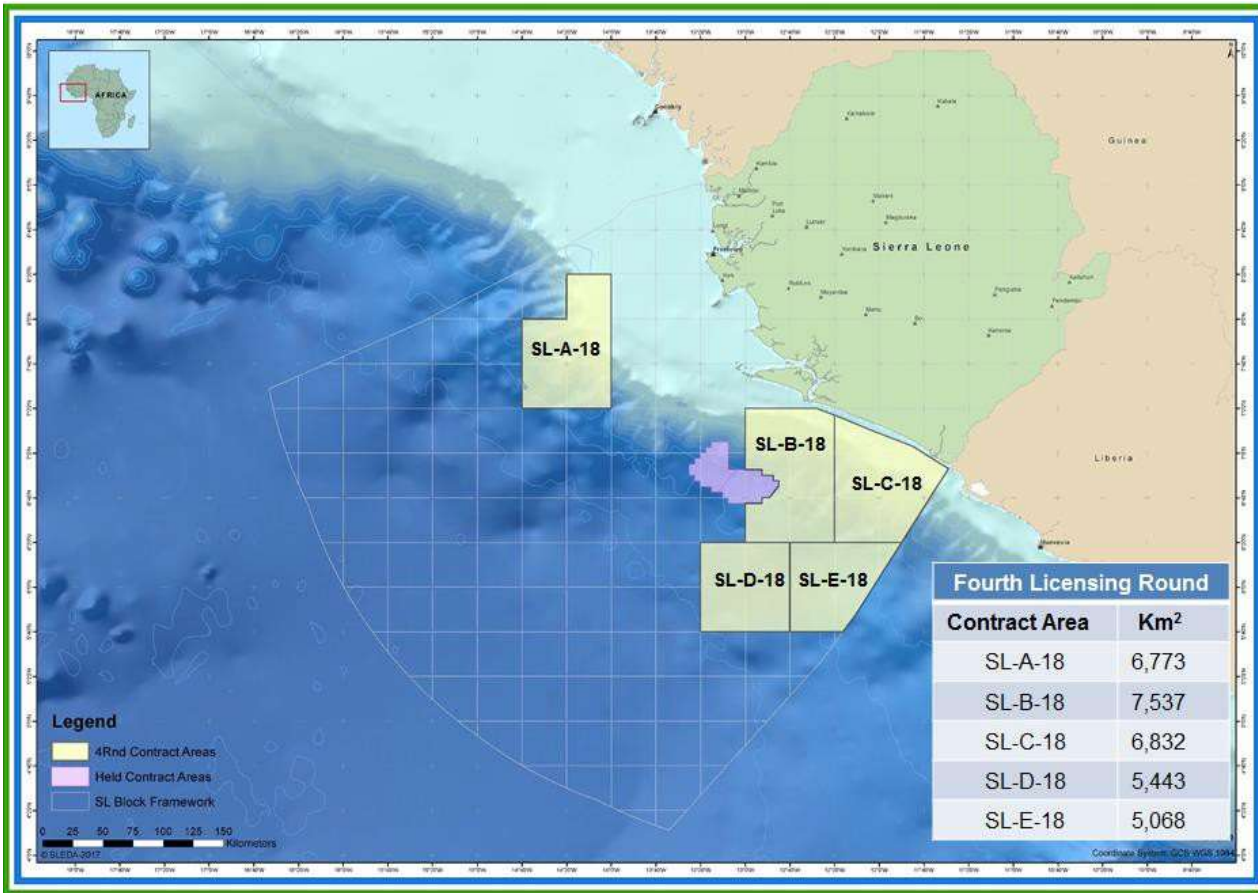
Undrilled turbidite fan systems



- Proven hydrocarbons in deep water Cretaceous turbidite plays
- Structural and stratigraphic plays identified in deep water by PDSL
- Abundant remaining potential



Sierra Leone- Opportunities



- Approx. 32,000 km²
- Open Acreages cover existing hydrocarbon discoveries and prospective underexplored areas

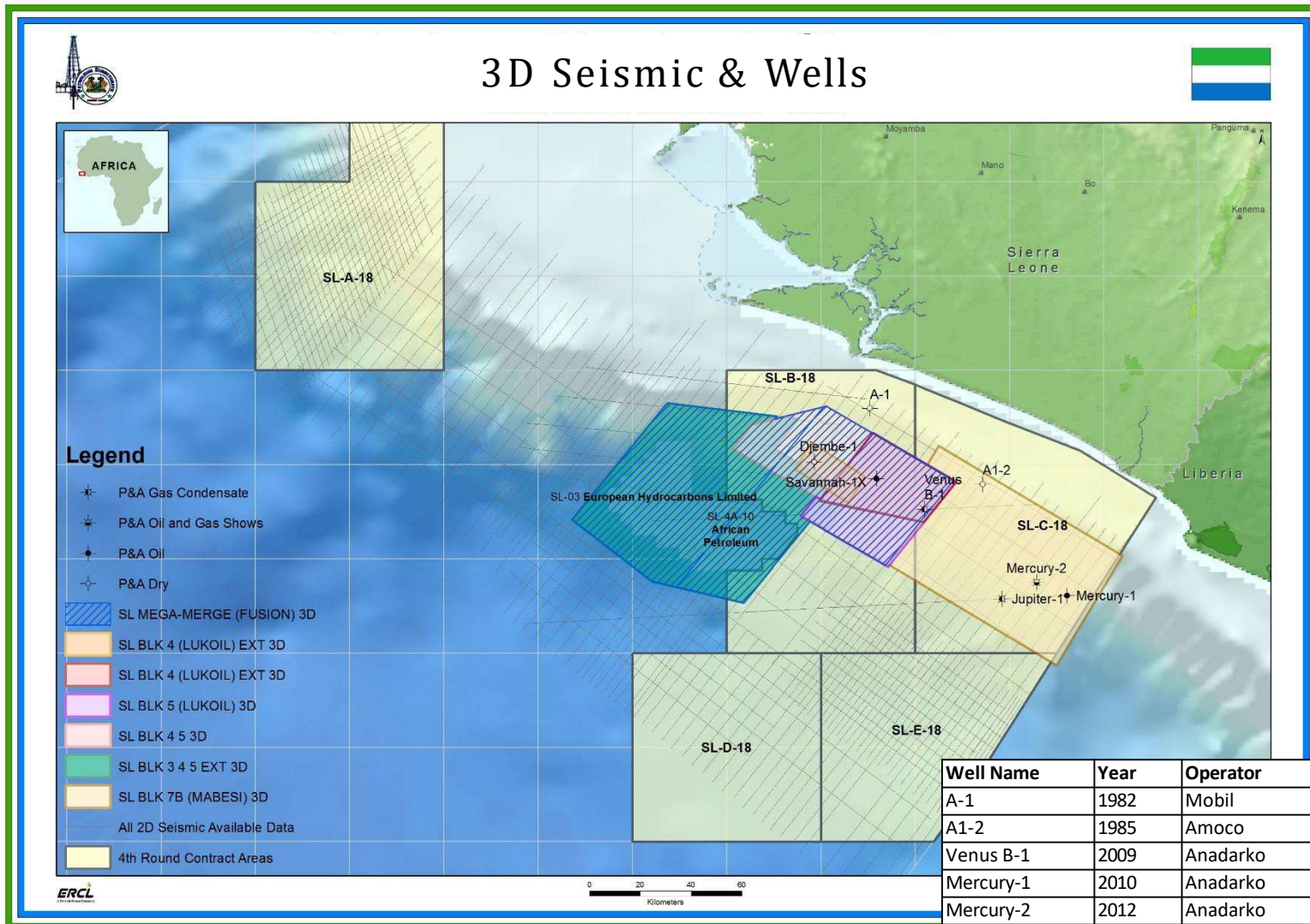


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PDSL Technical Database



| Well Name | Year | Operator | Well Status |
|-------------|------|----------|-------------|
| A-1 | 1982 | Mobil | Dry Hole |
| A1-2 | 1985 | Amoco | Dry Hole |
| Venus B-1 | 2009 | Anadarko | Discovery |
| Mercury-1 | 2010 | Anadarko | Discovery |
| Mercury-2 | 2012 | Anadarko | Shows |
| Jupiter-1 | 2012 | Anadarko | Discovery |
| Djembe-1 | 2012 | Talisman | Dry Hole |
| Savannah-1X | 2013 | Lukoil | Discovery |

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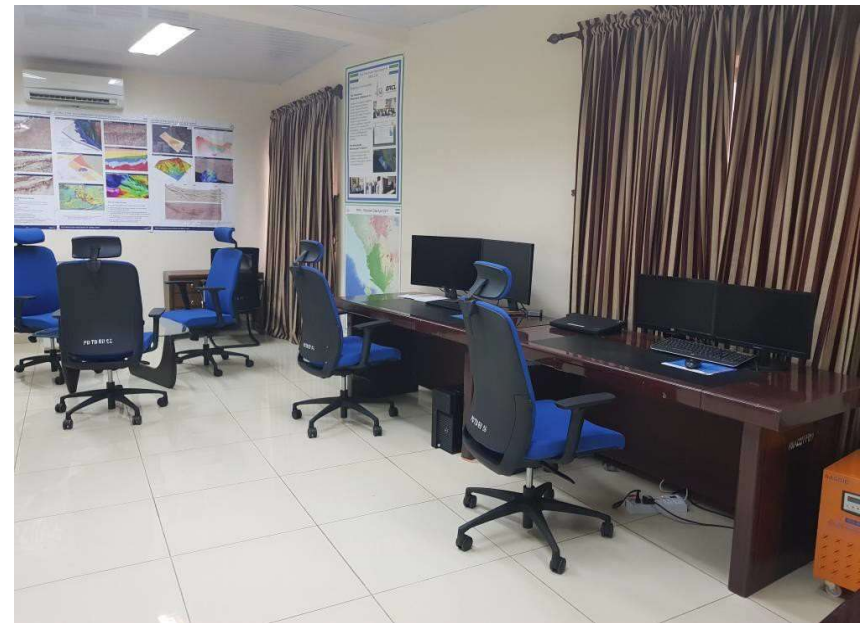
Freetown Data Room is Open



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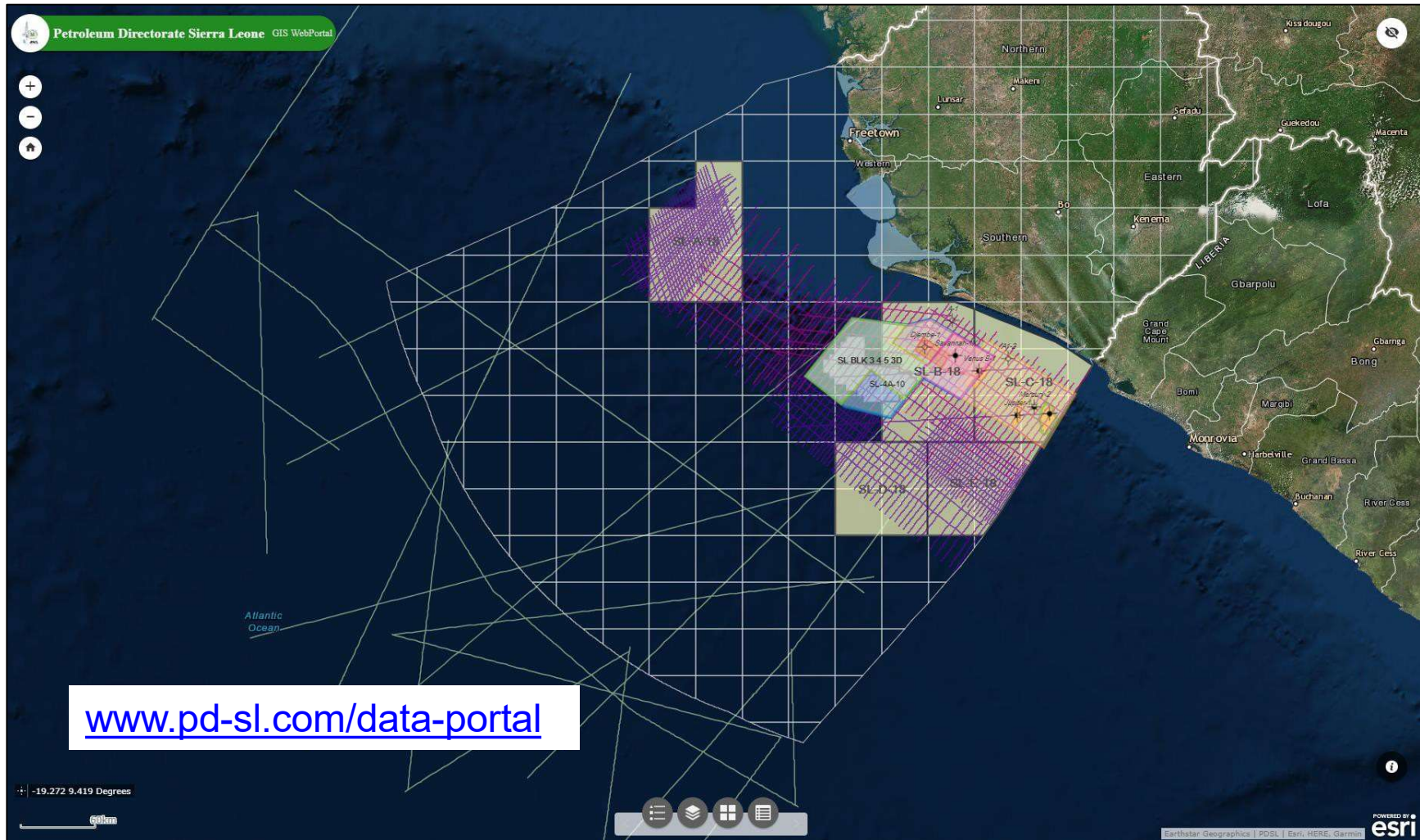


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Arc GIS Portal



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Sierra Leone- Digital Atlas (SLE-DA)



Sierra Leone Digital Atlas

PDSL - Petroleum Directorate of Sierra Leone
Multi-Client Technical Data, Report and Products

The Sierra Leone Digital Atlas is the first digital petroleum atlas of Sierra Leone, and covers both onshore and offshore regions. Created jointly by PDSL and ERCL, the atlas comprises material from the PDSL archives supplemented by Getech Group's regional knowledge.

The Sierra Leone Digital Atlas provides the following deliverables in ArcGIS format:

- Block boundaries (current and legacy)
- General cultural information (e.g. rivers, country borders)
- Seismic navigation
- Bathymetry
- Well locations
- Well headers
- Well montages/well summaries
- Public domain gravity and magnetic grids
- Hyperlinks to key figures and sections
- Legacy maps from the Amoco (Technical assessment of Amoco Acreage, Offshore Sierra Leone 1987) & Mobil (Mobil exploration report 1982) reports.
- DSDP/ ODP Wells
- USGS Yet-to-find



- The Sierra Leone Digital Atlas (SLE-DA) is a joint project between the Petroleum Directorate and ERCL to create the first digital petroleum atlas, both onshore and offshore, of Sierra Leone.
- The atlas is based on material from the PDSL archives including released data, and released reports supplemented by ERCL-Getech's regional knowledge.
- The first release can be licensed through ERCL (Getech Group Company).



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Introduction to Sierra Leone Petroleum Geology & Prospectivity Report



Introduction to the Petroleum Geology and Prospectivity of Sierra Leone
PDSL - Petroleum Directorate of Sierra Leone
Multi-Client Technical Data, Report and Products

The **Introduction to the Petroleum Geology and Prospectivity of Sierra Leone** is a report by PDSL and ERCL on the petroleum geology and prospectivity of Sierra Leone for licensing by potential investors.

The report combines previous studies, recent interpretation by PDSL and Getech Group regional expertise.

Data
Using PDSL seismic and well data, legacy reports and public domain data.

Literature Review
Review of all available academic literature, regional interpretation reports, block scale reports and well reports to synthesize an overview of the regional geology, petroleum geology and exploration history.

Petroleum Geology and Identified Play Types
A summary of the current understanding of the petroleum geology of Sierra Leone, including all the currently identified plays.

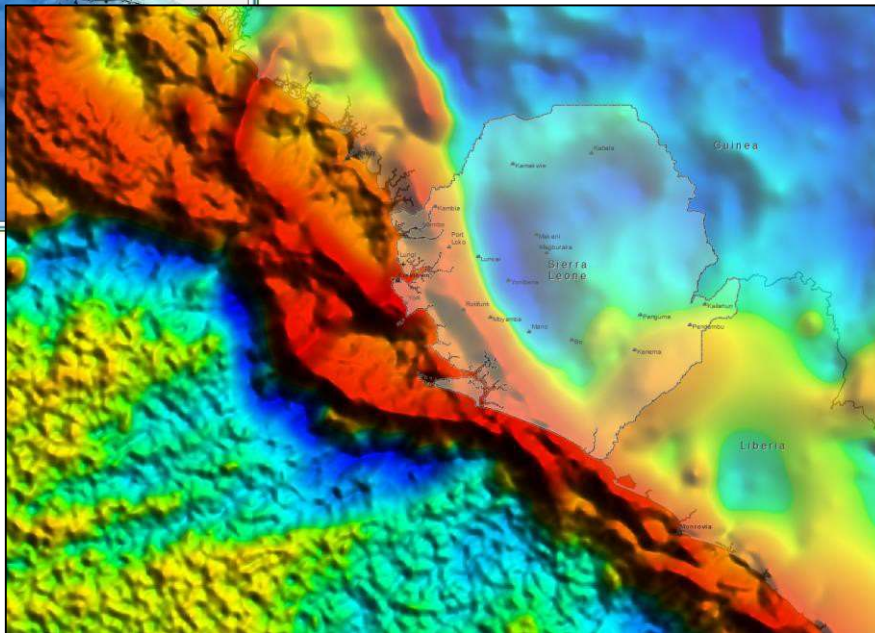
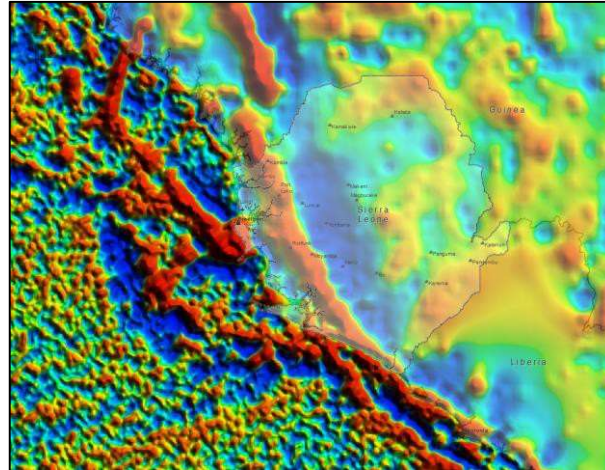
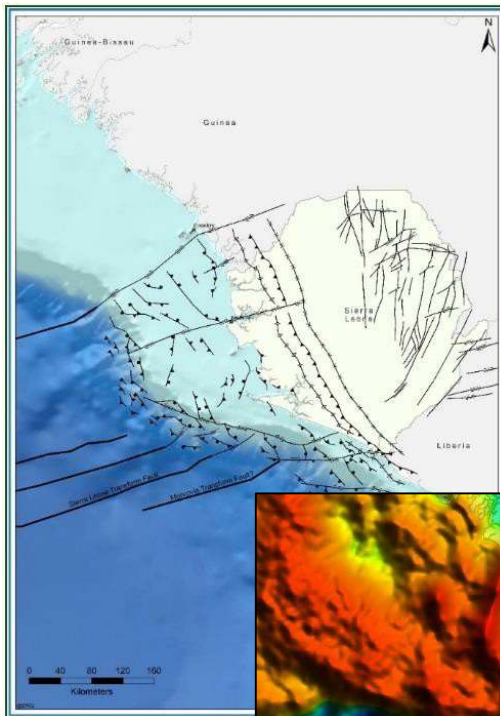
Conjugate Margins Field Analogues
Summarising the petroleum potential and successes of the Sierra Leone conjugate margins highlighting the Sierra Leone margin in the Equatorial Atlantic Play.

- The 'Introduction to Sierra Leone Petroleum Geology & Prospectivity Report' is a joint project between the Petroleum Directorate and ERCL to create an introductory report into the petroleum geology and prospectivity of Sierra Leone for licensing by potential investors.
- The introductory report will encompass previous studies and work completed during the last 12 months by the PDSL.
- The first release can be licensed through ERCL (Getech Group Company).

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Sierra Leone- Integrated Structural Study



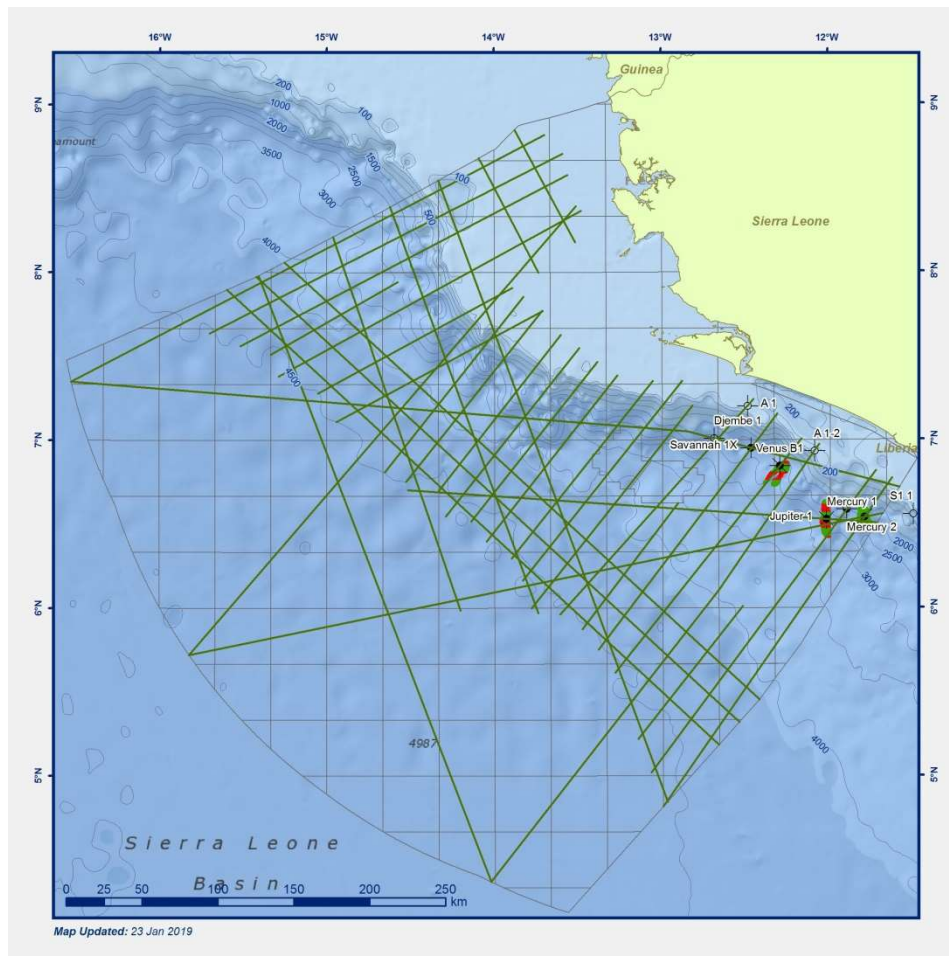
- A new insight into the tectonic development of the Sierra Leone margin, highlighting areas of interest in Mesozoic titled fault blocks in the shallow to ultra deep water.
- Integration of released well and seismic data and Getech Groups gravity and magnetic data base (Multi Sat) to enhance understanding of genesis of Sierra Leone margin



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Sierra Leone- New Long Offset 2D seismic



GeoPartners

- 9000km of new ultra-long offset broadband 2D seismic
- Ties all offshore wells
- First shallow to ultra-deep survey
- PreSTM and PreSDM deliverables
- Acquisition start date early Q2 2019
- Fast track deliverables provided early Q3 for acreage assessment



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Sierra Leone - Final remarks



- The PDSL suspended the Fourth Licensing Round to allow for Industry Consultations.
 - Consultations complete – licence round preparations restarted
 - Pre-announcement to be made at CERAWeek Houston 11-15th March
 - Licence Round kickoff events starting early Q2 in London etc
 - Legacy data packages – seismic and well data – available through the PDSL
 - New 2D Long Offset available for licensing through GeoPartners
- Sierra Leone represents an excellent investment opportunity with proven hydrocarbon discoveries
 - Open Blocks on offer in the full offshore area – shallow to deep water
 - Good prospective acreage available with significant amount of Seismic data (2D and 3D), Gravity & Aeromagnetic and Well data available
 - New interpretation reports across the offshore basin
 - Onshore Exploration potential in the near future
 - New 2D Long Offset to provide improved subsurface imaging



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Sierra Leone- Final remarks (continued)



- The investment climate is investor friendly and conducive, driven by:
 - A favourable legal, regulatory and fiscal framework
 - Political stability
 - Attractive fiscal incentives for foreign investment
 - Improved infrastructure - roads, telecommunications and electricity



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Thank you from Sierra Leone



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