



Republic of Sierra Leone

Sierra Leone 4th Licensing Round:
Undeveloped Discoveries and the Next
Phase of the Deepwater Renaissance

APPEX 2018

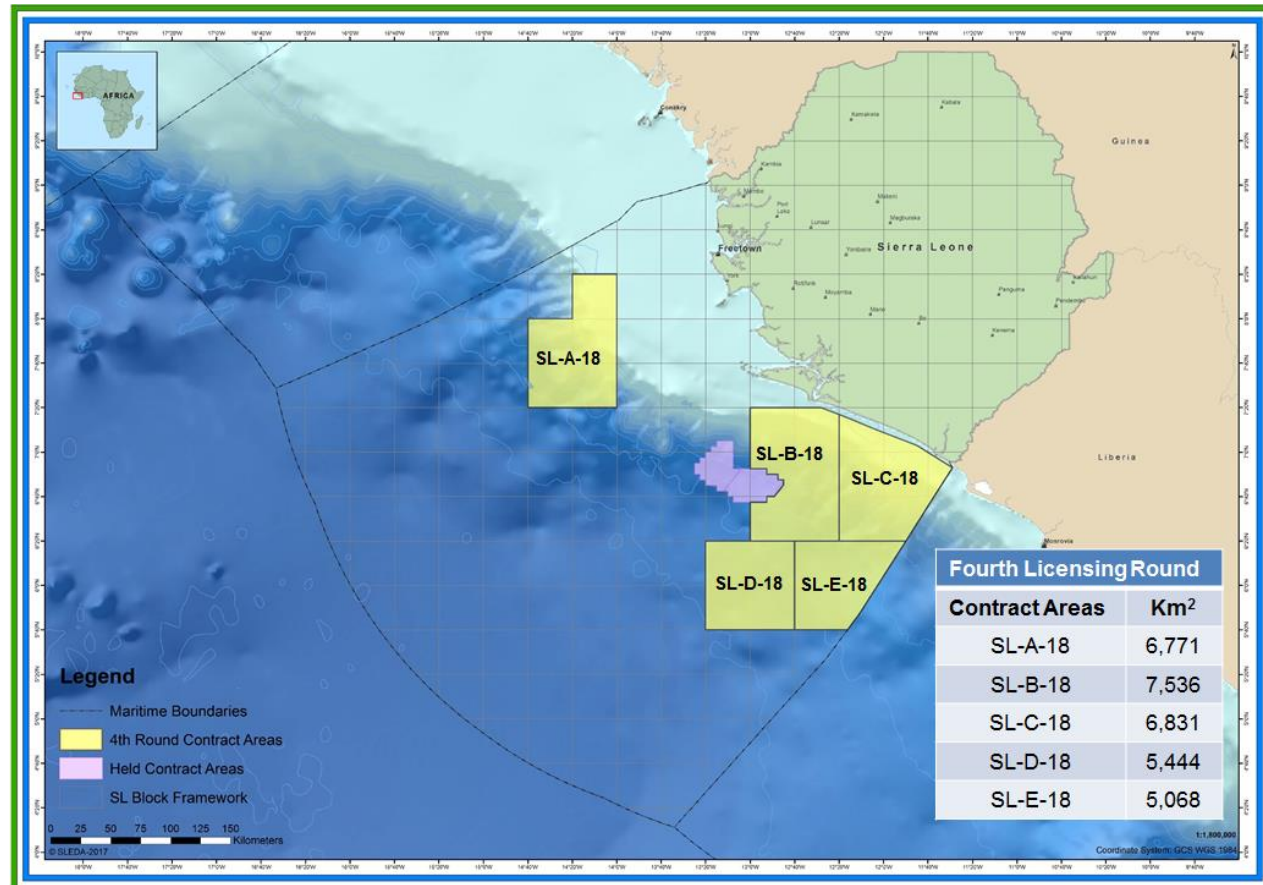
Petroleum Directorate Sierra Leone (PDSL)

Sierra Leone Fourth Licensing Round

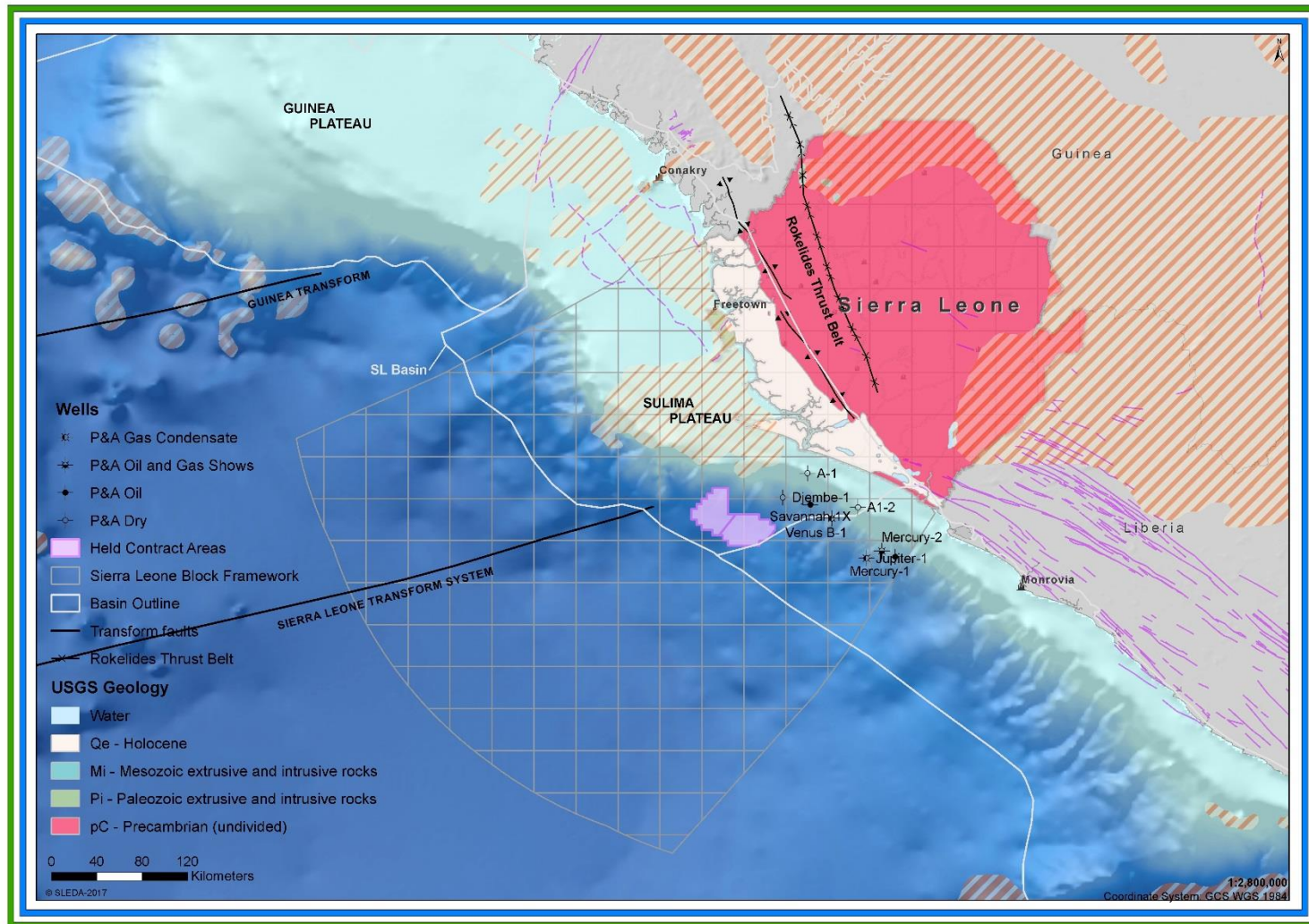


The Fourth Licensing Round is now open and will close:
12 noon on Thursday June 28th 2018

- 5 Contract Areas on offer
- Approx. 32,000 km²
- Contract Areas cover existing hydrocarbon discoveries and prospective underexplored areas
- We invite companies to pre-qualify. All documentation can be found on the website
www.pd-sl.com



Sierra Leone- Structural Elements

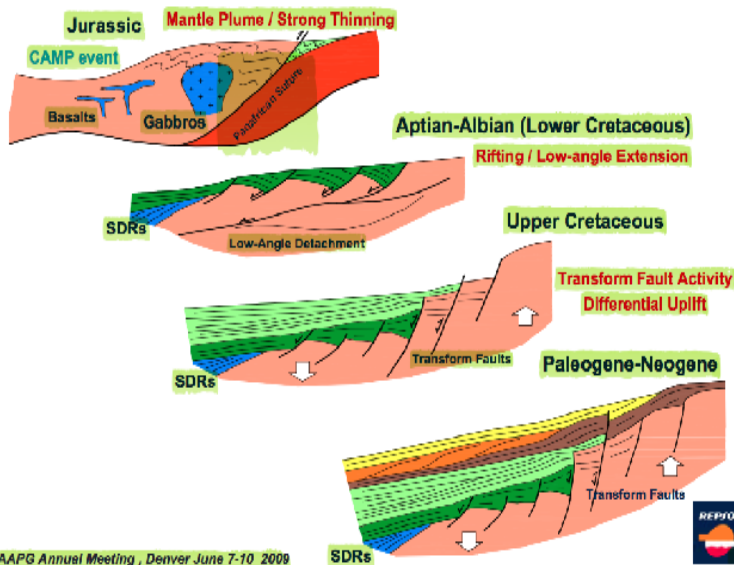


Regional Geology



STRUCTURAL EVOLUTION

Structural Evolution of the Sierra Leone – Liberia Margin



- The geology of the basin is related to the opening of the Atlantic
- Forms part of the West African Equatorial Margin
- The basin is bounded by the Guinea Transform System to the north and the Monrovia Transform System to the south
- The Sierra Leone Transform Fault runs in the middle of the basin, thus giving the basin two distinct physiographic patterns in the north and south

The evolution of the basin is divided into three phases:

- **1. Pre-rift/Pre-transform phase:** dominated by block faulting throughout the Jurassic with associated volcanics
- **11. Syn-rift/Syn-transform phase:** characterized by NNW-SSE oriented extensional faulting, sediments of early Cretaceous age.
- **111. Post-rift/Post-transform:** represented by the passive margin.

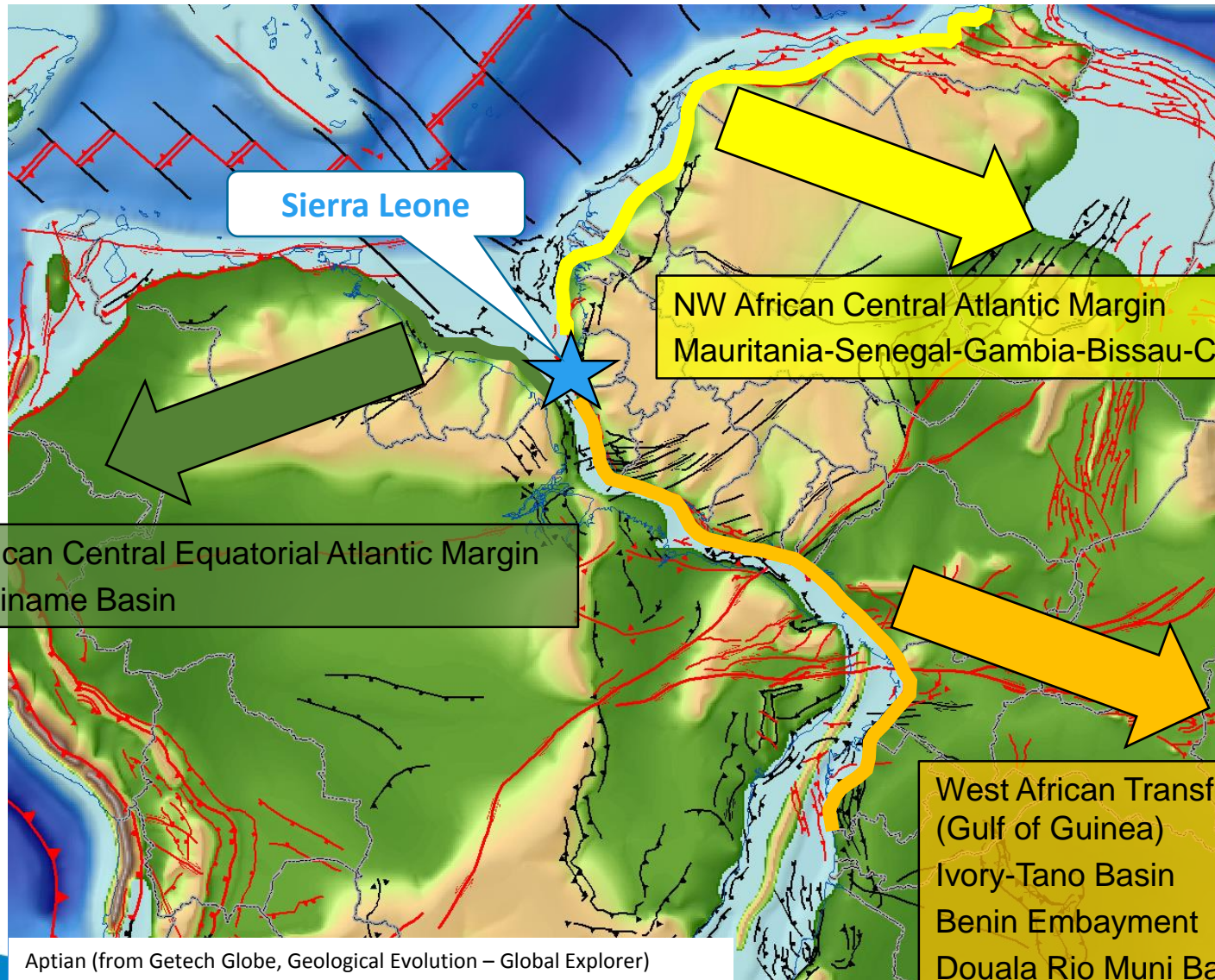
AAPG Annual Meeting, Denver June 7-10 2009

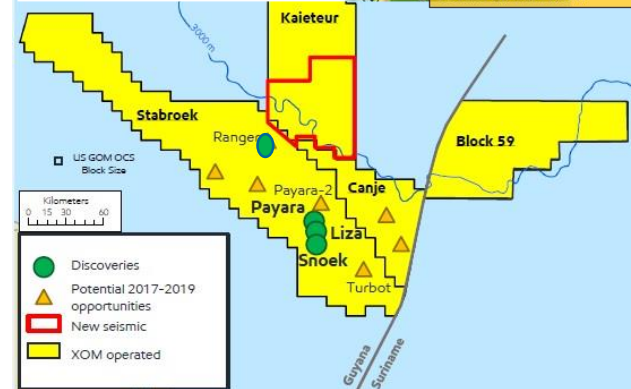
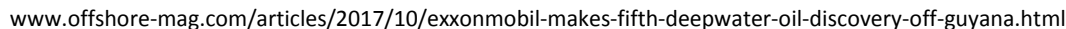
Sierra Leone Margin Development



Sierra Leone- Conjugate Analogues

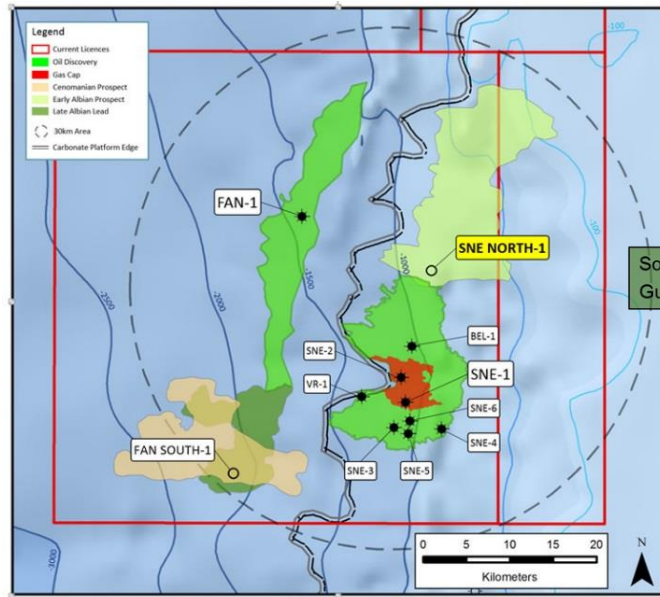
Aptian Reconstruction from Globe, Getech Group 2017



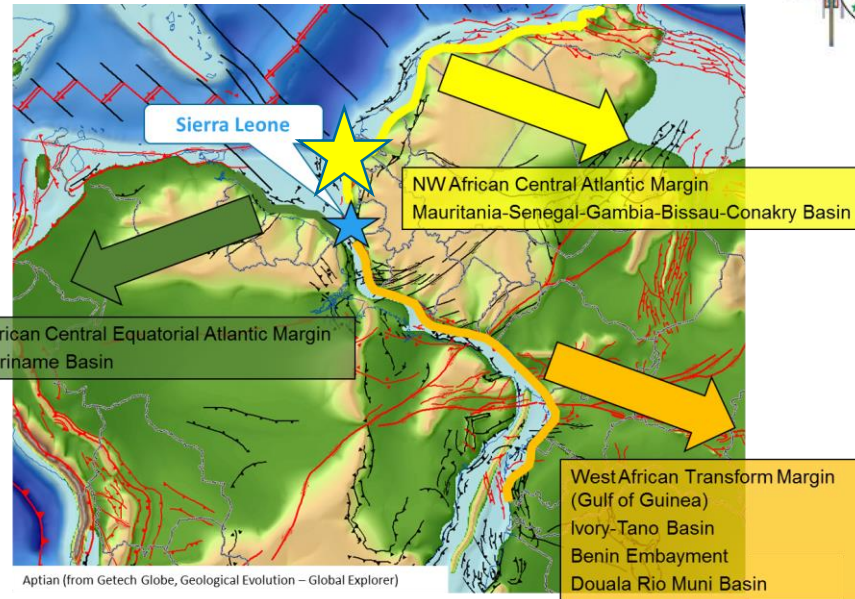
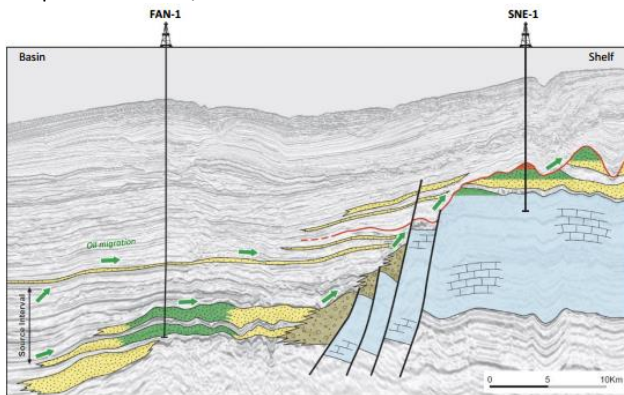


Country	Field/Discovery	Type	Age	Reservoir
Guyana	Liza (2015)	oil	Upper Cretaceous	sandstone
Guyana	Payara (2016)	oil	Upper Cretaceous?	sandstone
Guyana	Snoek (2017)	oil	Upper Cretaceous?	sandstone?

Recent Successes in Deepwater NW Africa



<http://www.offshore-technology.com/projects/sne-deepwater-oil-field/>



- Tortue- 2015-2016- Albian/ Cenomanian slope channel
- Marsouin- 2015- Upper/ Lower Cretaceous slope channel
- Teranga- 2016- Cenomanian slope channel
- Yakaar- 2017- Cenomanian basin floor fan
- Fan-1- 2014- Cretaceous slope/basin floor fan
- Fan South- 2017
- SNE- 2014- Albian sandstone
- Sinapa West- 2015 Guinea Bissau- Aptian sandstones

Petroleum Systems of Sierra Leone



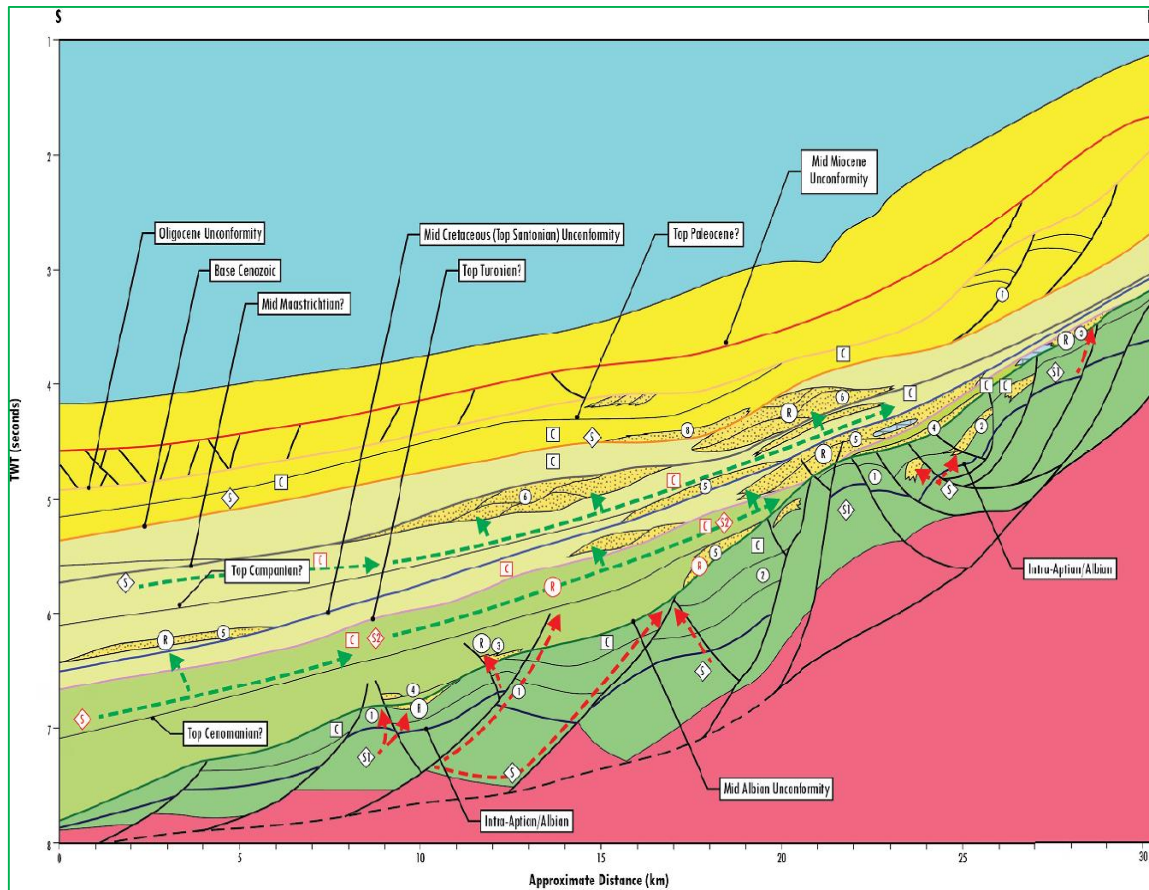
- SOURCE ROCK

- Aptian to early Cenomanian lacustrine shales (HI795-482 & TOC up to 11%). Geochemical analysis has confirmed the good quality and high potential of this source zone.
- Late Cretaceous, Cenomanian-Turonian shales (HI approx. 560 & TOC approx. 5%)
- Aptian encountered in 2009-2013
- Both source rocks have reached the oil/gas window (0.8 to 1.2)

- RESERVOIR

- Potential reservoir sequences include the Aptian, Albian, Cenomanian, Maastrichtian and Paleocene to Eocene.
- The total net sand thickness is estimated at 1,500m for all sequences. The average porosity of the sandstone series is expected to exceed 15%.

Petroleum Systems



- TRAP
 - Stratigraphic, structural or a combination exists before the Paleocene which is ideal for generation & expulsion of HC
- SEAL
 - The seal can be lateral, transformational shales or regional pelagic/hemipelagic shales

Undeveloped Discoveries

(Contract Areas B&C)



Venus – B1 (2009 – Contract Area B/C)

Water Depth: 1,800m, TD: 5,636m 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 (2010 - Contract Area C)

Water Depth: 1,600m, TD: 4,862m 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.

Jupiter-1 (2011 - Contract Area C)

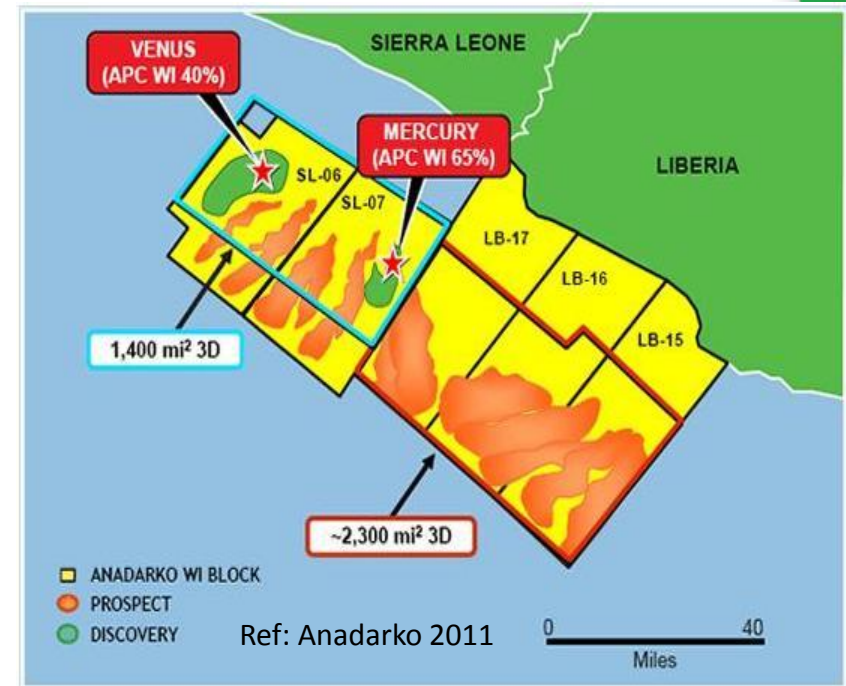
Water Depth: 2,199m, TD: 6,465m

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

Savannah-1X (2013 - Contract Area B)

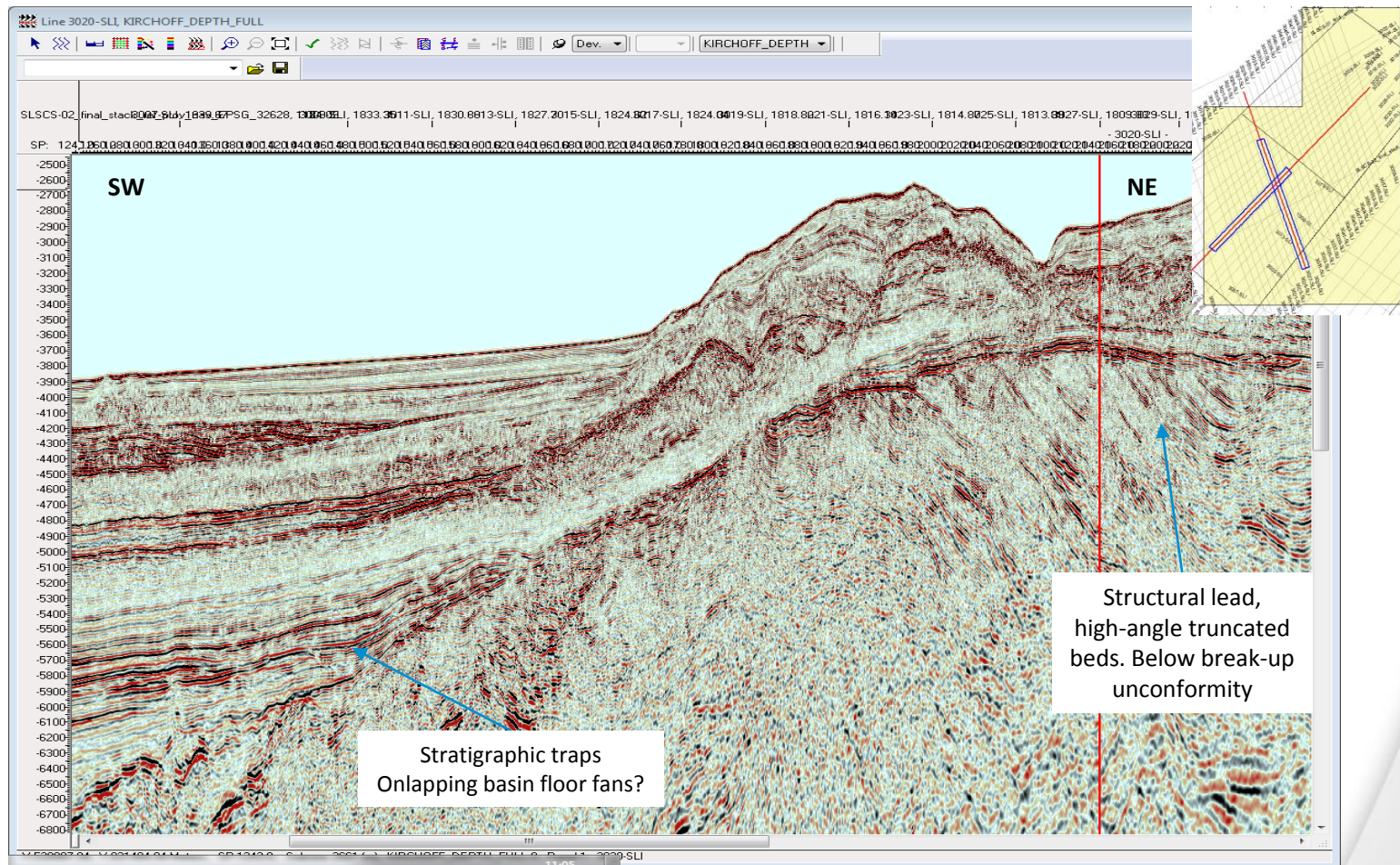
Water Depth: 2,153, TD 4,737m

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



Data from 8 wells and interpretation reports available

SL-A-18 – Example Prospectivity

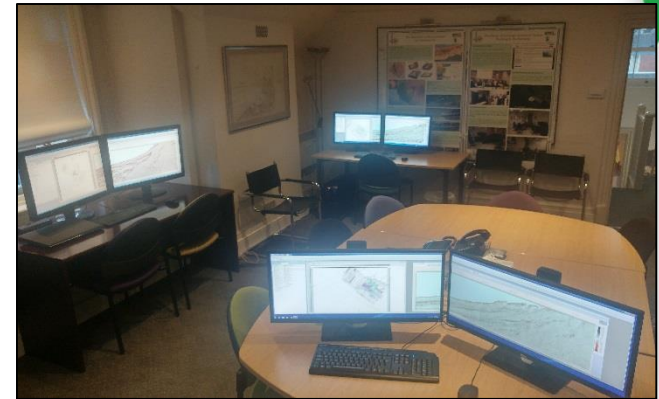






www.pd.gov.sl www.pd-sl.com

UK and Freetown Data Rooms are Open



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Data room rules can be accessed at www.pd-sl.com/documentation

www.pd.gov.sl www.pd-sl.com

Executive Summary



- The Sierra Leone Fourth Licensing Round was launched 15th January 2018 and runs until 28th June 2018
- 5 contract areas were made available, with ~32,000km² on offer with each Contract Area being >5000km²
- Water depth range from <100m to >4000m in the Contract Areas
- Contract areas contain multiple Cretaceous undeveloped light oil and condensate discoveries
- Basin floor fan prospects remain untested and have been identified by the Petroleum Directorate's technical team in the Contract Areas on offer
- Cretaceous fault block prospects have also been identified in the Contract Areas on offer
- Aptian and Cenomanian/ Turonian source rocks identified offshore Sierra Leone
- Recent exploration success in the deep water of South America (eg Guyana) and NW Africa (eg Senegal) in analogous Upper and Lower Cretaceous plays
- These successes highlight Sierra Leone as the potential next step in the deep water renaissance



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The Petroleum Directorate
looks forward to receiving your applications

THANK YOU