

# EAGE

EUROPEAN  
ASSOCIATION OF  
GEOSCIENTISTS &  
ENGINEERS

INCLUDING



EUROPEC

OPPORTUNITIES PRESENTED BY  
THE ENERGY TRANSITION

2018

# EAGE ANNUAL

80TH CONFERENCE + EXHIBITION

COPENHAGEN | DENMARK



11-14 JUNE 2018  
[WWW.EAGEANNUAL2018.ORG](http://WWW.EAGEANNUAL2018.ORG)



**EAGE ANNUAL**

80TH CONFERENCE + EXHIBITION

COPENHAGEN | DENMARK

# Cairn Energy PLC

The SNE Discovery Offshore Senegal – Moving a Frontier Basin to Emergent

Eric Hathon, Exploration Director

12<sup>th</sup> June 2018

**EAGE**

EUROPEAN  
ASSOCIATION OF  
GEOSCIENTISTS &  
ENGINEERS

11-14 JUNE 2018

[WWW.EAGEANNUAL2018.ORG](http://WWW.EAGEANNUAL2018.ORG)

# Disclaimer

These materials contain forward-looking statements regarding Cairn, our corporate plans, future financial condition, future results of operations, future business plans and strategies. All such forward-looking statements are based on our management's assumptions and beliefs in the light of information available to them at this time.

These forward-looking statements are, by their nature, subject to significant risks and uncertainties and actual results, performance and achievements may be materially different from those expressed in such statements. Factors that may cause actual results, performance or achievements to differ from expectations include, but are not limited to, regulatory changes, future levels of industry product supply, demand and pricing, weather and weather related impacts, wars and acts of terrorism, development and use of technology, acts of competitors and other changes to business conditions.

Cairn undertakes no obligation to revise any such forward-looking statements to reflect any changes in Cairn's expectations with regard thereto or any change in circumstances or events after the date hereof.

# Full Cycle Exploration

## Strategy

To generate value with an evolving portfolio of prospects which mature into a choice of material drilling targets and deliver consistent results on a three year rolling average

- |  |                         |                                   |
|--|-------------------------|-----------------------------------|
| ➤ Moving from Exploration and Appraisal to Development | ➤ Drill ready portfolio | ➤ Future / Maturing Opportunities |
| ➤ Senegal – SNE  | ➤ UK                    | ➤ Ireland    ➤ Suriname           |
| ➤ Norway – Nova  | ➤ Norway                | ➤ Mexico                          |

## Critical Success Factors

- An outstanding team
- Compelling commercial, subsurface and above ground risk
- Clear path to commerciality
- Operatorship and strategic partners



# MSGBC Basin Before FAN-1 and SNE-1

Over 100 wells drilled offshore with only one development

## Senegal

- 32 offshore wells drilled, all shallow water
- First well in basin Casamance Marine-1 1966
- First deep water licence Vanco, 1999
- RSSD licence awarded to Hunt 2004
- FAR enters in 2006, Cairn enters in 2013

## Mauritania

- 58 wells drilled
- Chinguetti only development (Woodside, 2001)
- 2003-2014 Dana drills 5 non-commercial discoveries
- Kosmos entered in 2012 with 3 licences
- 2D and 3D seismic commitment



## The Gambia

- One well drilled on 2D seismic data
- No 3D seismic

## AGC

- 15 wells drilled
- Dome Flore and Gea heavy oil discoveries

## Guinea Bissau

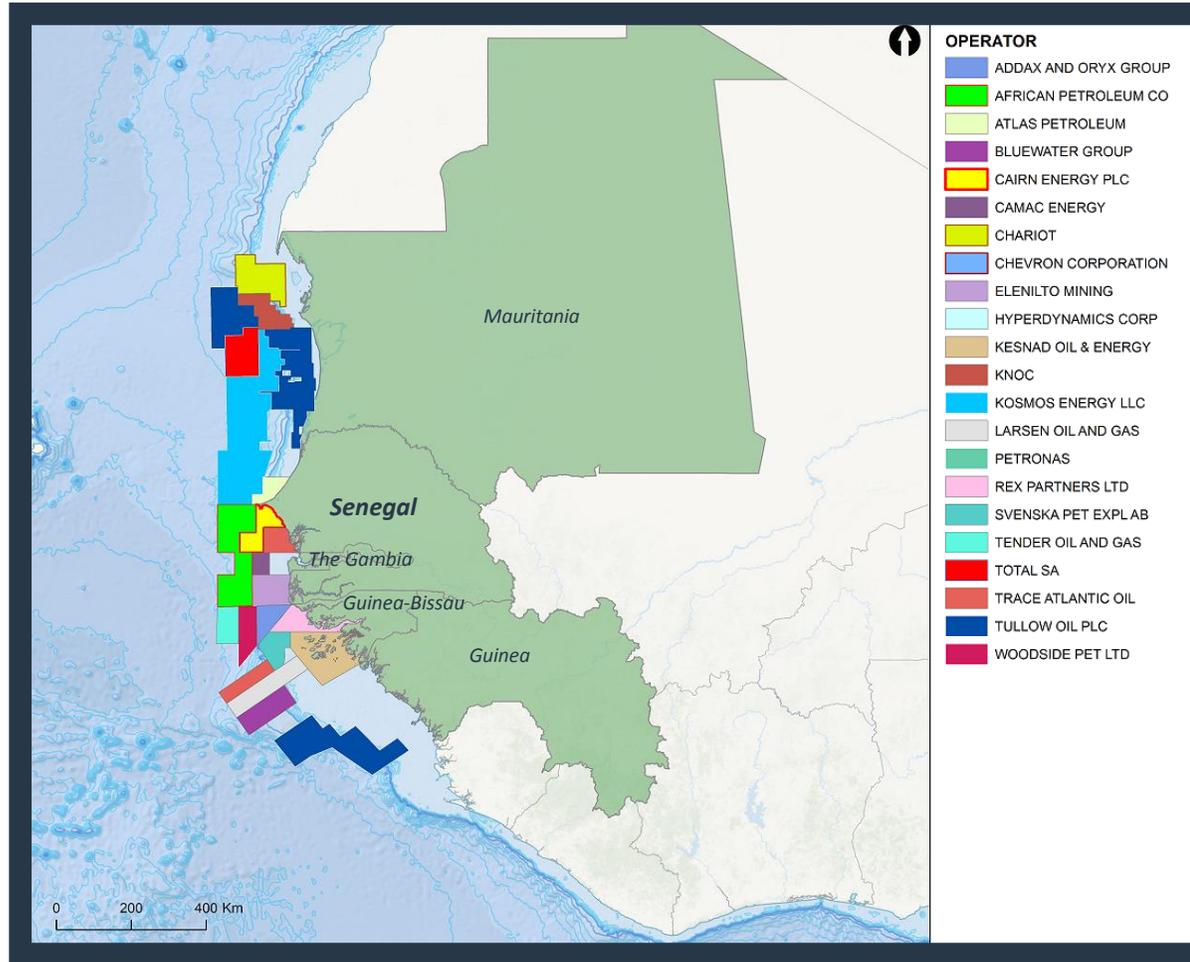
- 11 wells drilled 1968-2004
- All with shows

## Guinea Conakry

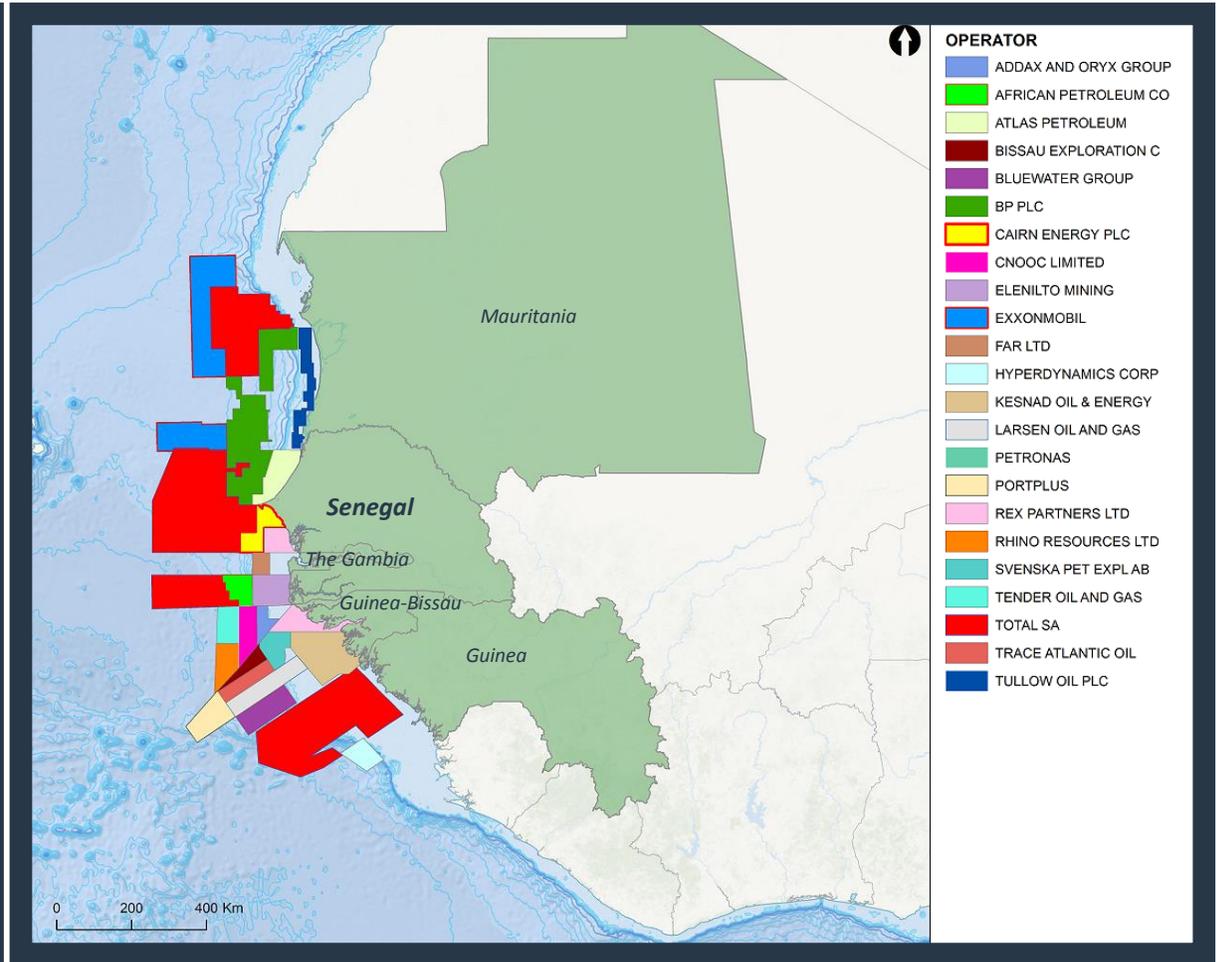
- One deep water well Sabu-1 (2012) with shows

# Significant Industry Interest in Recent Years

2014 Pre FAN-1 and SNE-1 Discoveries

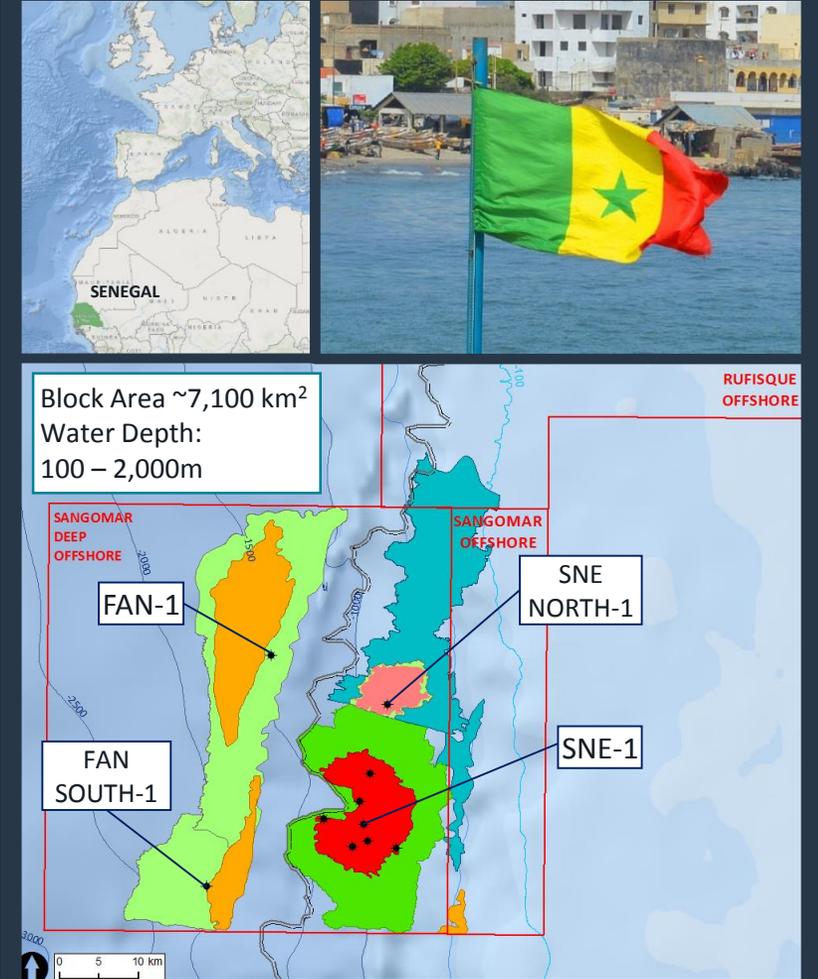


2018 Post FAN-1 and SNE-1 Discoveries



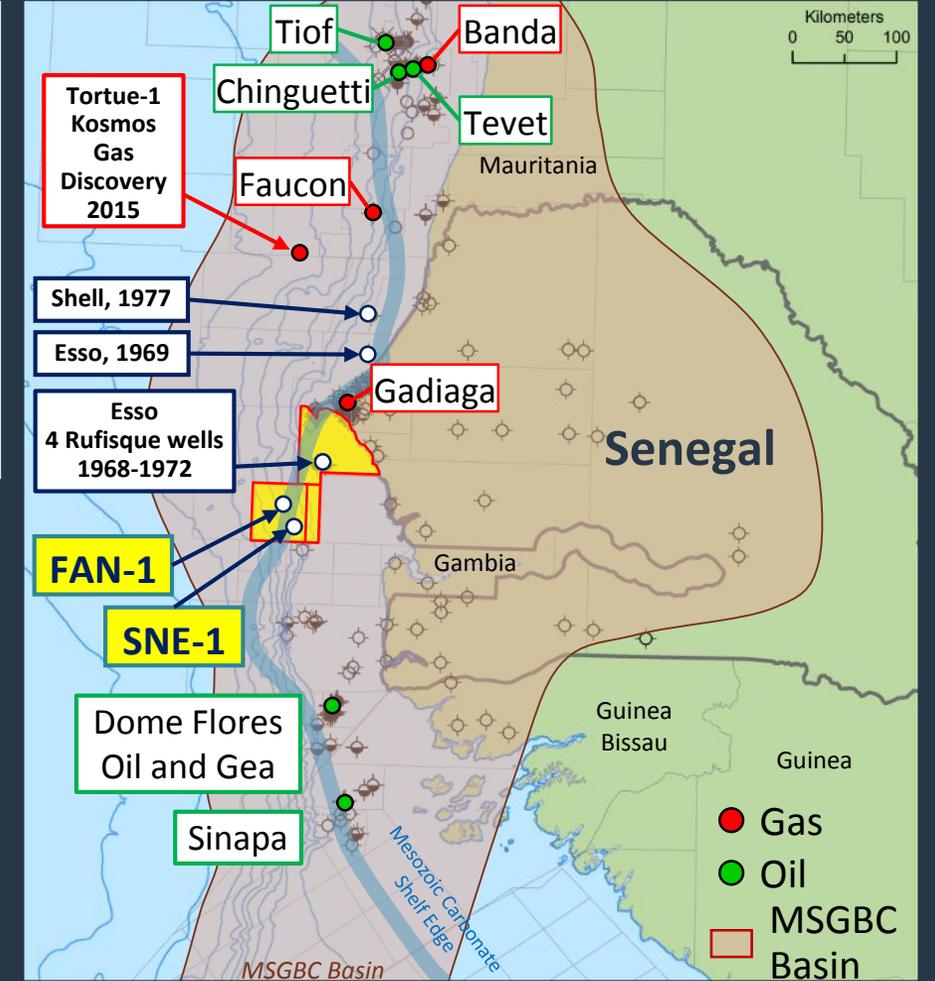
# Moving a Frontier basin to an Emerging Oil Play

- Strong belief in the potential of offshore Senegal
- Drilled first deep water wells offshore Senegal 2014
- Two basin opening discoveries, FAN-1 and SNE-1
- Eleven successful E&A wells drilled 2014-2017
- Established a new hydrocarbon basin, attracting the attention of the global industry
- Three phase drilling programme generated an increasing resource base of up to one billion barrels recoverable
- Foundation for multi field, multi phase development plan
- Progressing to first oil between 2021-2023



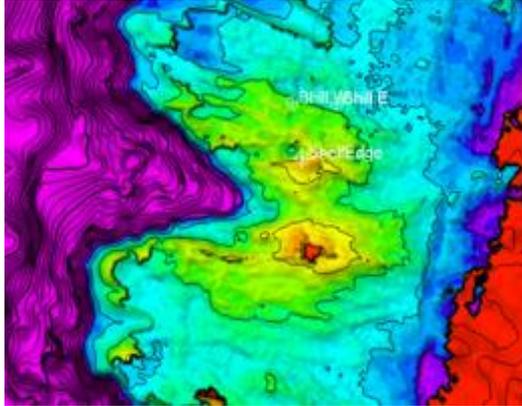
# Key Elements: 3D Seismic, Source Basin and Reservoir Models

- Previous offshore wells demonstrated oil on the shelf (Esso 1968-1972, Rufisque dome)
  - Seismic indication of hydrocarbons
  - DSDP wells further offshore (1970s) demonstrate Cretaceous source rocks
  - Cairn basin modelling suggested good chance of a mature source kitchen
- 
- Why RSSD ? (Rufisque, Sangomar and Sangomar Deep Blocks)
  - Cairn's basin modelling suggests mature HC source kitchen within the western part of the RSSD block area
  - Several prospects and leads identified by Hunt and FAR on 3D seismic
  - Seismic attributes suggest sand (and later hydrocarbons)

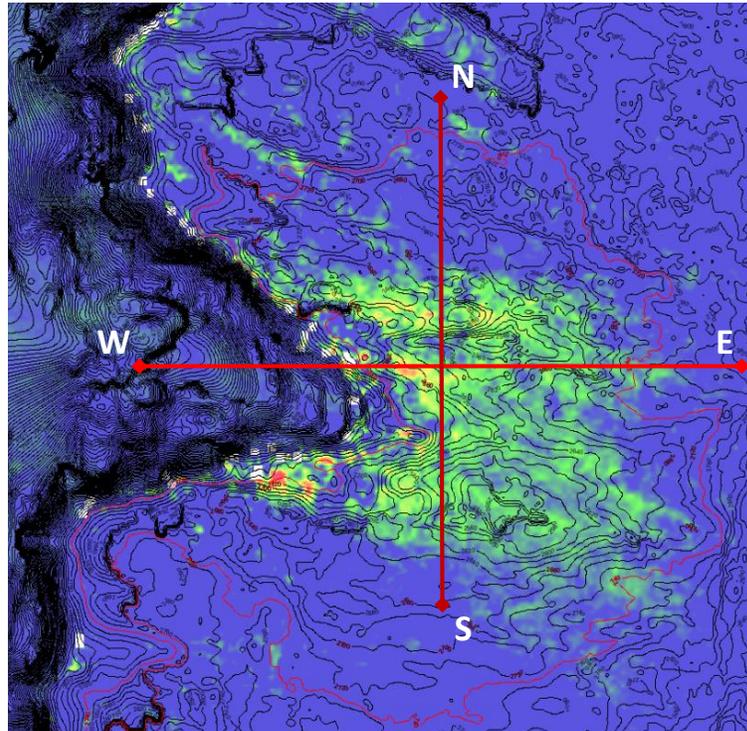


# SNE Field – Lower Albian Sands on Carbonate Platform Margin (Farm-in Stage)

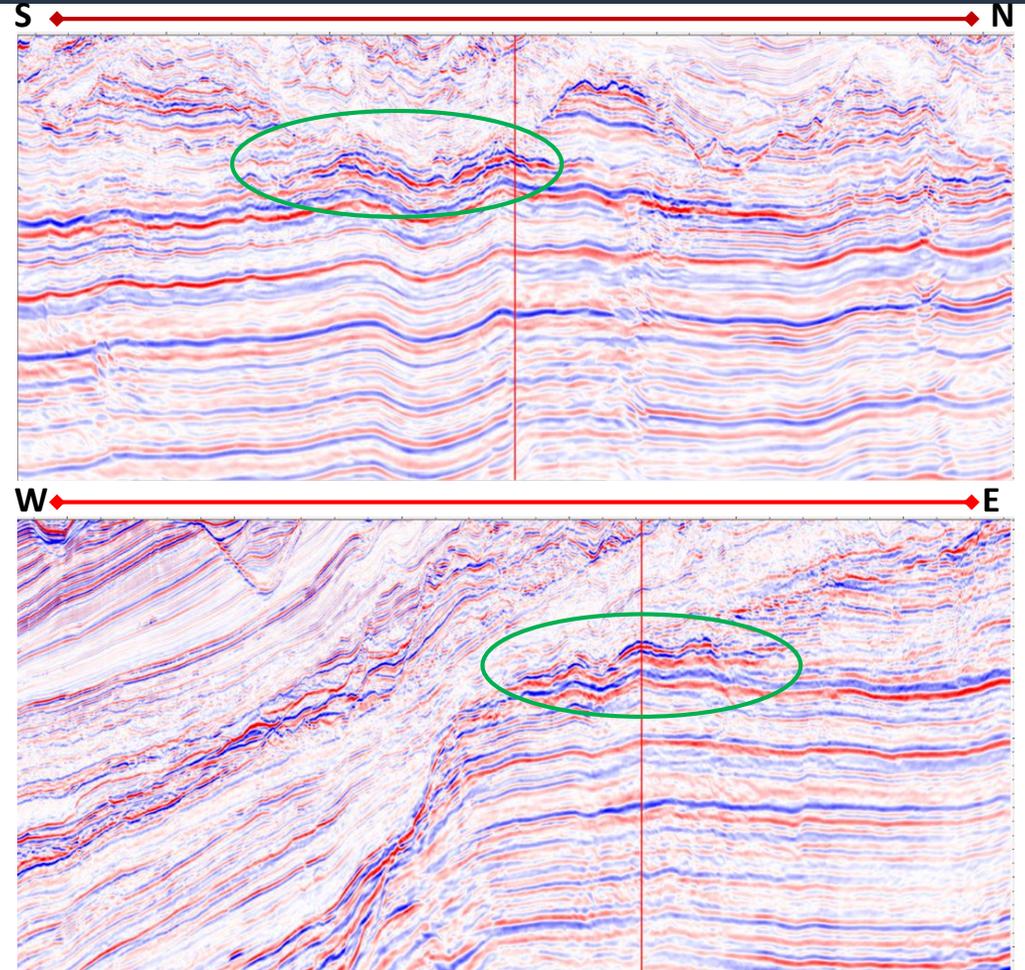
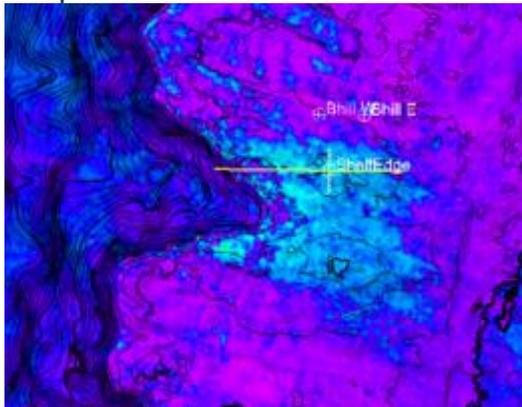
TWT Map



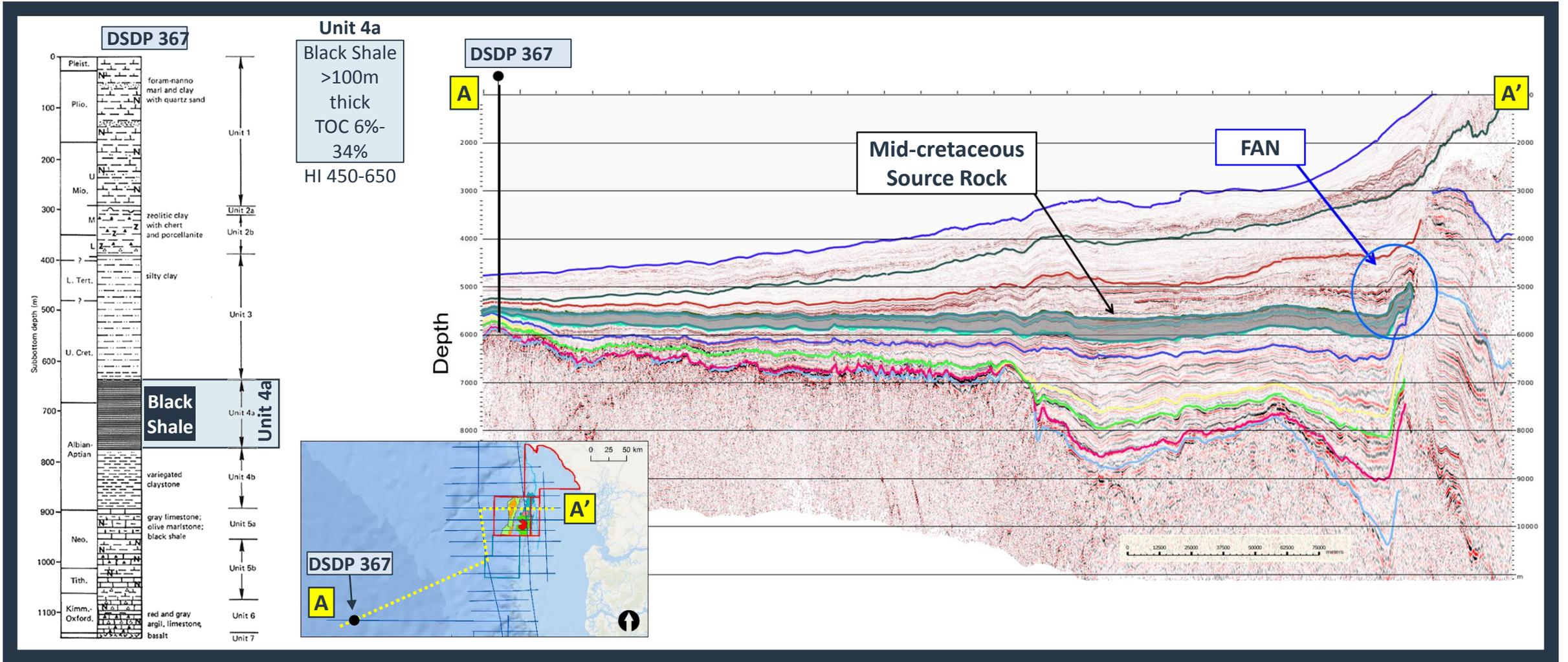
Amplitude Extraction



Amplitude Extraction

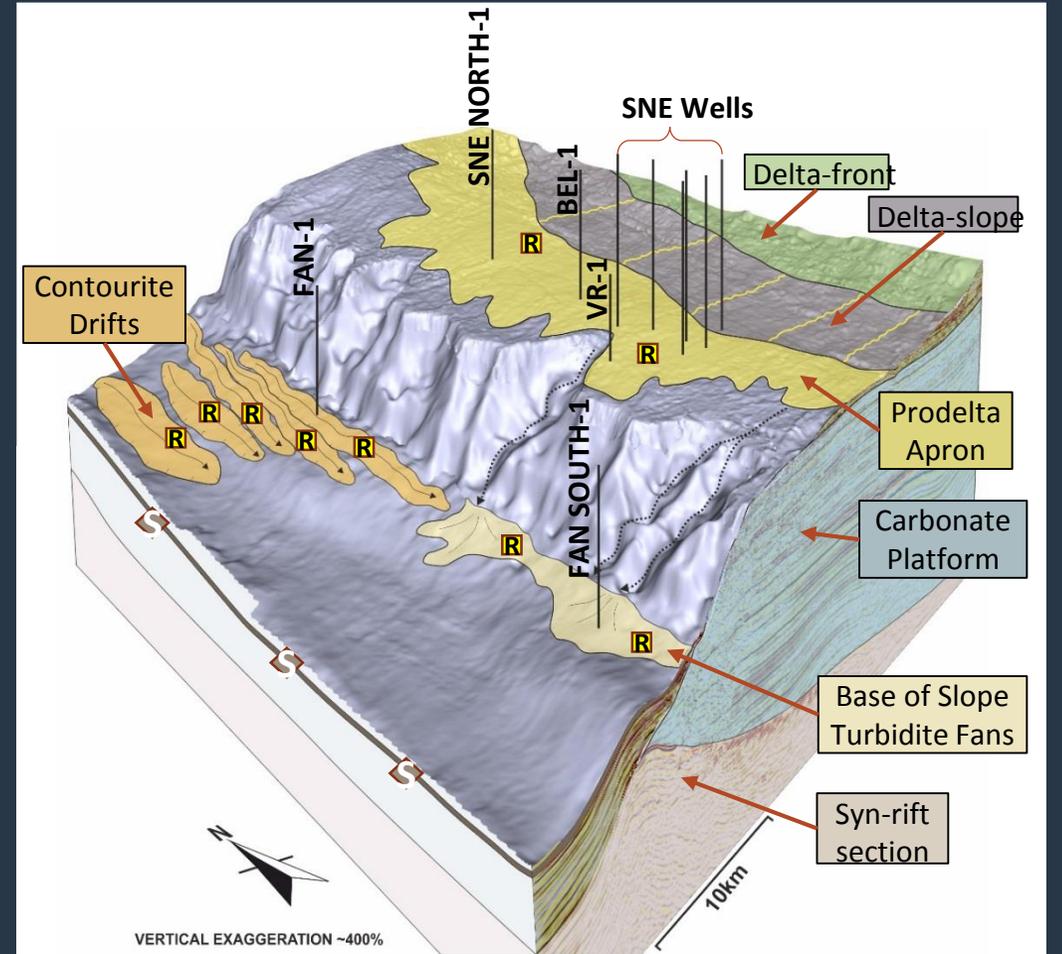
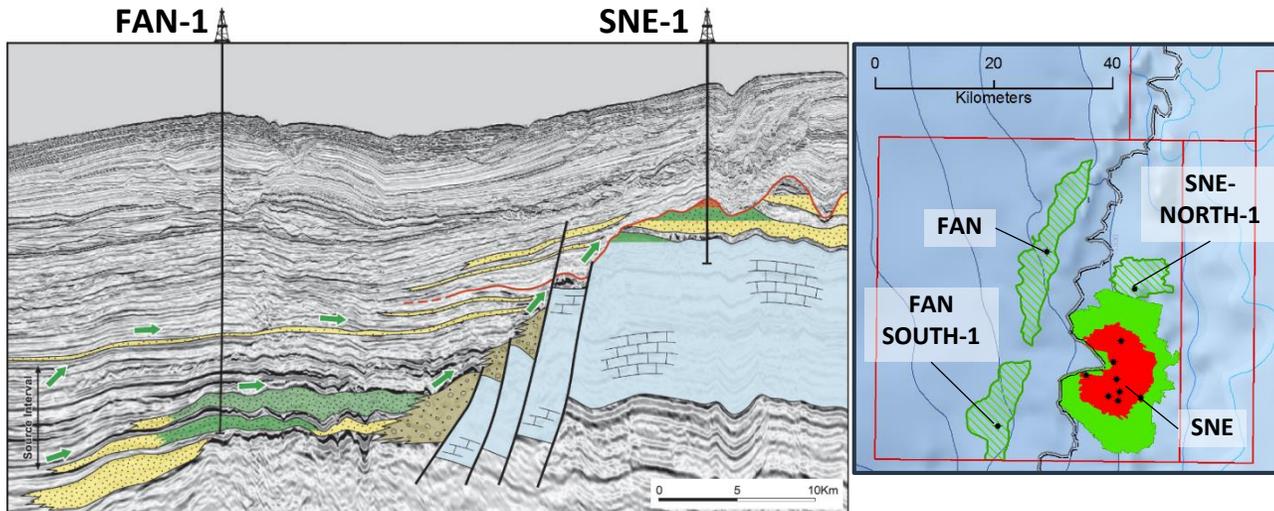


# High Quality, Oil-Prone Source Rock Present in Basin

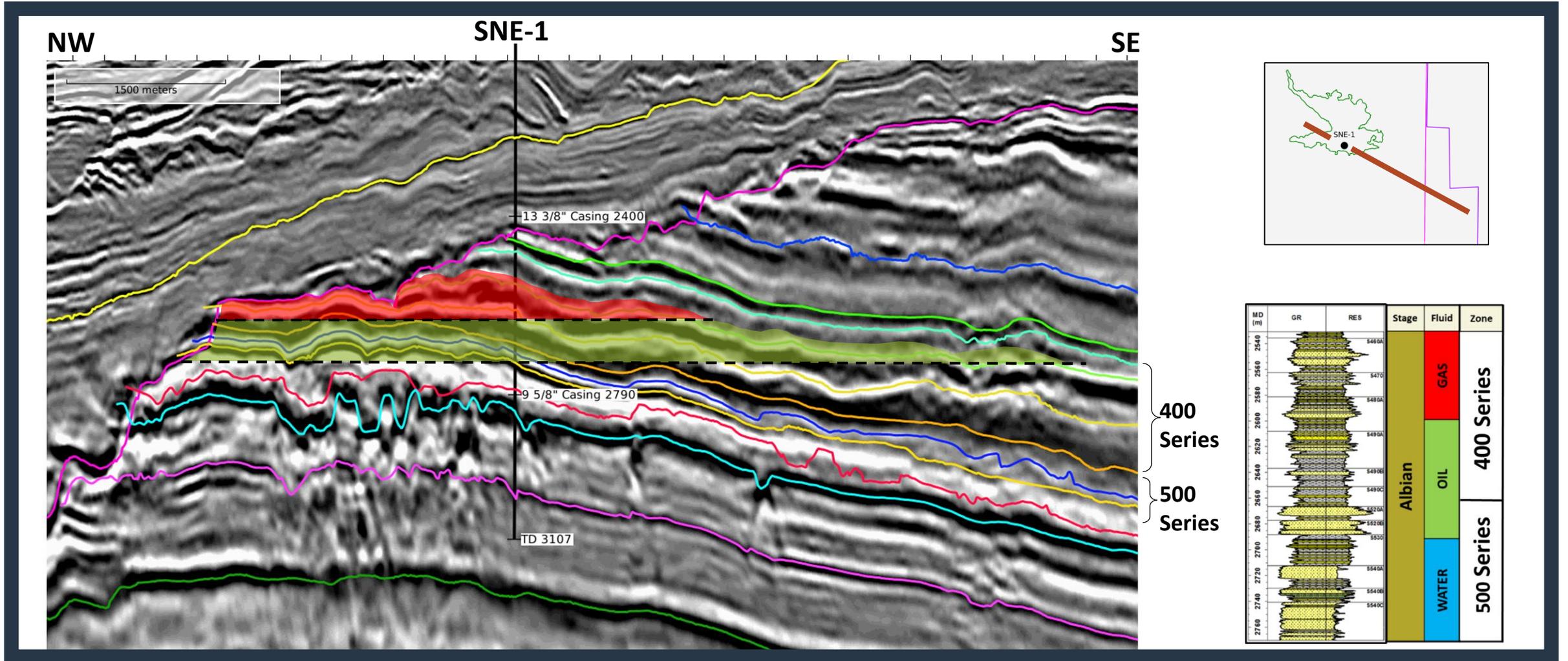


# Geology of Cretaceous SNE and FAN Plays

- SNE Field: Early Albian sandy pro-delta turbidite apron and delta-fed ramp
- FAN- Late Albian axially reworked contourites and gravity deposits
- FAN SOUTH: Albian base of slope turbidite fans shed off the shelf

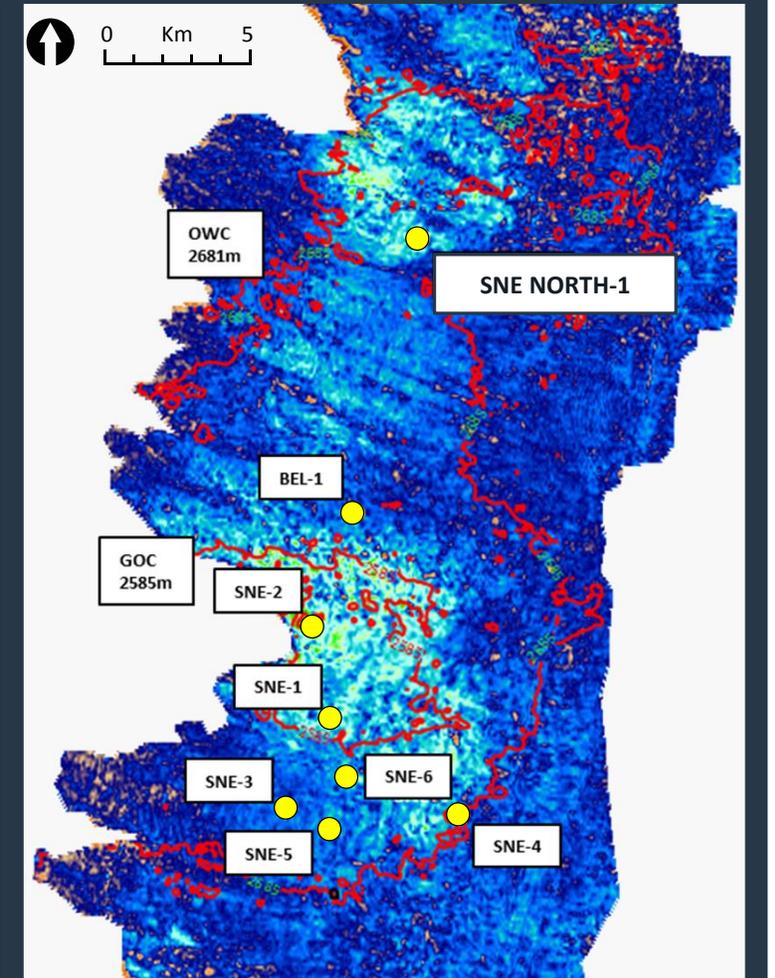
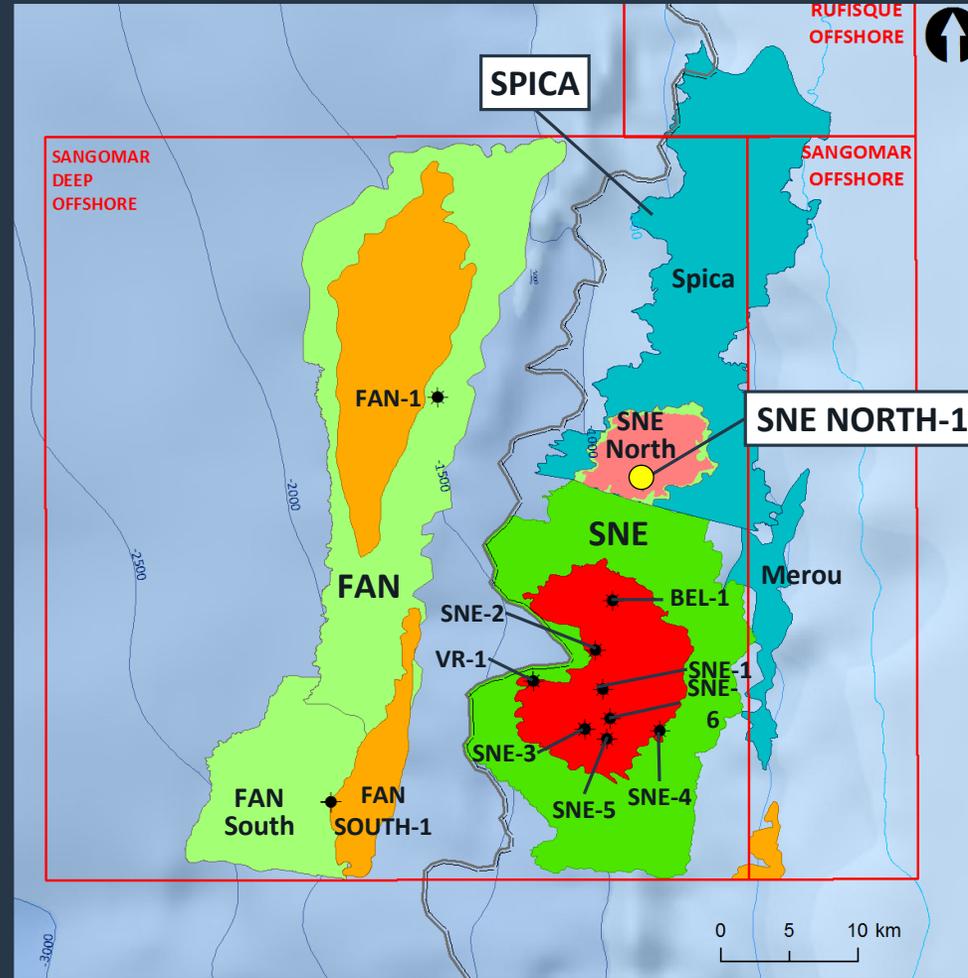


# SNE Field – SNE-1 Discovery Well



# SNE North Exploration Well – 11<sup>th</sup> Well in Programme

- Encountered deeper and separate reservoir to SNE field – S400 and S500 Series reservoirs
- Has positive implications for further hydrocarbon potential
- Spica prospect being matured for potential future exploration target

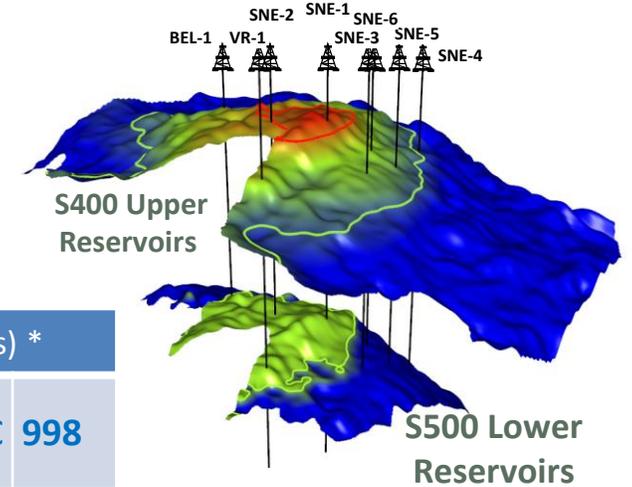
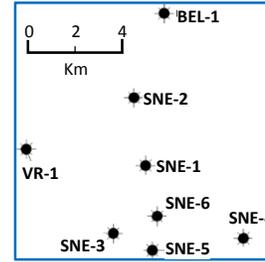


# Well Testing and Reservoir Productivity

## Reservoir and Oil Quality

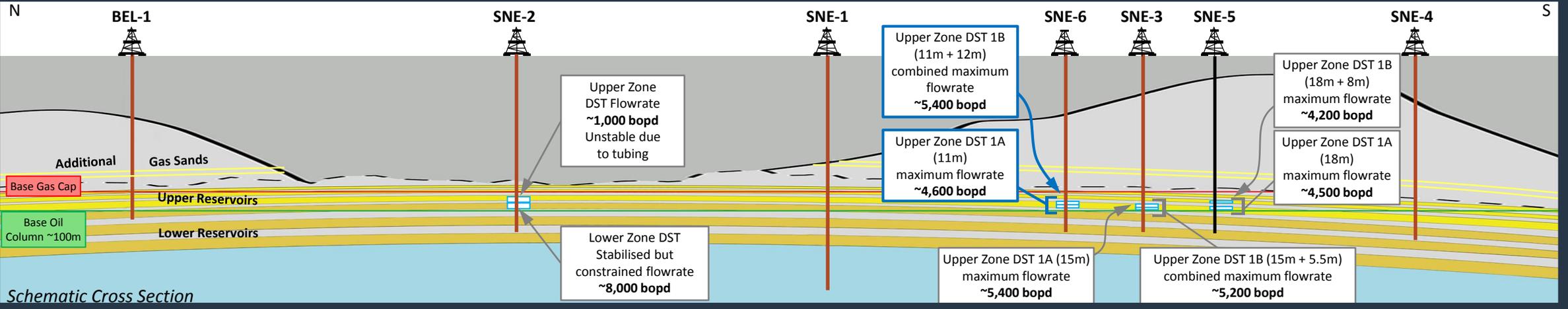
- Good correlation of gross reservoir packages
- Connectivity in S400 upper reservoirs demonstrated by interference test in a clearly preferred orientation
- DST in S500 lower reservoir confirms expected good inter-well connectivity
- Water flood planned for both sets of reservoir

Scale at 2D



Contingent Oil Resource (mmbbls) \*

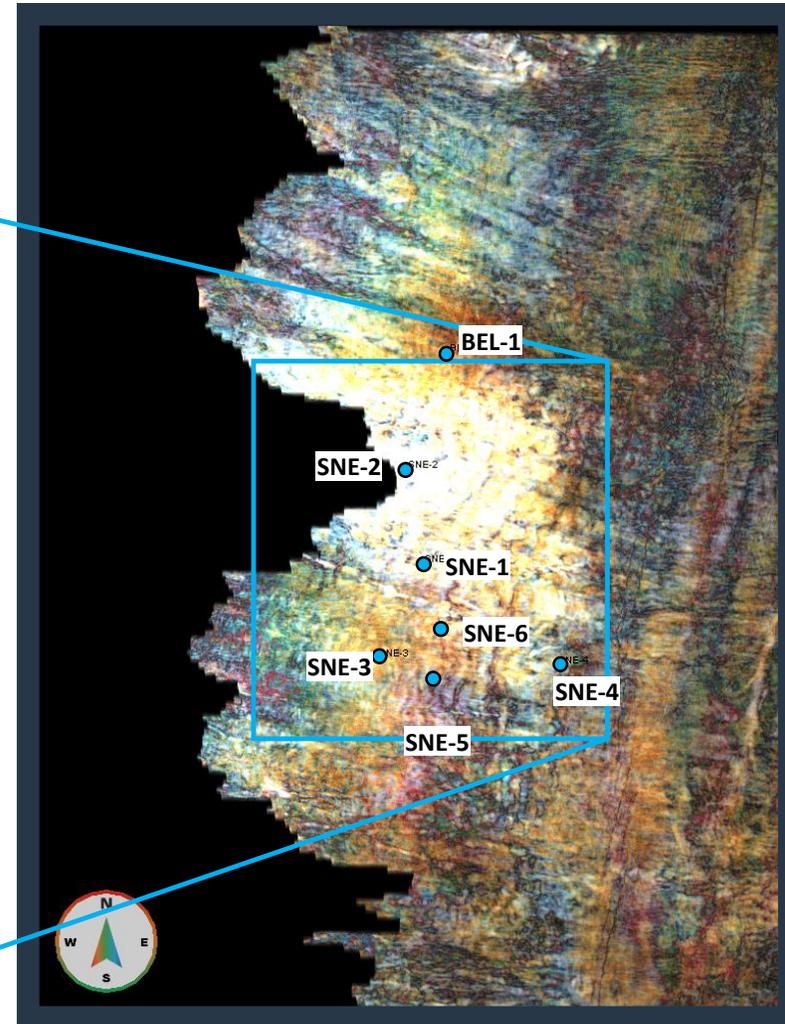
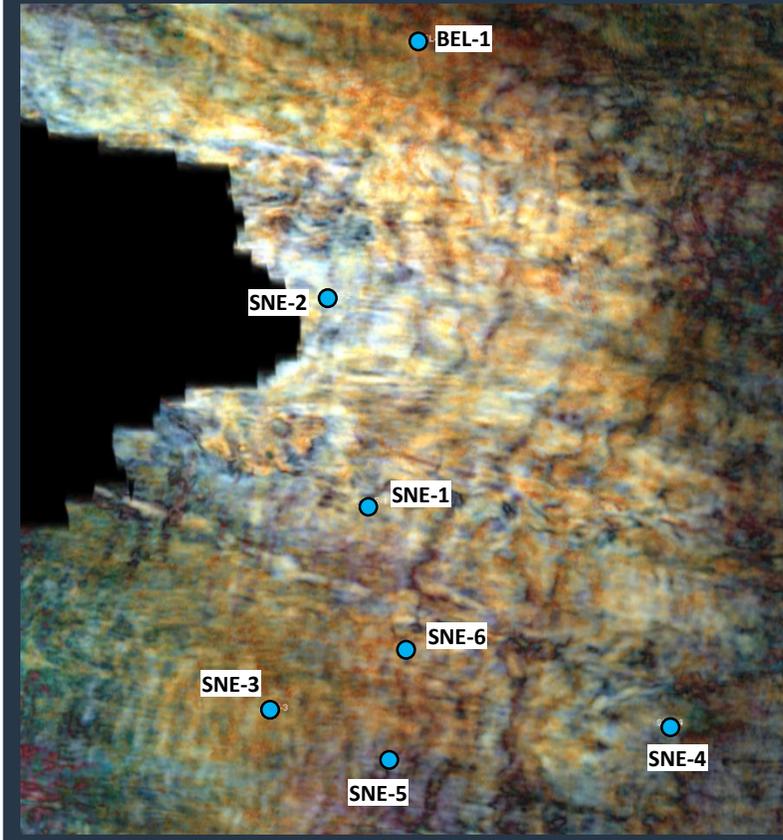
|             |    |     |    |     |    |     |
|-------------|----|-----|----|-----|----|-----|
| August 2017 | 1C | 346 | 2C | 563 | 3C | 998 |
|-------------|----|-----|----|-----|----|-----|



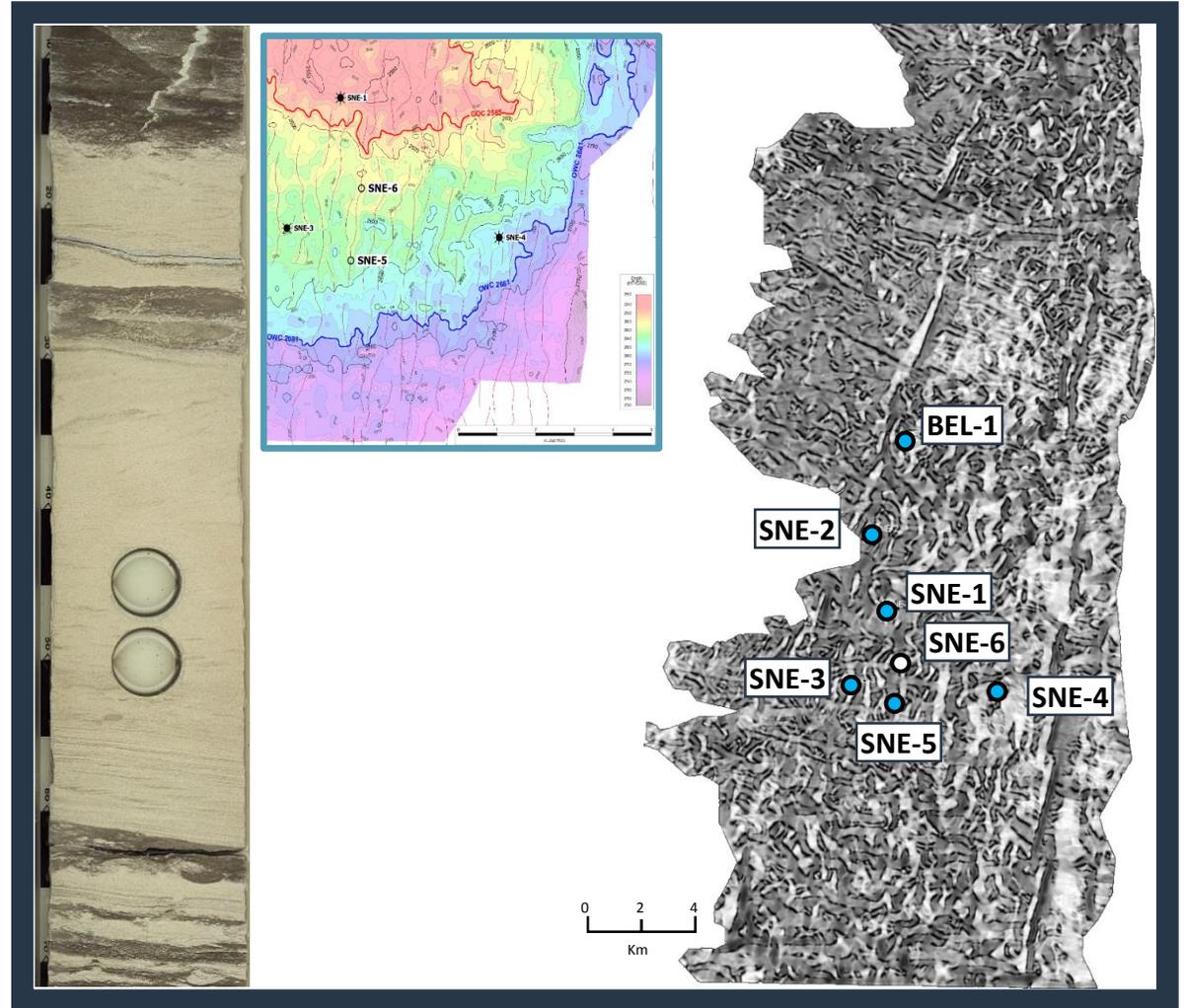
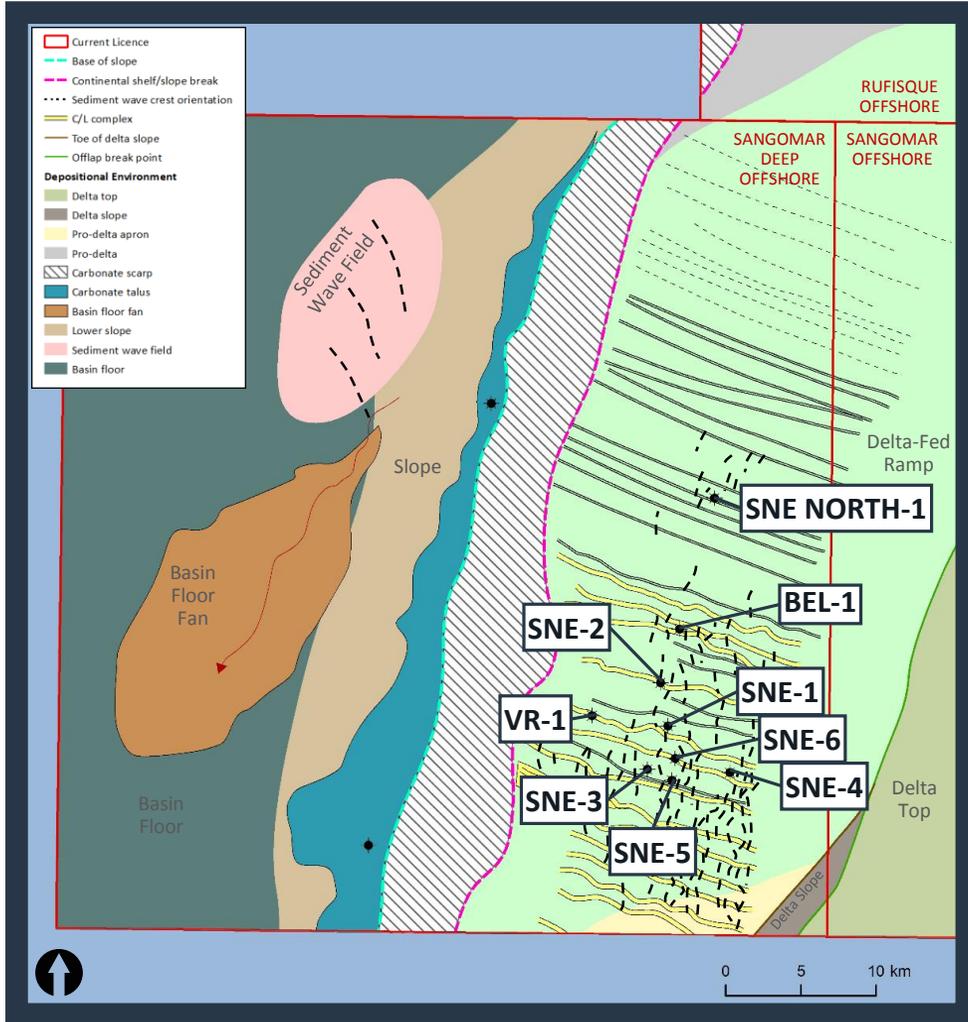
\* Resource estimates by ERC Equipoise

# S400 Series – NS Oriented SandWaves, EW Cutting Channels

- Frequency decomp 20/30/40Hz
- Showing sand waves and channels

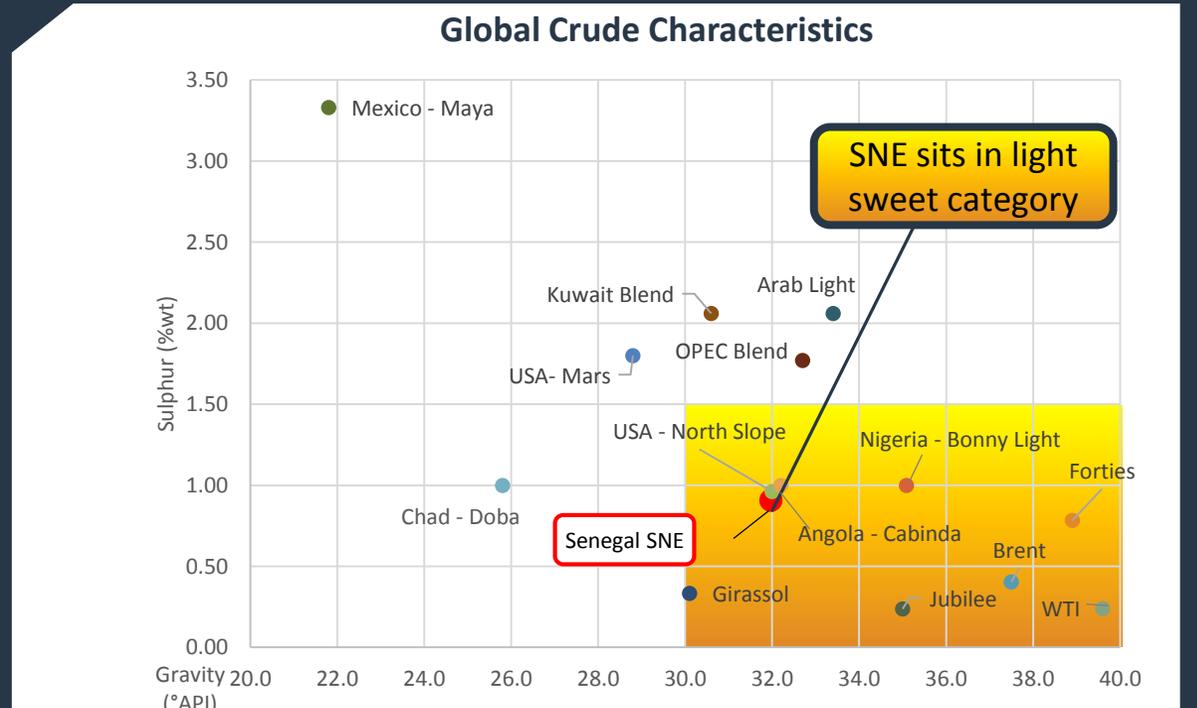
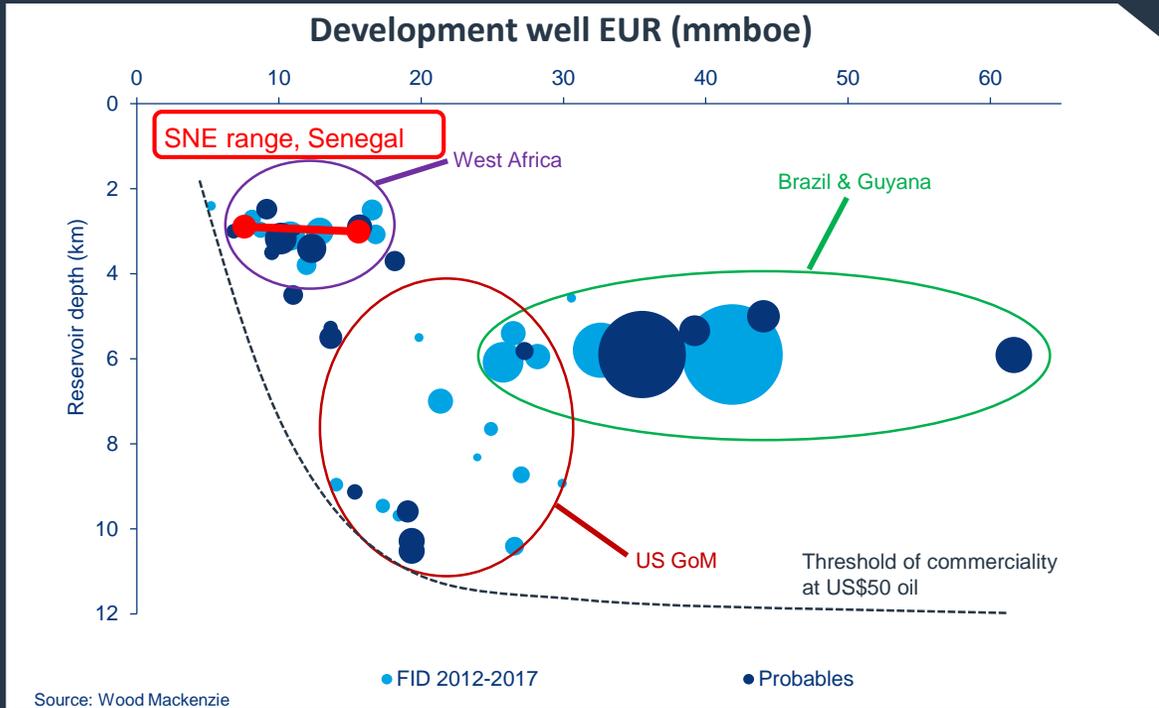


# S400 Gross Depositional Environment



# SNE Well Productivity and Oil Quality

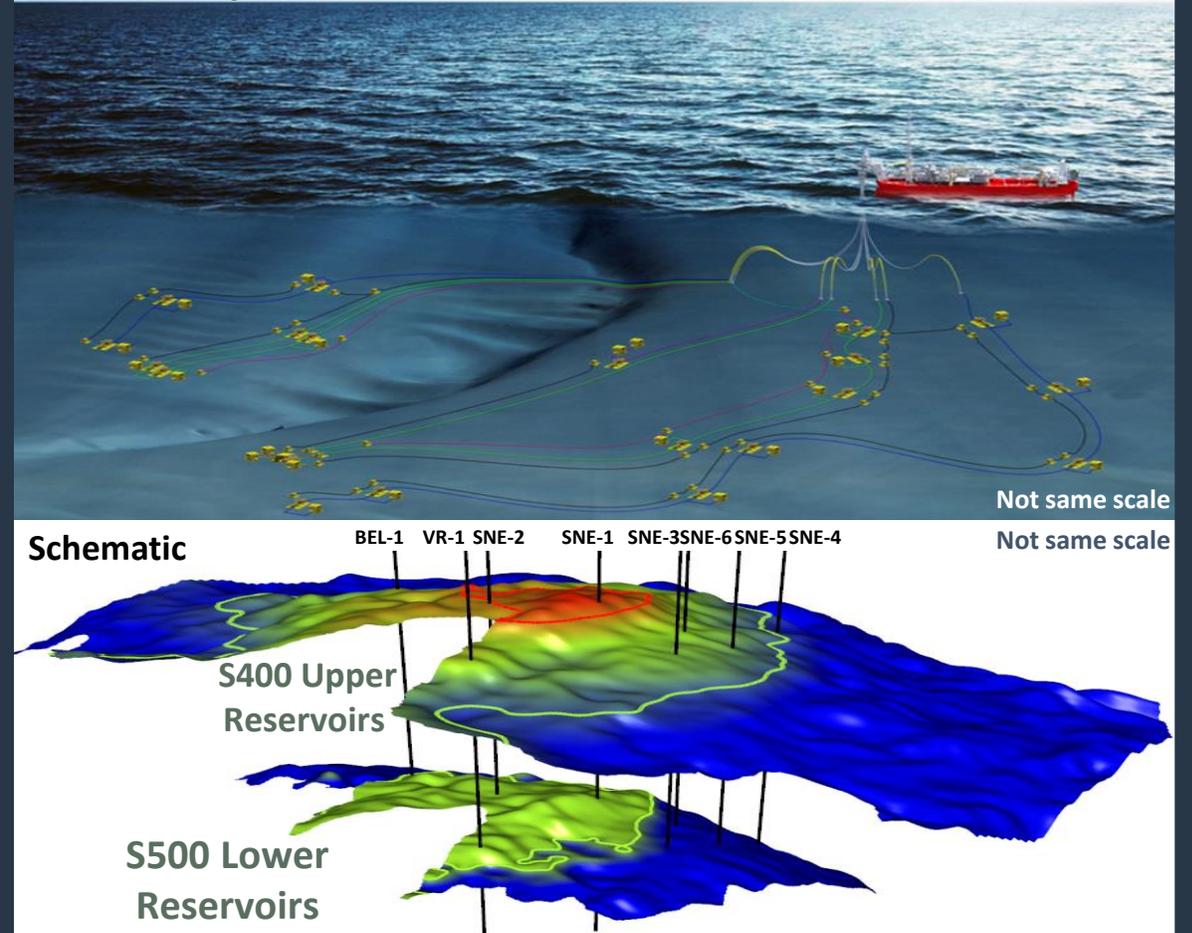
- Reservoir depth and productivity of recent and probable deepwater oil developments
- SNE fits well within West African analogues, with EURs/well ranging from 6-18 mmbbls, driven by shallow normally pressurised reservoirs and low viscosity oil



# SNE Field Development

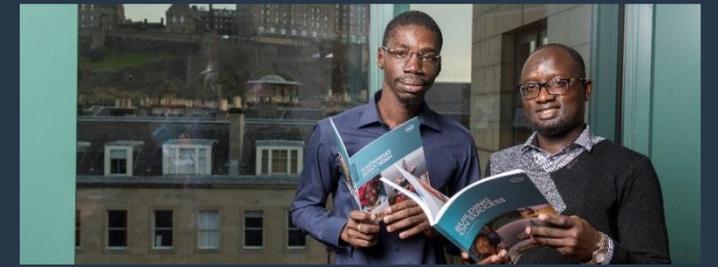
- SNE Development
  - Full field phased – FPSO
  - Exploitation plan approval targeted 2018
  - FID 1H 2019
  - First Production 2021-2023
- Expenditure
  - Capex to first oil ~\$800 m net
  - Development costs ~\$12/boe (60% development drilling) life of field
- Operating Expenditure
  - Production costs: ~\$7/boe (life of field)
  - FPSO lease costs: ~\$3-7/boe (life of field)
- Economics
  - Highly attractive even in lower oil price environment
  - Break even oil price ~\$35/boe
  - Full project unlevered IRR at \$60/boe, ~34%

SNE Development Schematic



# Sharing Benefits in Senegal

- Sustainable oil production will greatly benefit the people of Senegal
- Multi-million dollar investment since 2014
- Opened an office and built a team in Dakar
- Created major supply base in Dakar port
- Maximizing local participation including employment and working with local suppliers
- Developing capacity through training and education in key parts of operations
- Supporting social investment – local entrepreneurship, helping women in rural communities, supporting local business



# Social Investment in Senegal

- Supporting economic growth and good governance
  - Training and development - HSE culture
  - Capacity building >200 institutional stakeholders participating
- Promoting local participation
  - Senegalese Petroleum Institute development
  - Local supply chain preparation
- Social Investment
  - Education and community development over three years
  - The Hunger Project – working with 7 fishing communities around Yenne



Thank You

