

GAMBIA LICENSING ROUND 2021



Gambia Offshore

AFRICA OIL WEEK TECHNICAL PRESENTATION

COMMISSIONER FOR PETROLEUM

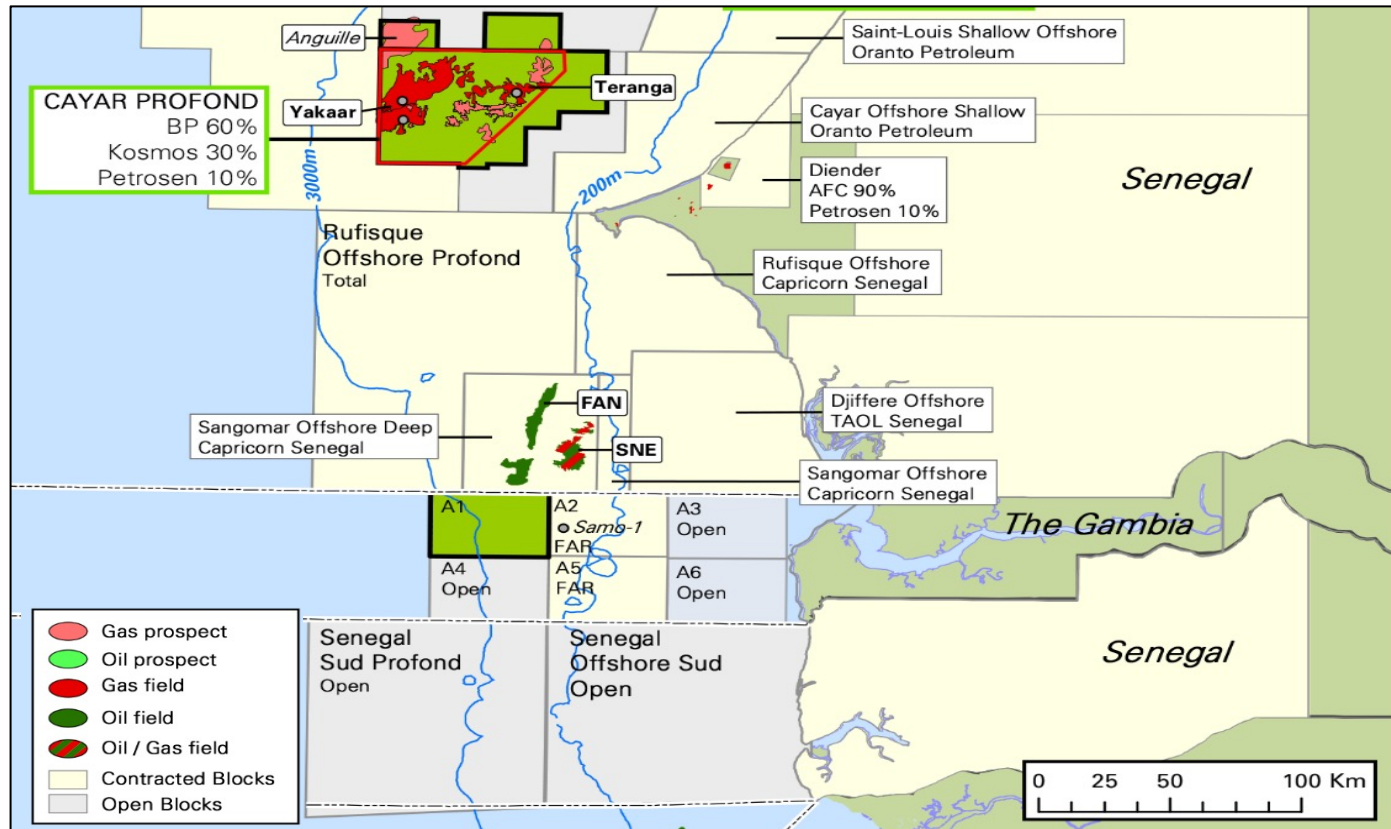
Jerreh Barrow

8 November 2021

PRESENTATION OUTLINE

- A1 block context
- Work completed by BP
 - EIA
 - Geohazard Study
 - Reprocessing of 2D & 3D
 - Prospect inventorization & Maturation

CONTEXT OF THE A1 BLOCK



- The A1 block is located in the center of the MSGBC, just over 10km SW of Sangomar field. Further north is also the CAYAR gas field, both fields are currently being developed;
- This is important, because, by the time A1 will be developed, an industry with infrastructure and services will exist;
- Also because it has been shaped by the same geologic history which is susceptible to HC presence. Major amongst these events were: Rifting of the Atlantic, carbonate formation during Triassic-Jurassic, then sedimentation from continental material, post-apitian tectonics and series of regressions and transgression events.

BP's WORK: GEOHAZARD STUDIES

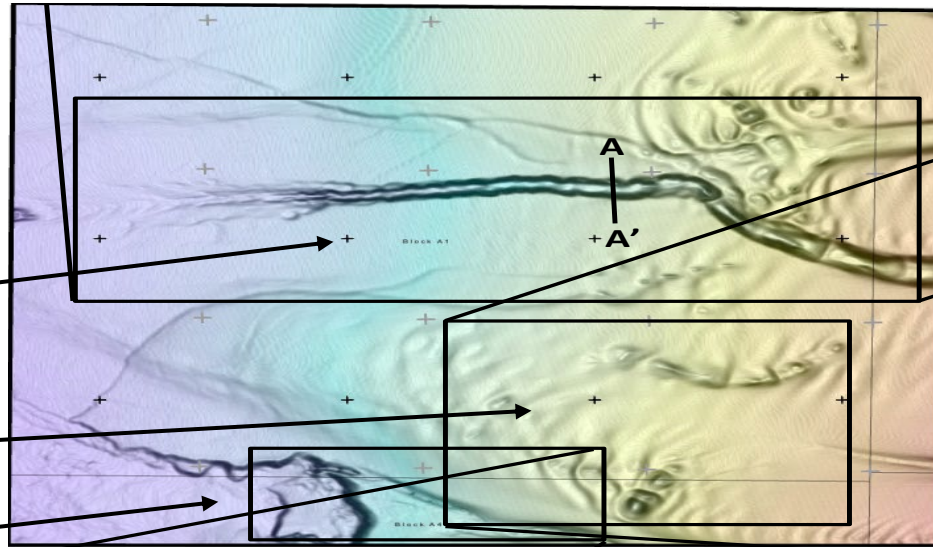
The objectives of the geohazard studies is the early identification of major instability issues relating to locating and drilling exploration, appraisal or dev't wells

Sea floor: Observations

Seafloor Canyons

Sediment waves

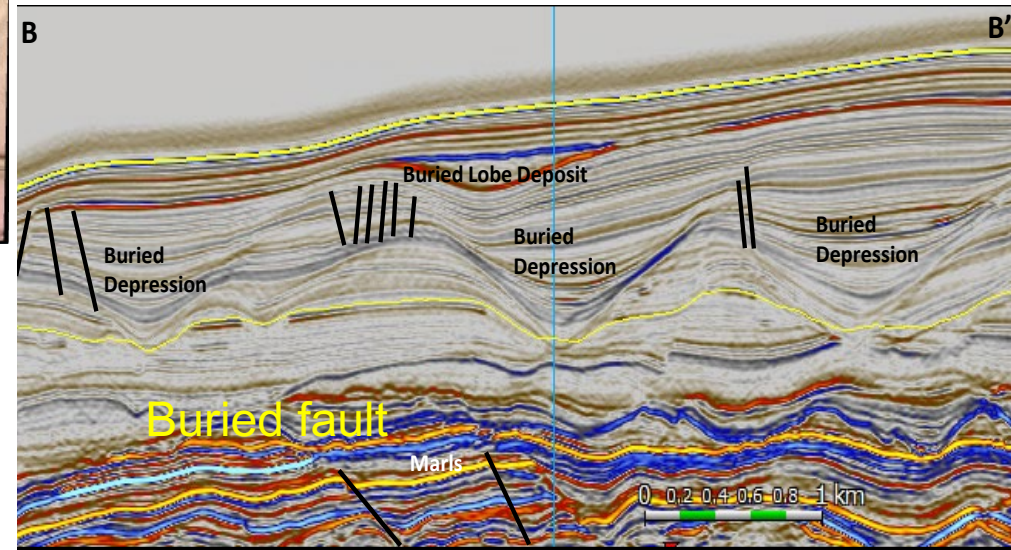
Mass wasting



Implication: These three features are often associated with slope instability, thus potentially a course for concern

SUBSURFACE FEATURES

Shallow sediments are expected to comprise marine silts and clays, fine- to coarse-grained debris flow deposits, marls and coarse-grained channel deposits, in addition there are buried faults and depressions visible on seismic.



CONCLUSIONS

- Conditions in Block A1 are **generally favorable for exploration/appraisal drilling** as well as field development, though geohazardous conditions are **locally present**.
- Shallow hazards observed in the area are **readily identifiable** and can be mitigated through avoidance and/or standard drilling practices.
- Avoidance may impact well location, as kilometer scale seafloor and subsurface features are present.
- While the current 3D seismic data is adequate for regional and wellsite specific geohazard assessment, if field development is sanctioned, further data will need to be used to support detailed engineering design.



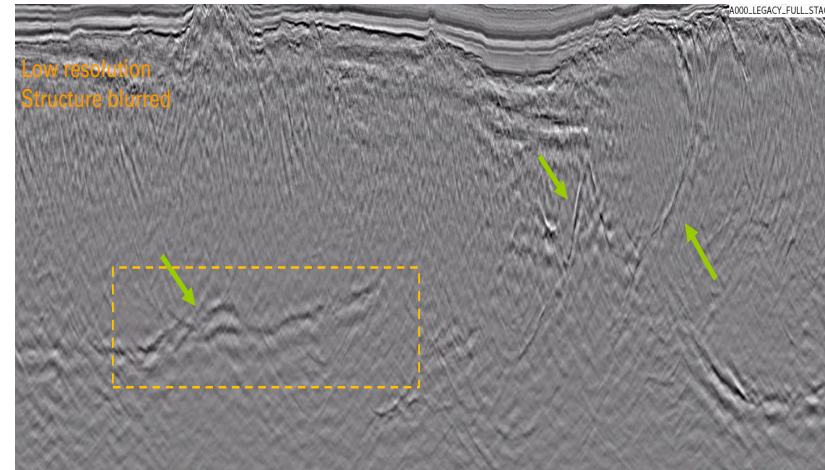
2D REPROCESSING

Objectives: Improve image resolution to enhance understanding of the basin architecture as well as local features

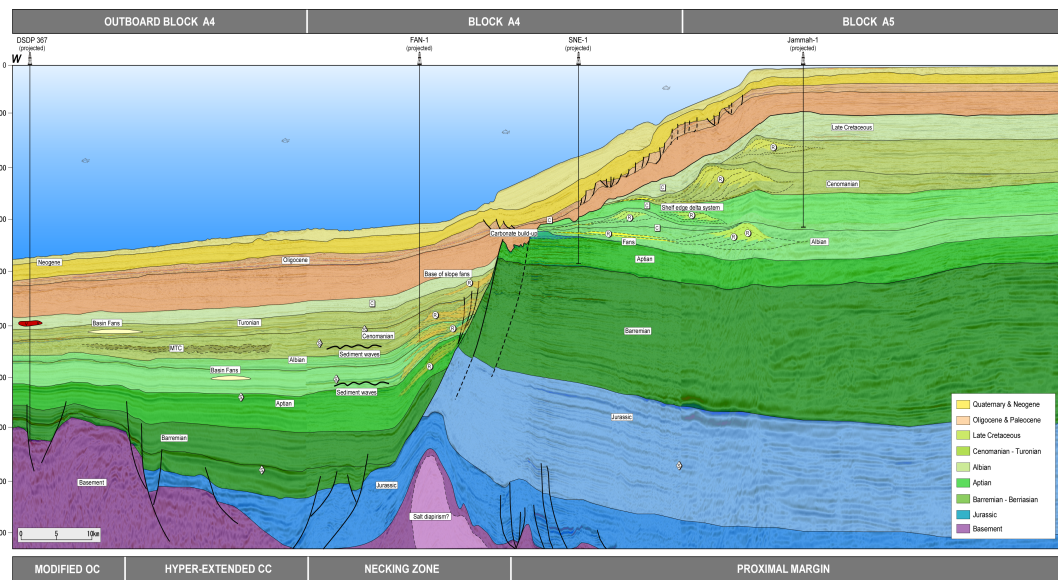
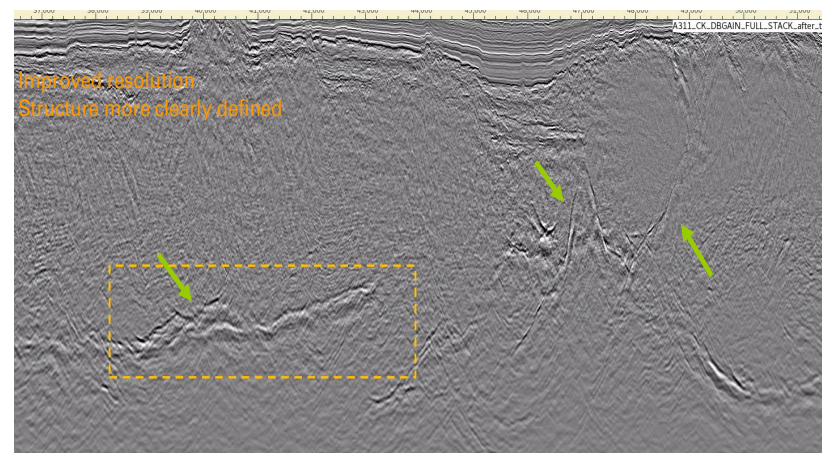
Results Local:

- Improved image quality at both shallow and deep structures
- Top left corner of the upper images shows blurred shallow structures
- Rectangle to the left corner also shows blurred deep structures

Legacy Data



BP reprocessed



Results Regional:

- This interpreted sub-regional 2D seismic line shows improved interpreted chronostraphy, shelf edge delta systems, BoS fans, basin fans etc.
- Wells are projected to systems they penetrate
- Constraining with existing wells helped improved the Velocity model as shown above

Improved resolution attained as shown in the improvement of the definition of both shallow and deep structures.



REPROCESSING 2566SQ KM

- Ion reprocessing:

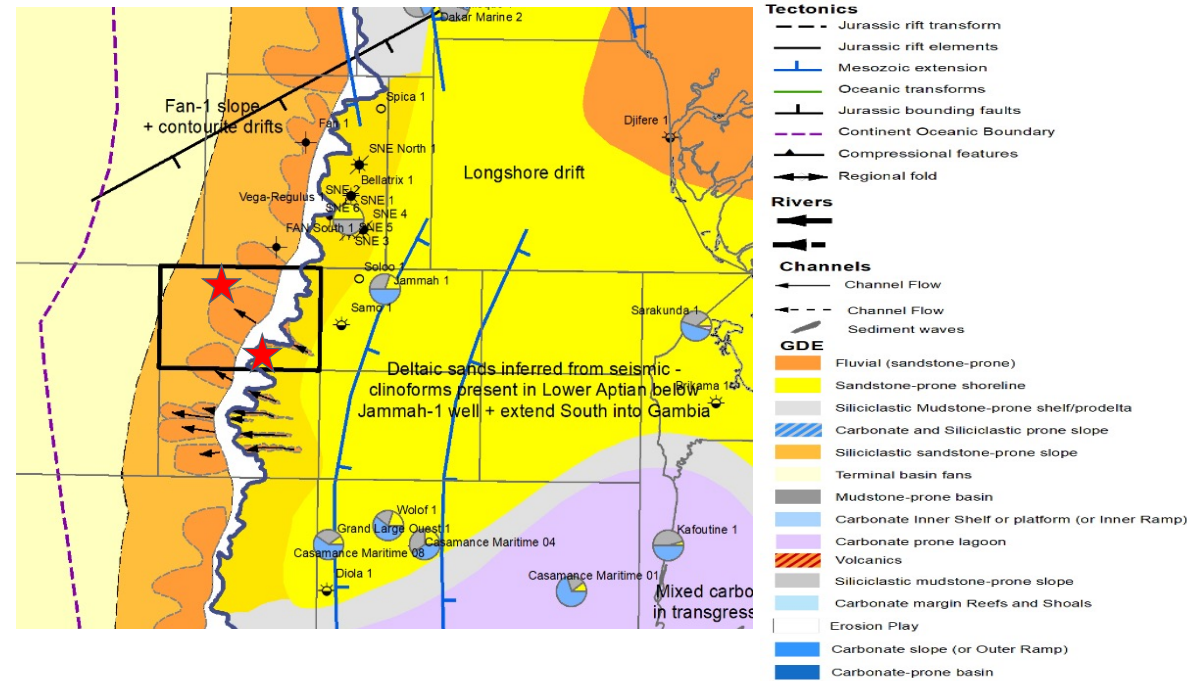
- **Objective:**

- Despite quite impressive quality of the existing A1 & A4 data, BP felt the need to conduct a laser focus processing of the data to improve the image quality for shallow & deep structural imaging

- **Results**

- Better imaged subsurface is a recipe for accurate interpretation results, thus;
 - Depositional environment better understood,
 - Elements of the Petroleum system such as reservoirs, traps and seals were better defined,
 - Consequently, prospects inventorization, maturation and Volumetric evaluation done with more confidence

Albian Gross Depositional Environment



- BP internal reprocessing: In addition to the work done by ION, BP conducted internal data conditioning for AVO

- **Objective:**

- Optimise data for AVO analysis

- **Results**

- Intercept and Gradient Volumes created;
 - Angle stacks generated,

Prospect Inventorisation: Armed with the enhanced imaging from the reprocessed 2 and 3D seismic, BP defined prospect, 2 prospects were high-rated with Eland ranked as having the highest CoS:

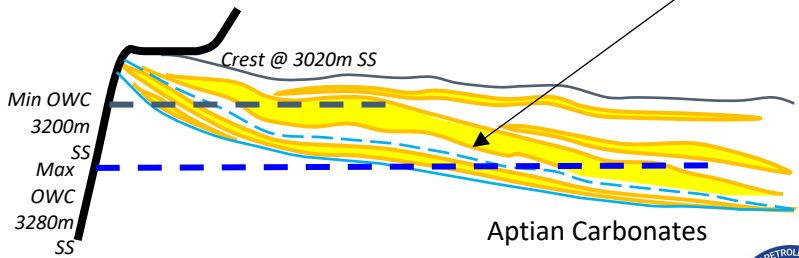
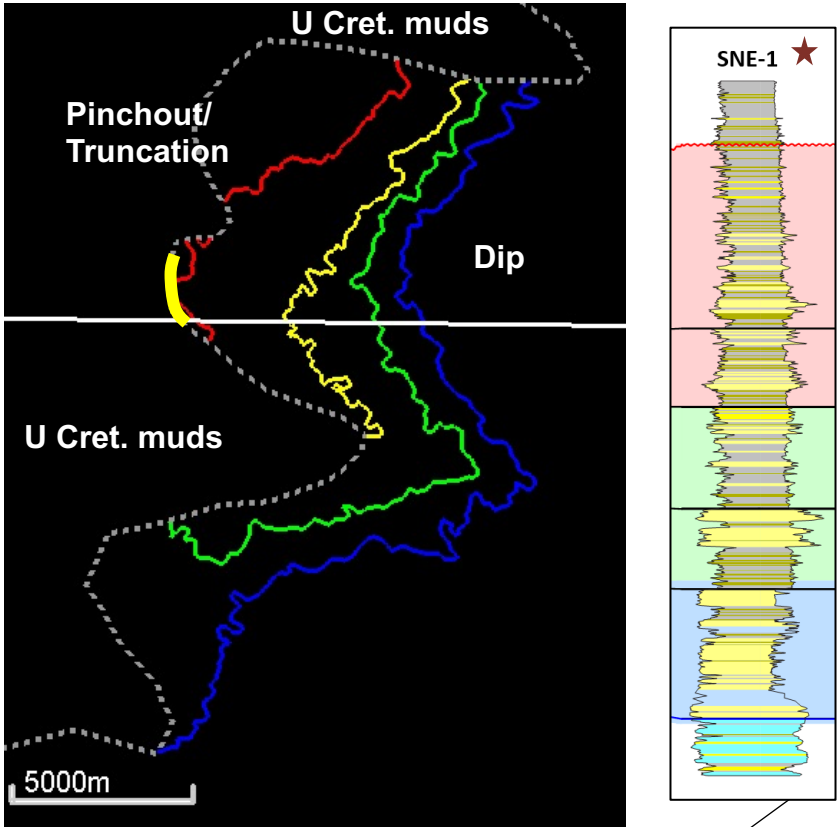
ELAND PROSPECT DESCRIPTION

- Trap Edges**
- North and South – Upper cretaceous muds overlying unconformity
 - East – Dip
 - West – Pinch-out

- Seal**
- Intraformational flooding events – clearly seen on the seismic
 - Lateral seal - seismically transparent package in the north, but SE corner shows risk due to presence of marls

- Reservoir**
- Soft seismic event seen on the seismic
 - Delta fed turbidite sand fan directly overlying the carbonate platform

- Charge**
- Model uncertain. Provided from the basin (mature Albian) via:
 - incised canyon?
 - onlapping permeable intervals?
 - Through carbonate platform?
 - Alternate model as through fill and spill from SNE



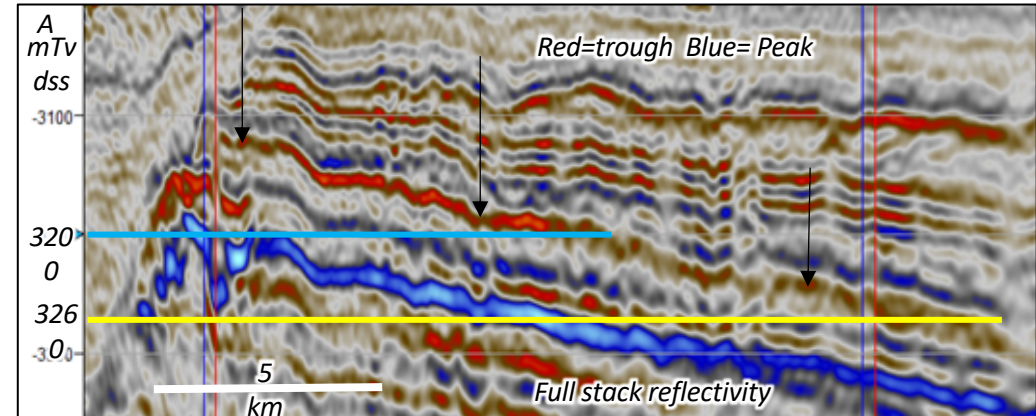
★ From: Cairn preliminary results presentation March 2016



In addition to the conventional interpretation of the seismic, BP also used optimised 3D reprocessed seismic for AVO analysis

Observations

- There is a gradual brightening updip above 3300m (brightest above -3200m_
- Upper most seismic trough event interpreted as pinch out up dip and showing thickening down dip
- Presence of extra seismic trough event up dip (on which the main event is onlapping) apparent thickening up dip.



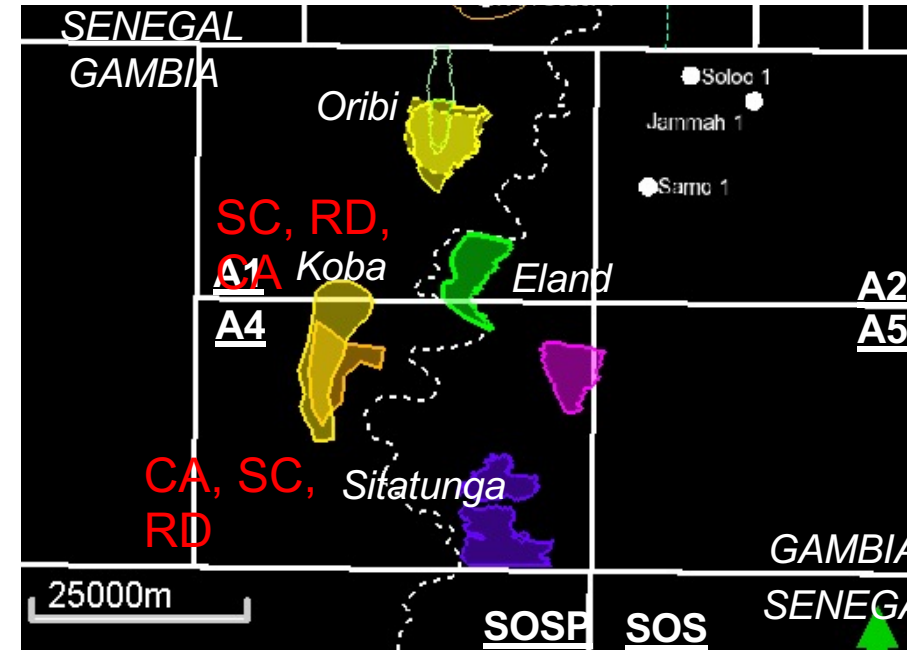
Possible causes

- **Gas cap** (possibly from additional gas kitchen to NE) - but not supported by possible amplitude conformance at -3200m, even though Nearby field have gas cap,
- **Cap rock SRP & velocity anomaly** – caused by that overburden **high velocity** contrast
- Primary event **pinching out** may cause tuning & brightening above -3200m
- **Lithology variation.**

GAMBIA LICENCES OVERVIEW

Licence	Prospects/ Leads	Mean Recoverable Resources (mmboe)	Risked recoverable resources (mmboe)	CoS	Key Risks
A1	Eland (A1 only)	383 (325)	91	24%	CA, SC, RD
	Oribi (Albian)	392	39	10%	SC, CA, RP, RD

SC Seal Capacity
 CA Charge Access
 RD Reservoir Developability
 RP Reservoir Presence



SUMMARY OF THE A1 OPPORTUNITY

- On trend with the 500mmBOE Sangomar Field , first production in 2023, '**elephant country**'
- Comprehensive seismic coverage
- 'State of the art' seismic processing and prospect definition by BP
- Eland Prospect represents a practically 'drill ready ' prospect , analogous to Sangomar, with a mean recoverable resource estimate of 344 MBO
- Further multi – horizon potential in the Oribi Prospect

- THANK YOU FOR YOUR ATTENTION

