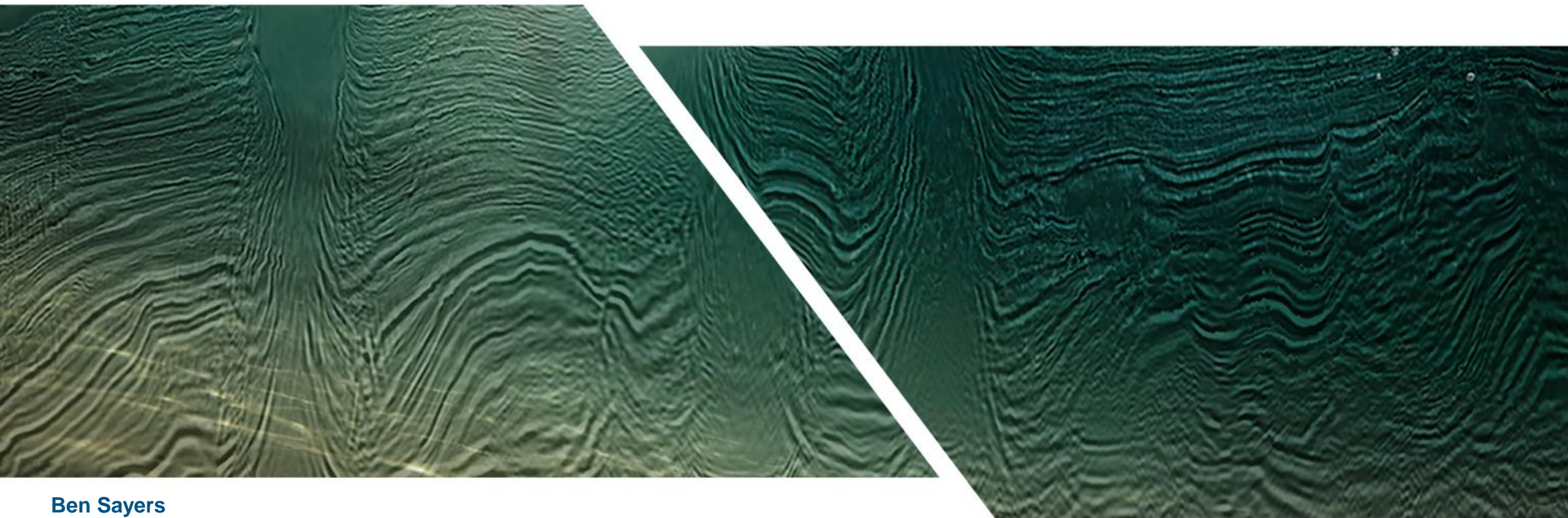




# Unlocking the MSGBC Basin with New Data

APPEX 2018



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1<sup>st</sup> March 2018

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# Agenda

- 12 months of action in the MSGBC basin
  - Drilling
  - Acreage position changes etc.
- Look at the growth and examples of TGS MC data in the MSGBC Basin
  - 2D
    - NWAAM2012
    - NWAAM2017
    - NWAAM2012RE18
  - 3D Data
    - Guinea 3D
    - The Gambia A1/A4
    - AGC/GB 3D datasets
    - SOSP 3D
- TIME FOR SOMETHING NEW!

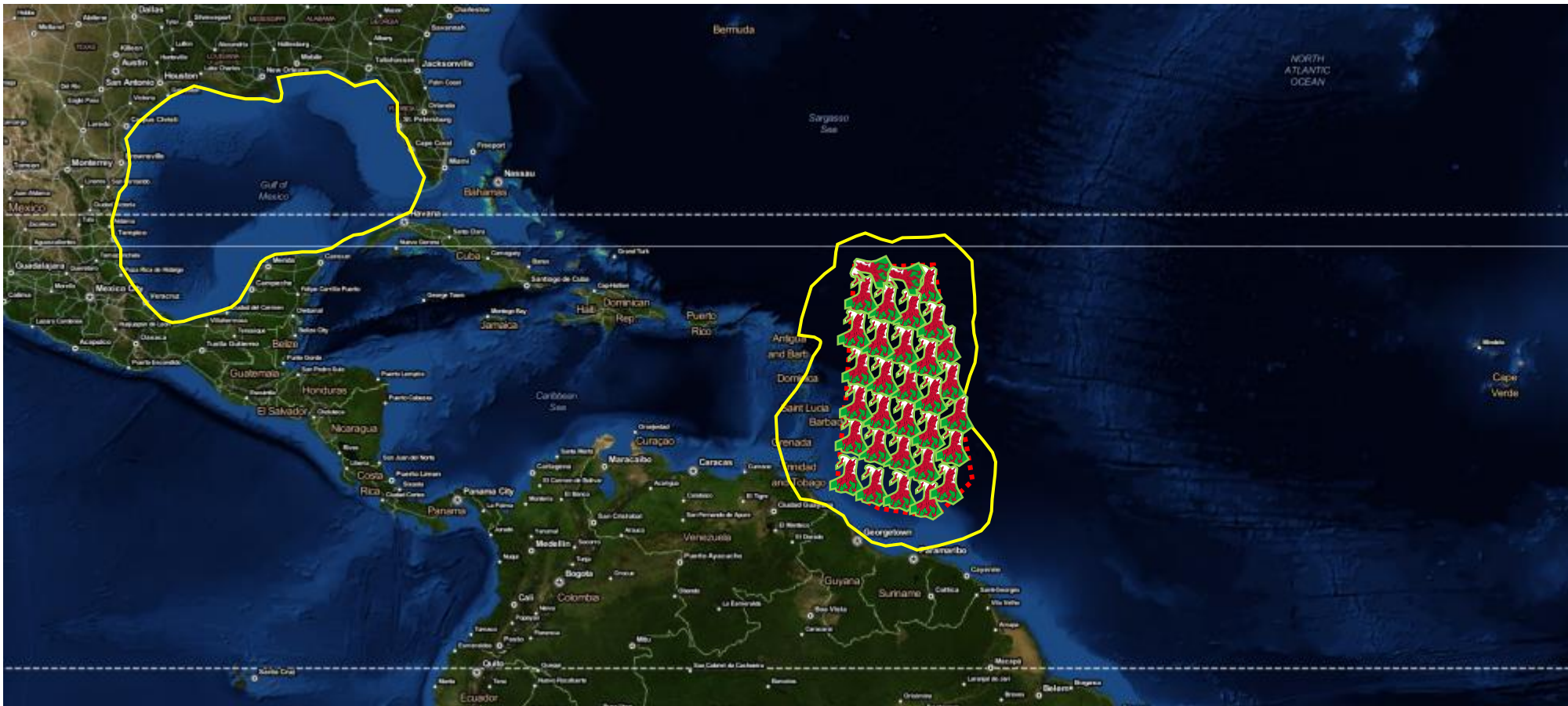


# MSGBC Basin

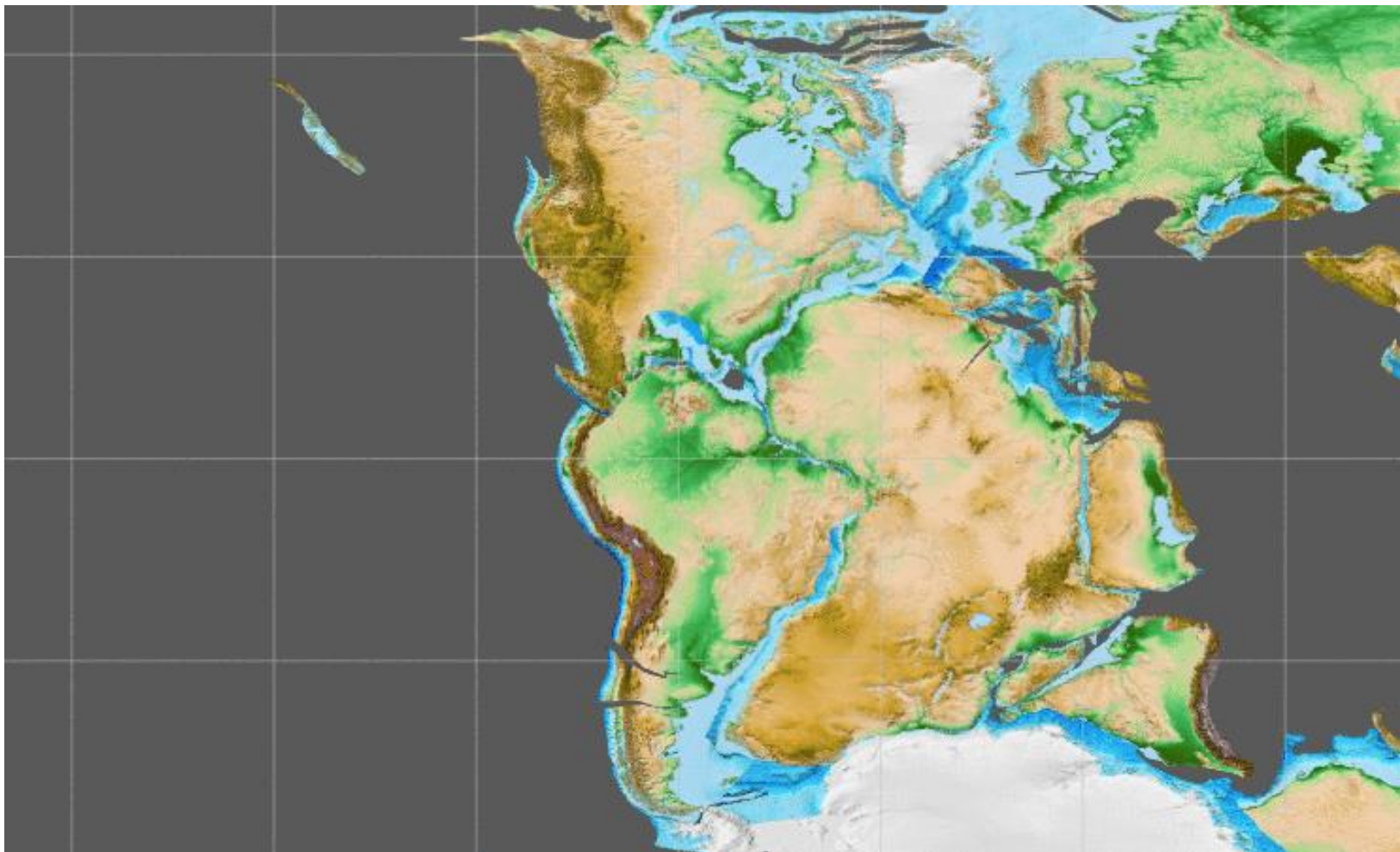
# What is the MSGBC Basin?



# MSGBC Basin extent



# Plate Reconstruction



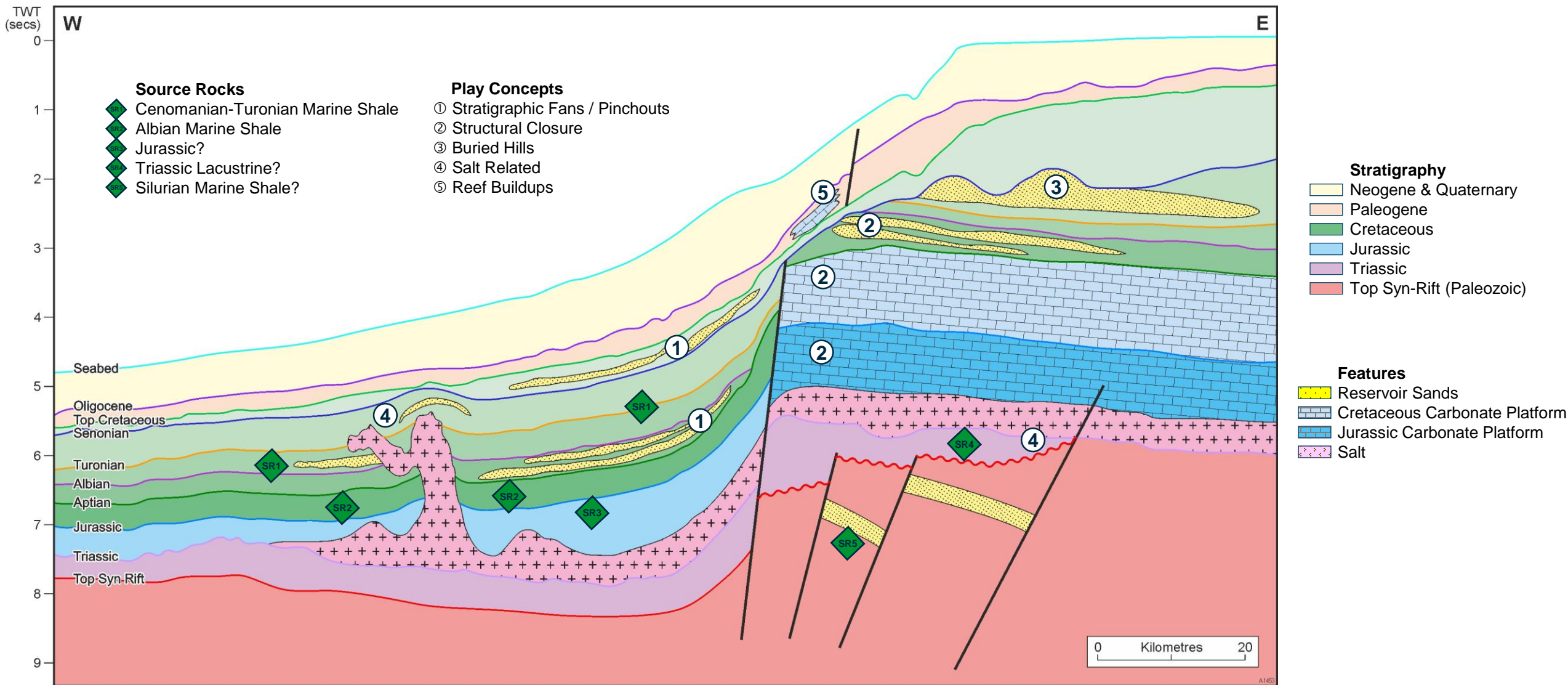
Adapted from outputs from Gplates - EarthByte Research Group, School of Geosciences, The University of Sydney, Australia



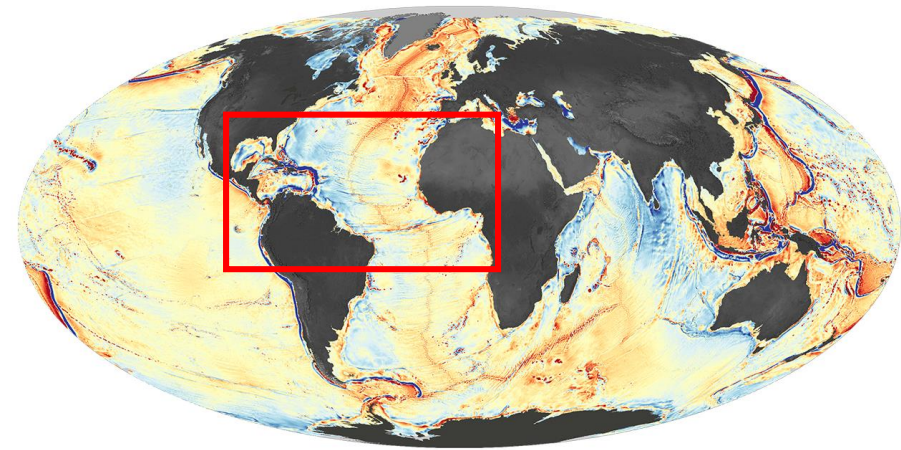
The Basin has undergone a complex history that can be divided into 3 main stages of development:

- the pre-rift (Precambrian to Paleozoic)
- syn-rift (Permian to Early Jurassic)
- post-rift (Middle Jurassic onwards)

# Play Types



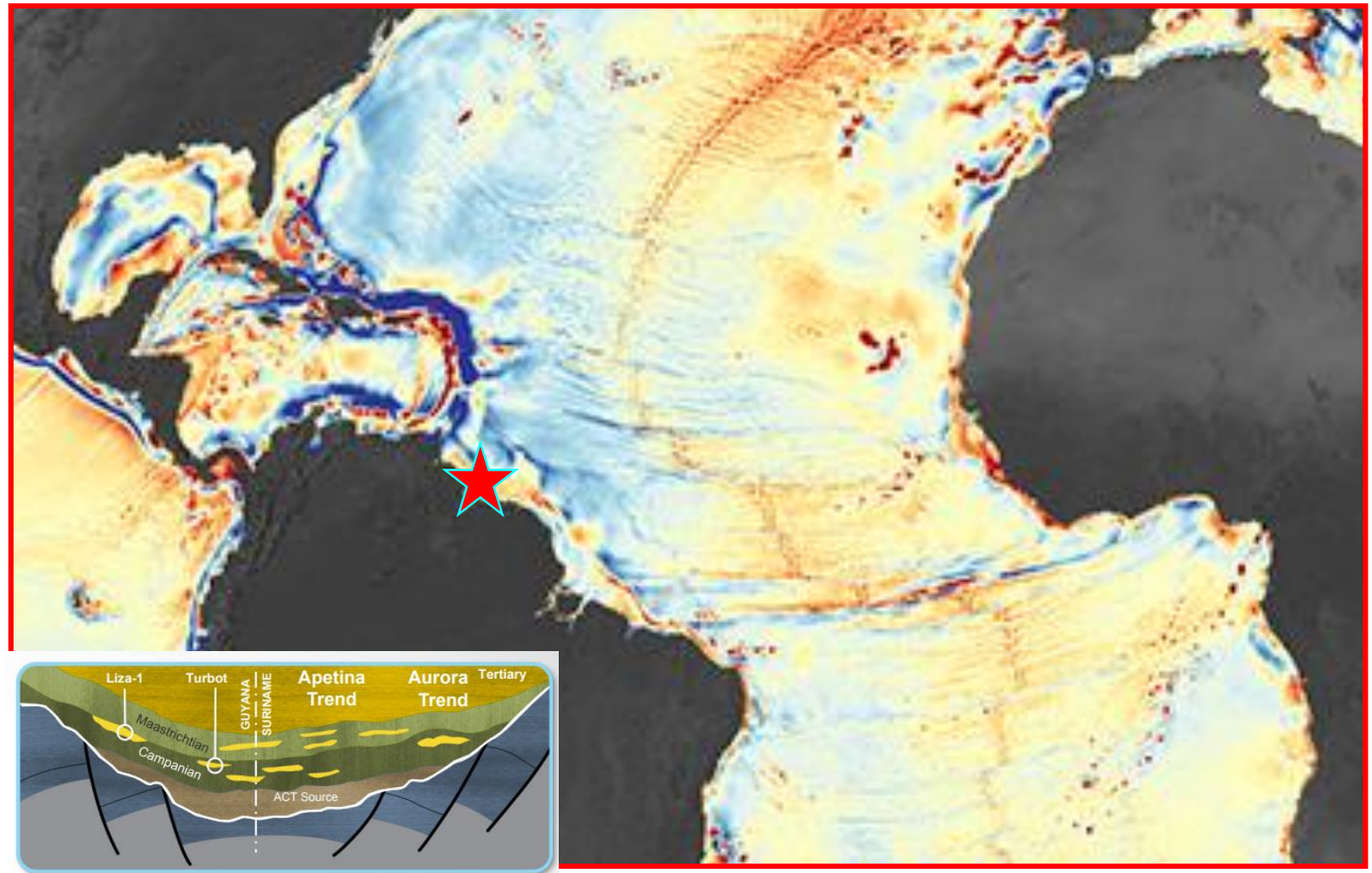
# Conjugate Success



Continued success in Guyana by ExxonMobil with Liza appraisals and production expected via FPSO in June 2020!!!

January 2018 Ranger-1 (2735 m WD) hit a 70m NET pay in a carbonate reservoir 100 km away from Liza.

Discoveries at Liza, Payara, Snoek, Liza Deep and Turbot, are estimated to total more than **3.2 billion recoverable** oil-equivalent barrels.



Source: NASA Global Gravity Ocean Floor

<http://news.exxonmobil.com/press-release/exxonmobil-announces-sixth-oil-discovery-offshore-guyana>



**Last 12 Months**

# 12 months of MSGBC

## Lamantin-1 (December 2017)

Campanian reservoir objective was water bearing with some residual hydrocarbons from Valanginian – Neocomian source

## Hippocampe-1 (October 2017)

Lower Cenomanian and Albian reservoirs charged from the deeper Valanginian – Neocomian source, drilled to a total depth of 5,500 meters. Well-developed reservoirs were encountered in both exploration targets but these proved to be water bearing.

## Requin Tigre-1 (February 2018)

Drilled to a total depth of 5,200 meters to evaluate Cenomanian and Albian reservoirs in a structural-stratigraphic trap, charged from an underlying Neocomian-Valanginian source kitchen. The prospect was fully tested but did not encounter hydrocarbons.

## Yakaar-1 (May 2017)

2,550 meters of water, the well has been drilled to a total depth of 4,700 meters and intersected a gross hydrocarbon column of 120 meters in 3 pools within the primary Lower Cenomanian and encountered 45 meters of net pay. Well results confirm the presence of thick, stacked, reservoir sands over a very large area with very good porosity and permeability.

## SNE North-1 (August 2017)

Encountered in excess of 24 m of gross hydrocarbon column across at least three intervals of a consistent 35° API oil in the well located 15 km north of the SNE-1 well.

## Vega Regulus -1 (March 2017)

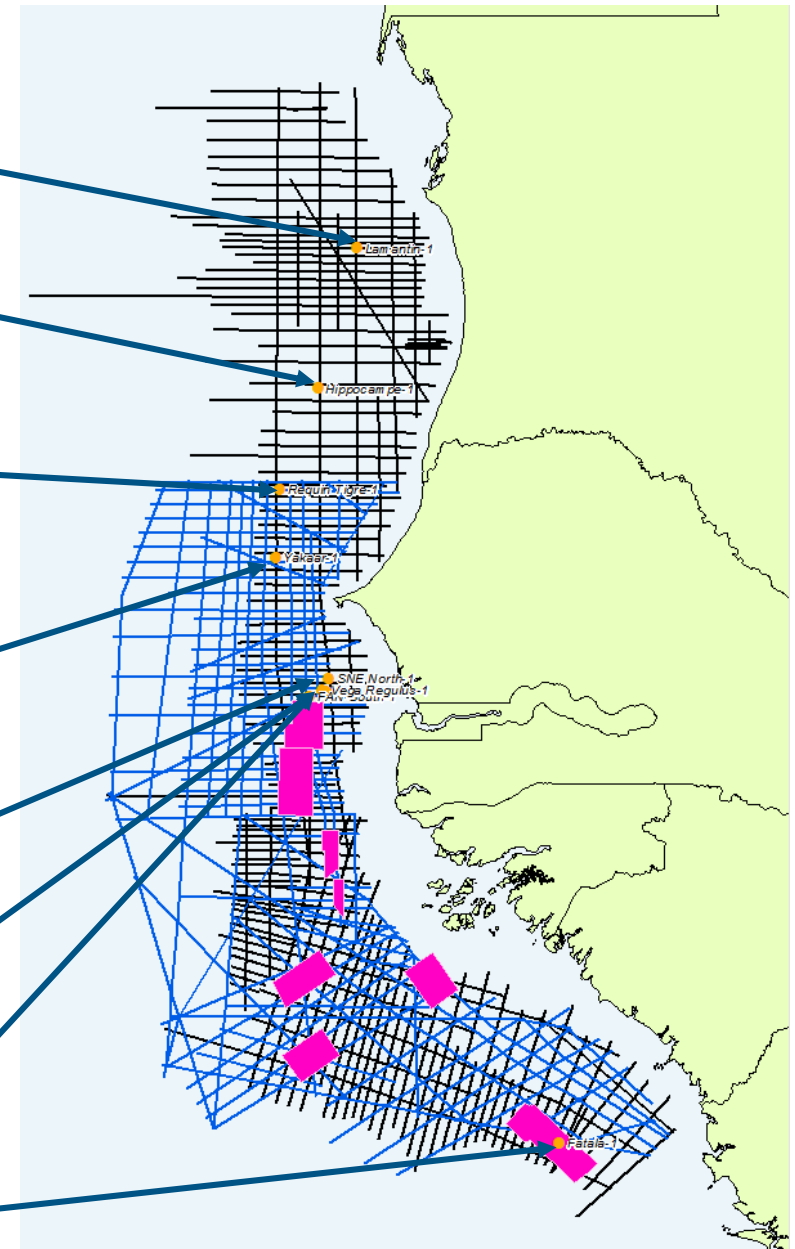
Drilled to appraise the western part of SNE field and encountered 97m oil column

## Fan South-1 (July 2017)

Mean prospective resource > 110 mmbbls in an Upper Cretaceous stacked multi-layer channelised turbidite fan prospect and a Lower Cretaceous base of slope turbidite fan prospect (similar to the FAN-1 oil discovery). Oil discovered in Lower Cretaceous (Albian) reservoirs 31° API oil quality

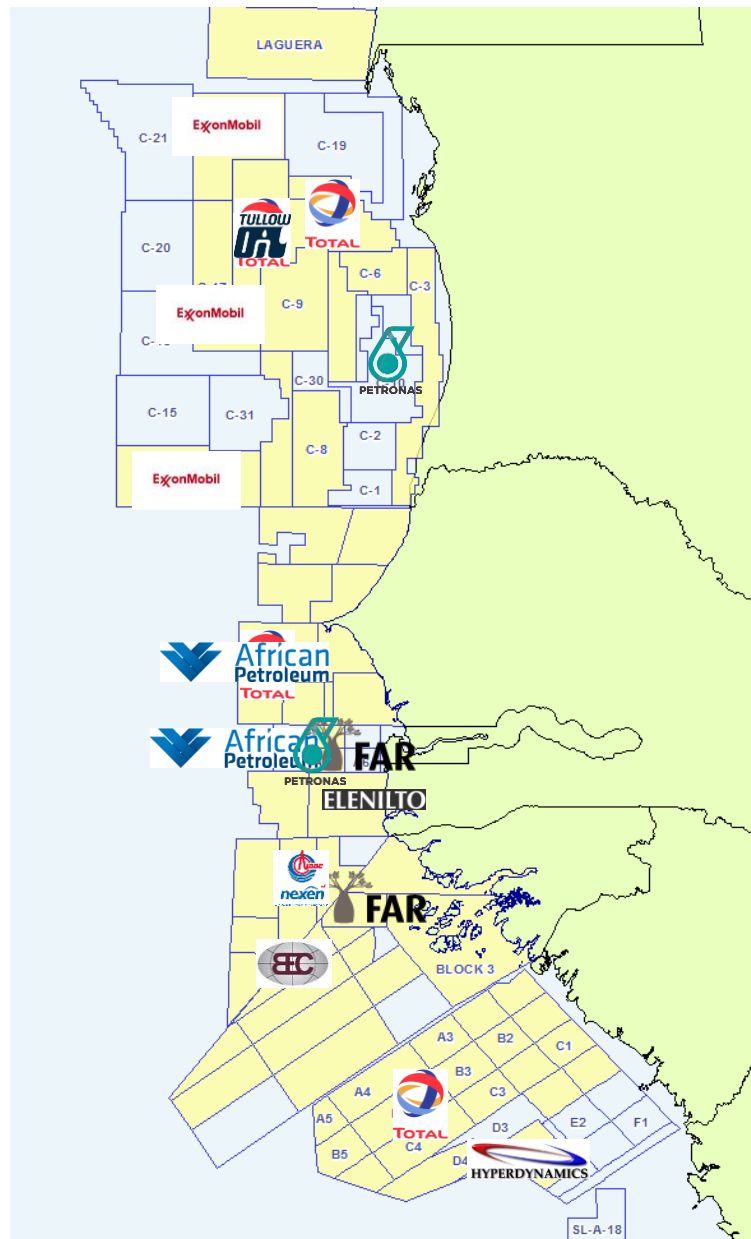
## Fatala-1 (September 2017)

Drilled in 2,897 meters of water and reached a TD of 5,117 meters BSL. The well encountered a 75-meter-thick Cenomanian sedimentary channel sequence, but it contained predominantly siltstone and clays with no hydrocarbon shows.



# 12 months of MSGBC

ExxonMobil (C-22, C-17 & C-14) December 2017
Chinguetti End of Production November 2017
African Petroleum EXIT (Rufisque DP) May 2017
Total (Rufisque DP) May 2017
African Petroleum EXIT (A1/A4) July 2017
CNOOC (AGC Profond) March 2017
FAR increase interest (Block 2, 4A, 5A) April 2017
Bissau Exploration Company (Block 4B) June 2017



Total (C-7) May 2017
Total (C-18) January 2018
Tullow exit (C-18) November 2017
Far (A2/A5) July 2017
Petronas (A2/A5) February 2018
Elinilto Exit (Sud Offshore) 2017
Total (TEA) October 2017 12-months
Hyperdynamics (Offshore) December 2017



# **Building a data library**

The background of the image is a topographic map. It features green contour lines of varying thicknesses, representing different elevations. A white grid is overlaid on the map, with lines intersecting at regular intervals. The text "2D" is centered in the middle of the image.

2D

# 2011

## NWAAM2012 Phase 1

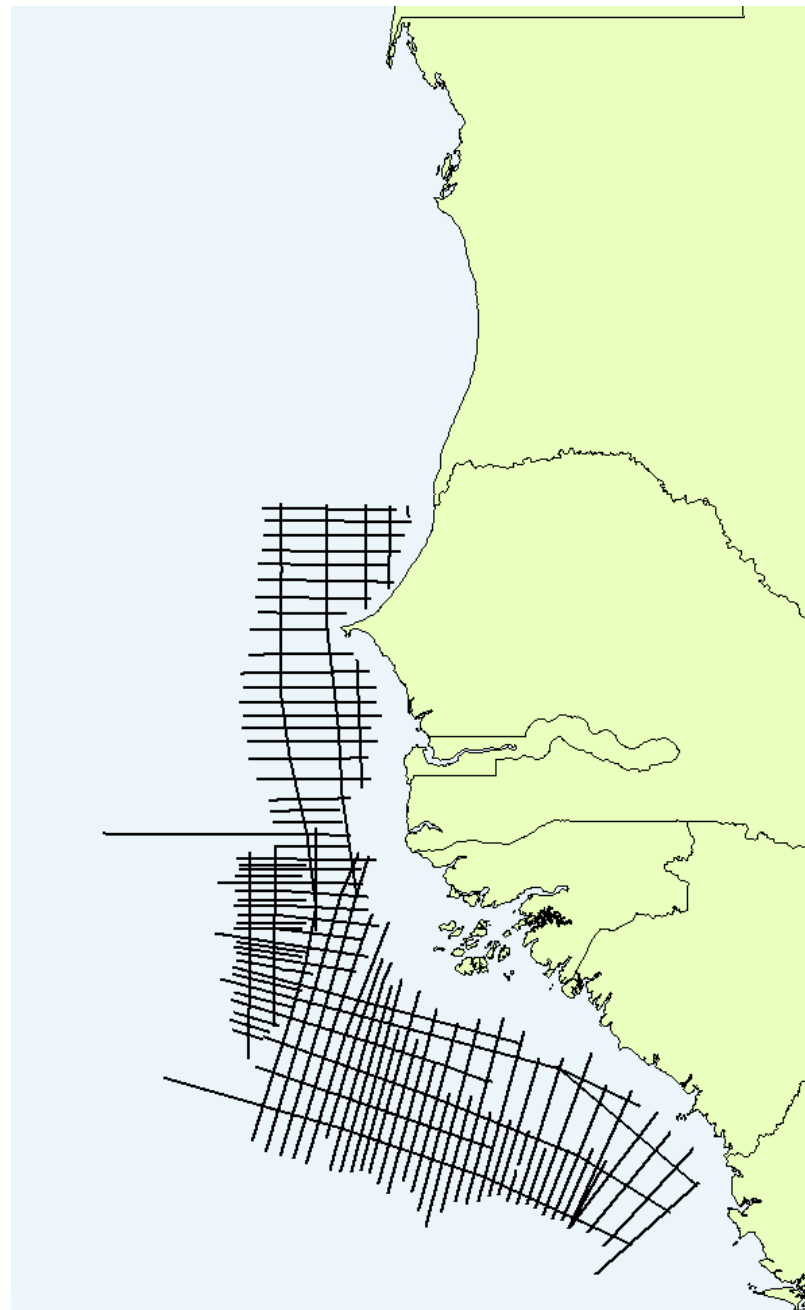
17,652 km

Acquired 2011

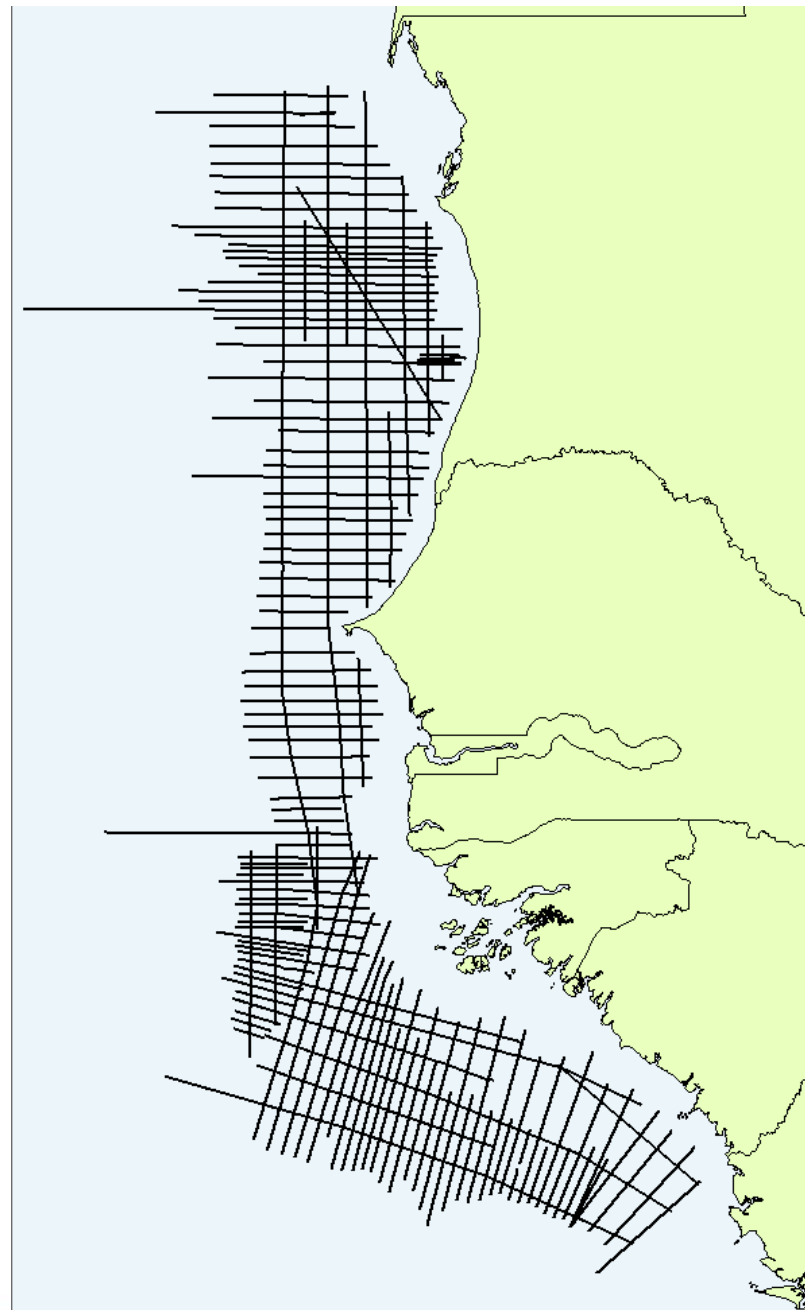
8 m Streamer Depth

8 km Streamer Length

9 s Record Length



# 2012



## NWAAM2012 Phase 2

**10,865 km**

Acquired 2011/2

8 m Streamer Depth

8 km Streamer Length

14 s Record Length

# 2016

## NWAAM2017 Phase 1

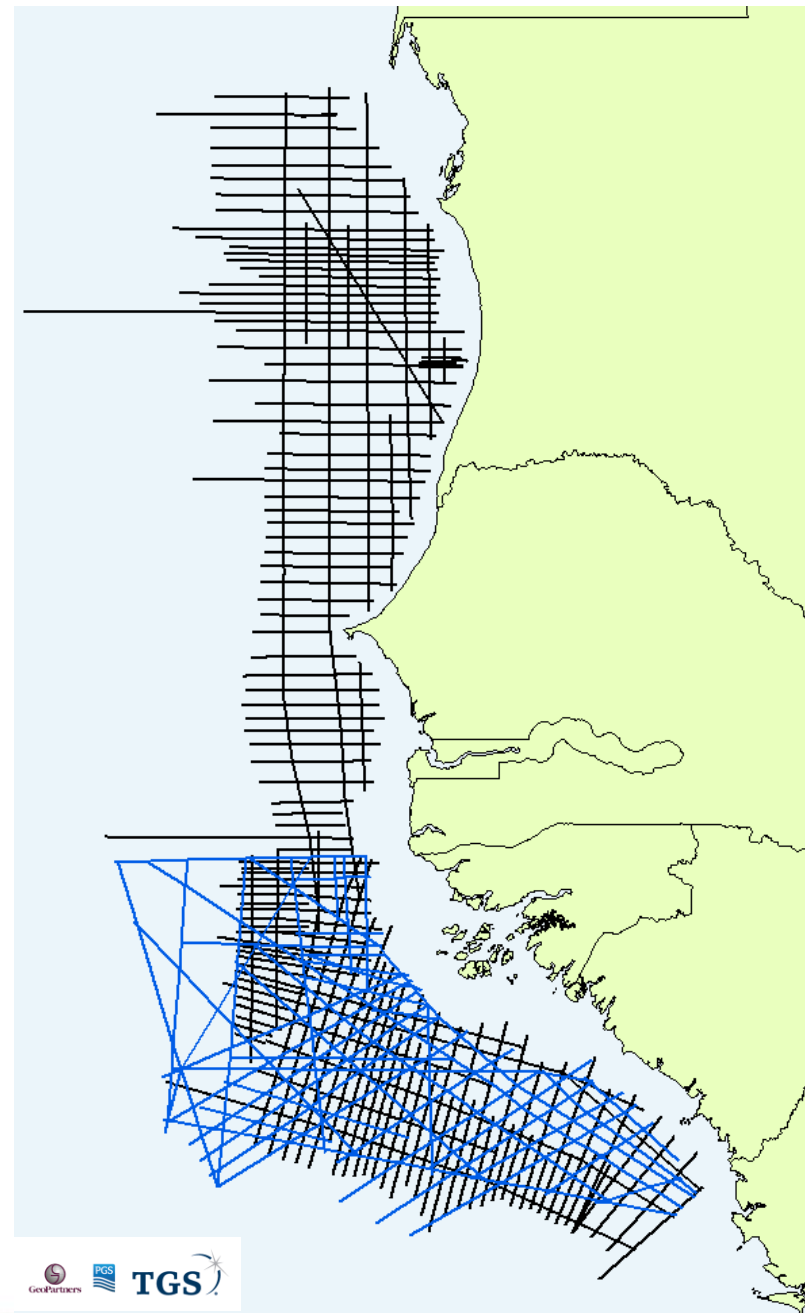
**12,516 km**

Acquired 2016/7

18 m Streamer Depth

12 km Streamer Length

14 s Record Length



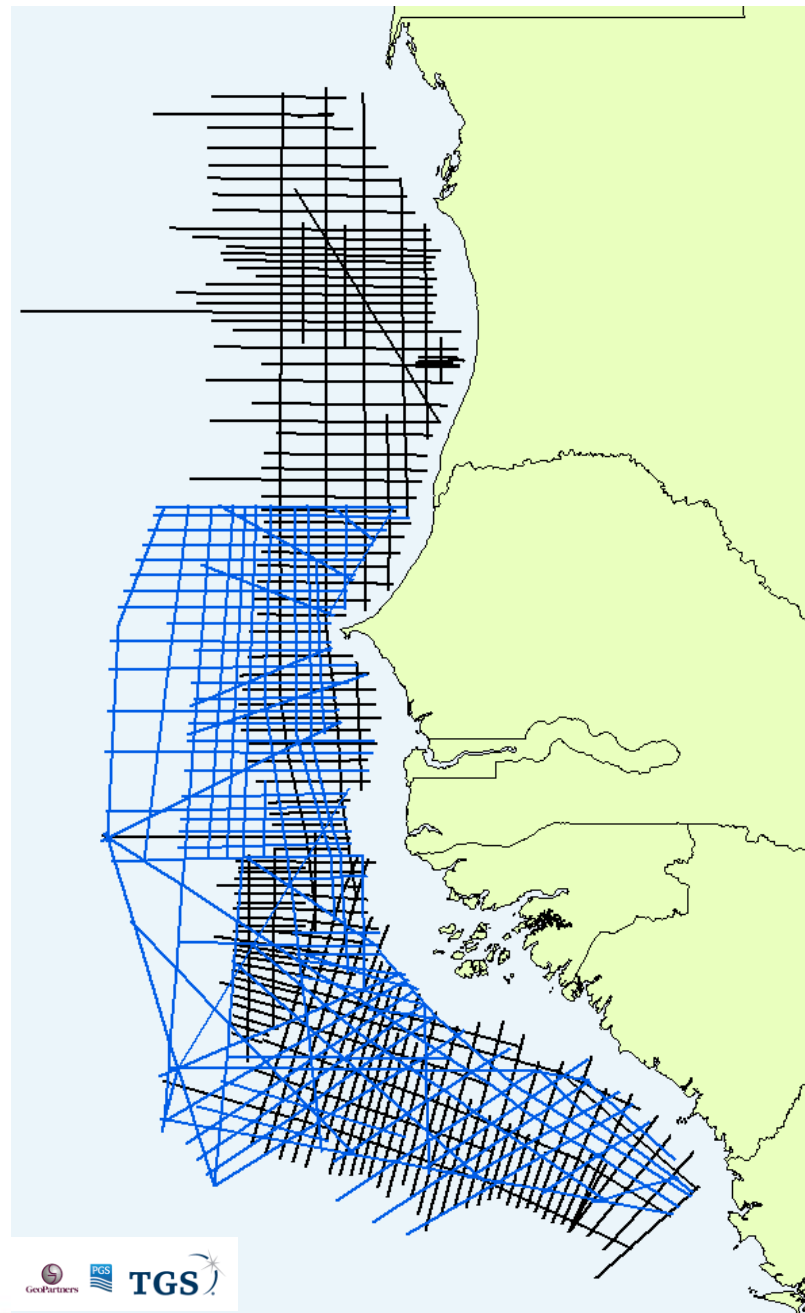
The NWAAM2017 Phase 1 Data are currently being processed:

Processing Start:	March 2017
FT PSTM:	July 2017
PSTM Final:	December 2017
PSDM Final:	January 2018
Final report:	March 2018

# 2017

The NWAAM2017 Phase 2 Data are currently being processed:

Processing Start: June 2017  
FT PSTM: October 2017  
PSTM Final: March 2018  
PSDM Final: May 2018



**NWAAM2017 Phase 2**  
**11,835 km**  
Acquired 2017  
15 m Streamer Depth  
12 km Streamer Length  
14 s Record Length



# 2018

## **NWAAM2012RE18**

**28,427 km**

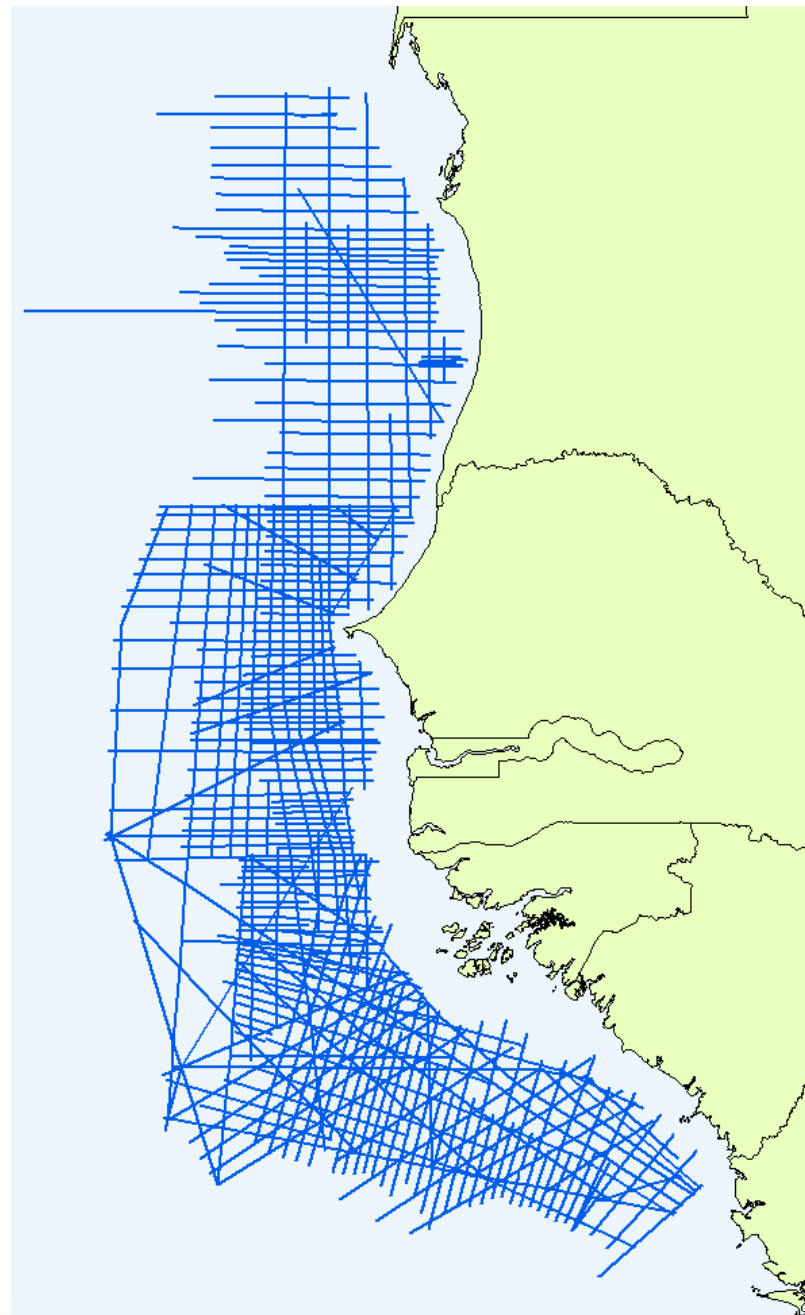
Acquired 2012

Reprocessed 2018

8 m Streamer Depth

8 km Streamer Length

9/14 s Record Length



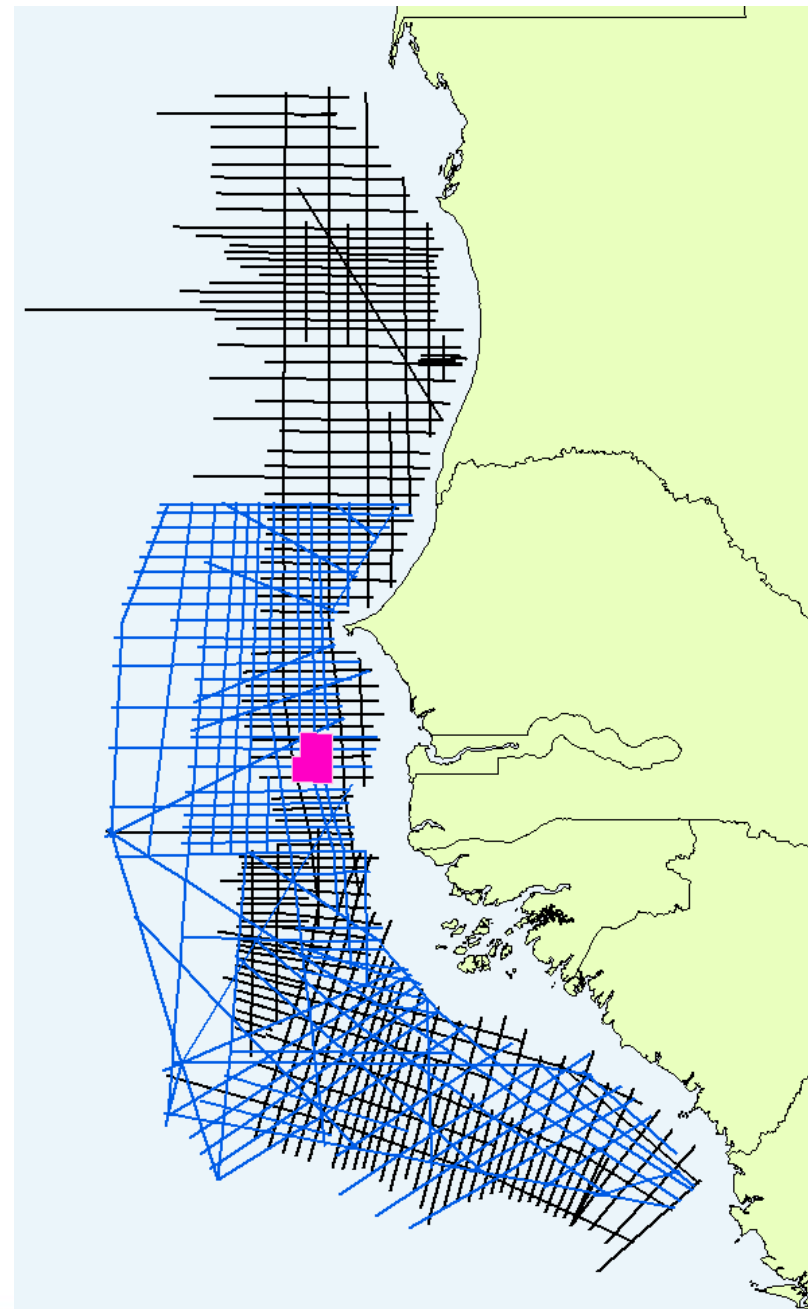
The NWAAM2012 Data are currently being processed to Depth but also an upgraded Clari-Fi Broadband PSTM will also be produced

Processing Start: November 2017  
Completion: September 2018



**3D**

# 2010



**Gambia A1/A4**

**2,566 km<sup>2</sup>**

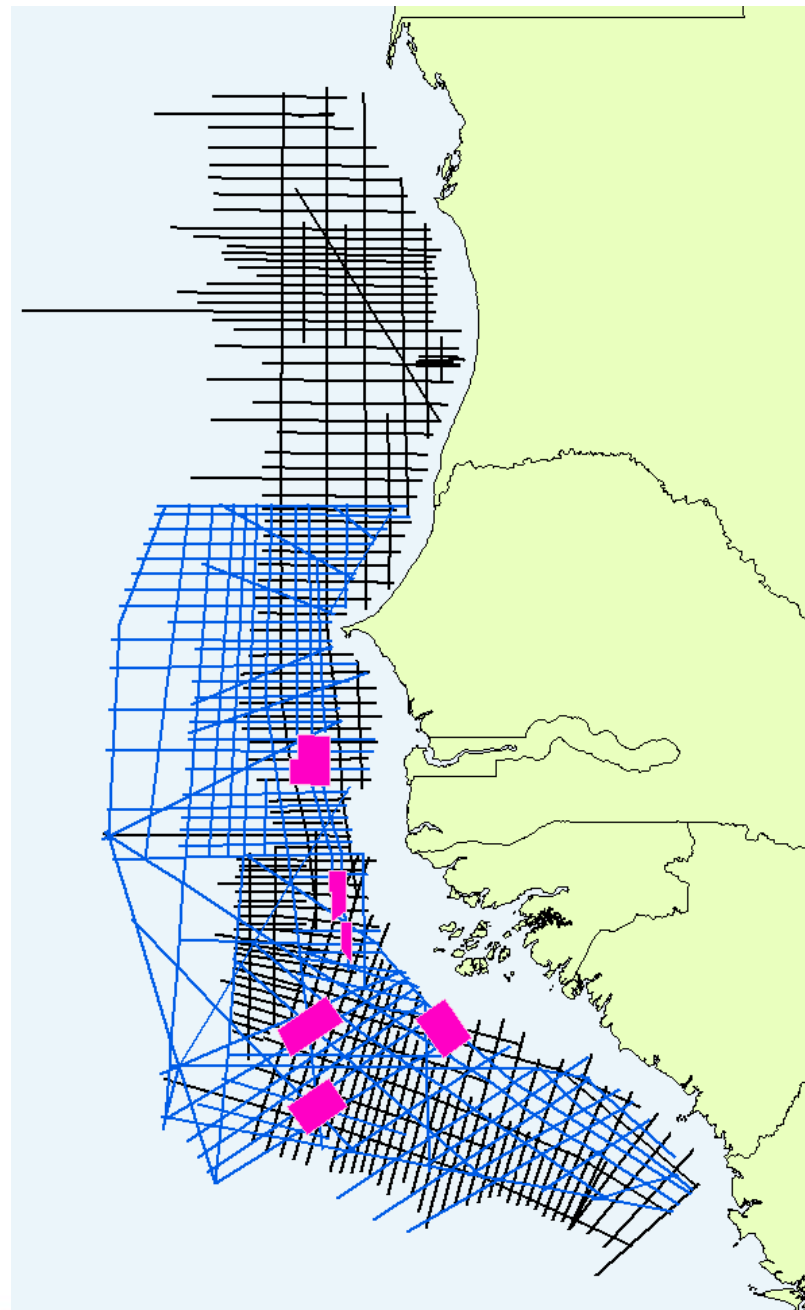
Acquired 2010

9 m Streamer Depth

12 x 8100 m Streamer Length

13 s Record Length

2015



### Guinea-Bissau / AGC 3Ds

**8,985 km<sup>2</sup>**

Acquired 2014

8 m Streamer Depth

10 x 8000 m Streamer Length

9 s Record Length

# 2016

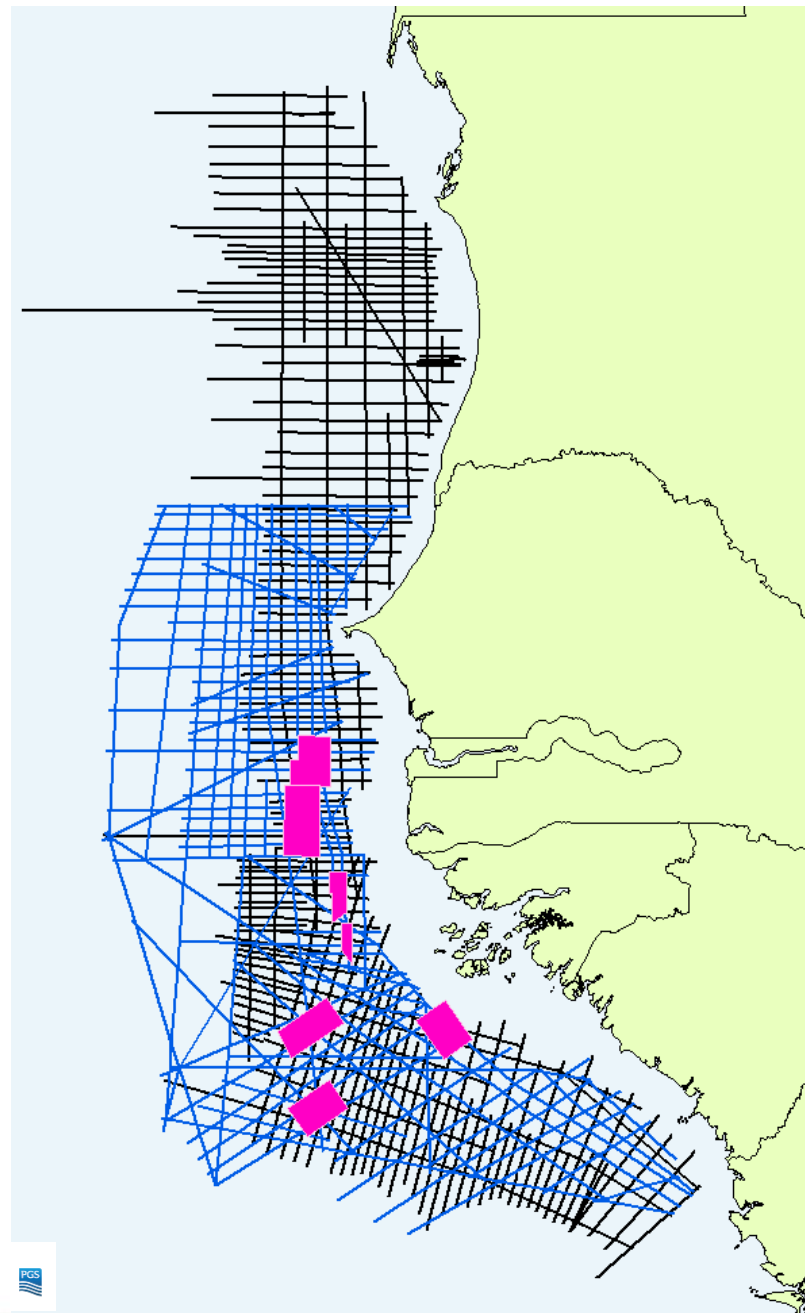
## Senegal Offshore Sud Profond 3,611 km<sup>2</sup>

Acquired 2012

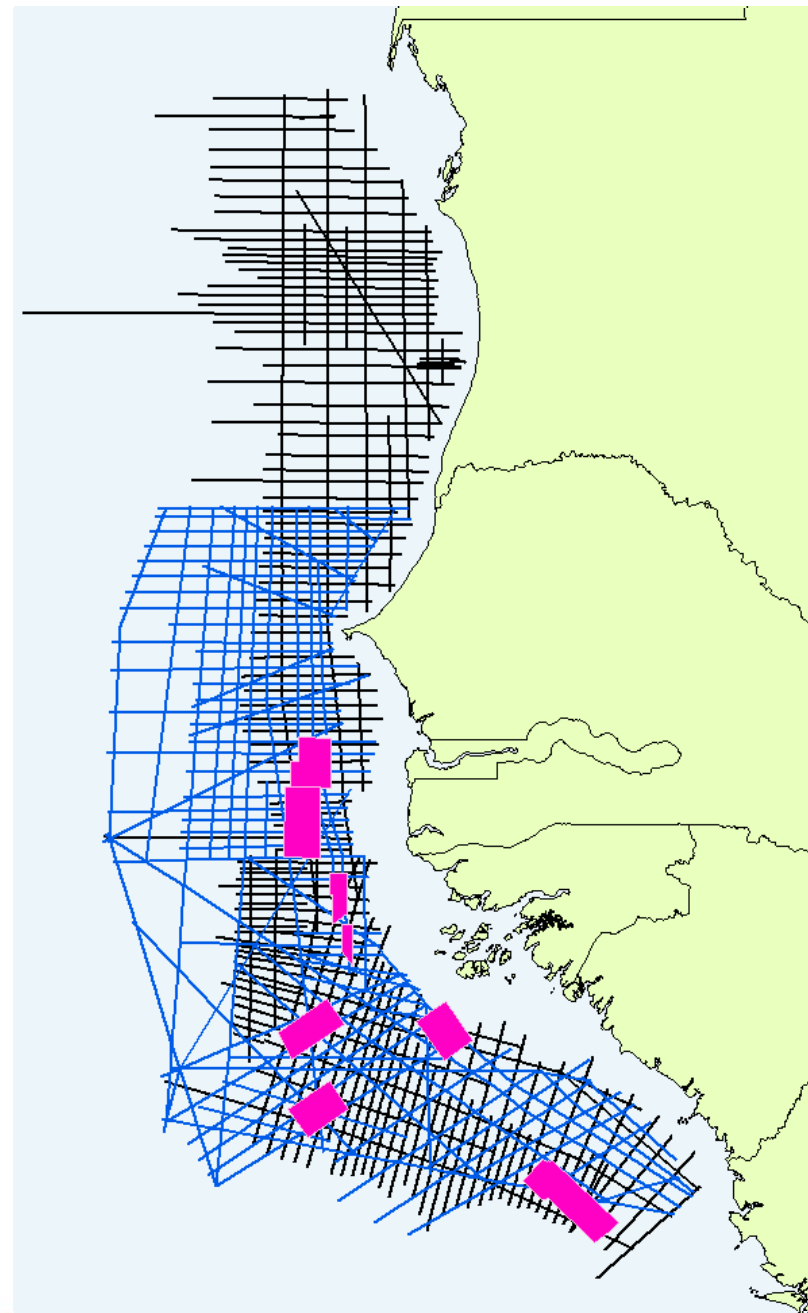
9 m Streamer Depth

10 x 8000 m Streamer Length

10 s Record Length



2017



**Republic of Guinea 3D**

**4,831 km<sup>2</sup>**

Acquired 2011

Variable Streamer Depth

12 x 7650 m Streamer Length

10 s Record Length

# 2018

## Gambia A1/A4

2,566 km<sup>2</sup>

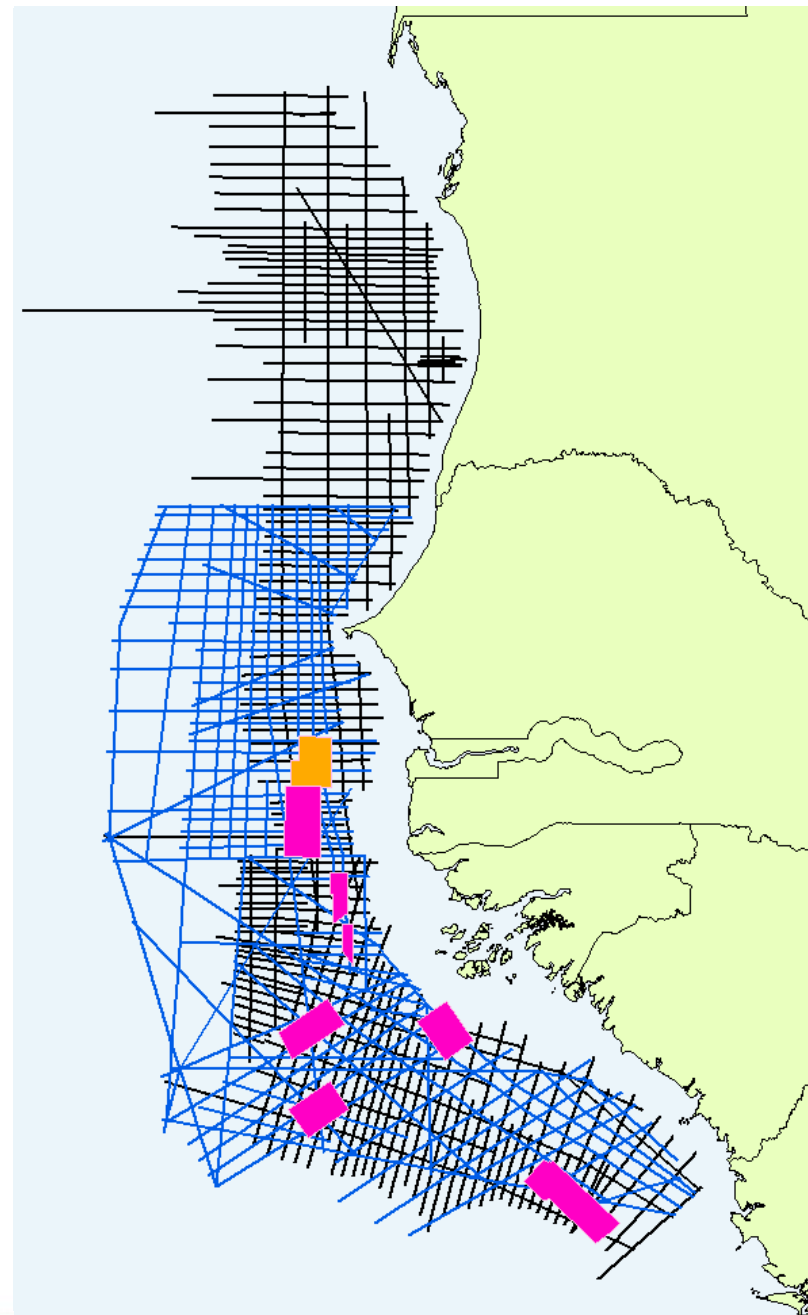
Acquired 2010

Reprocessed 2018

9 m Streamer Depth

12 x 8100 m Streamer Length

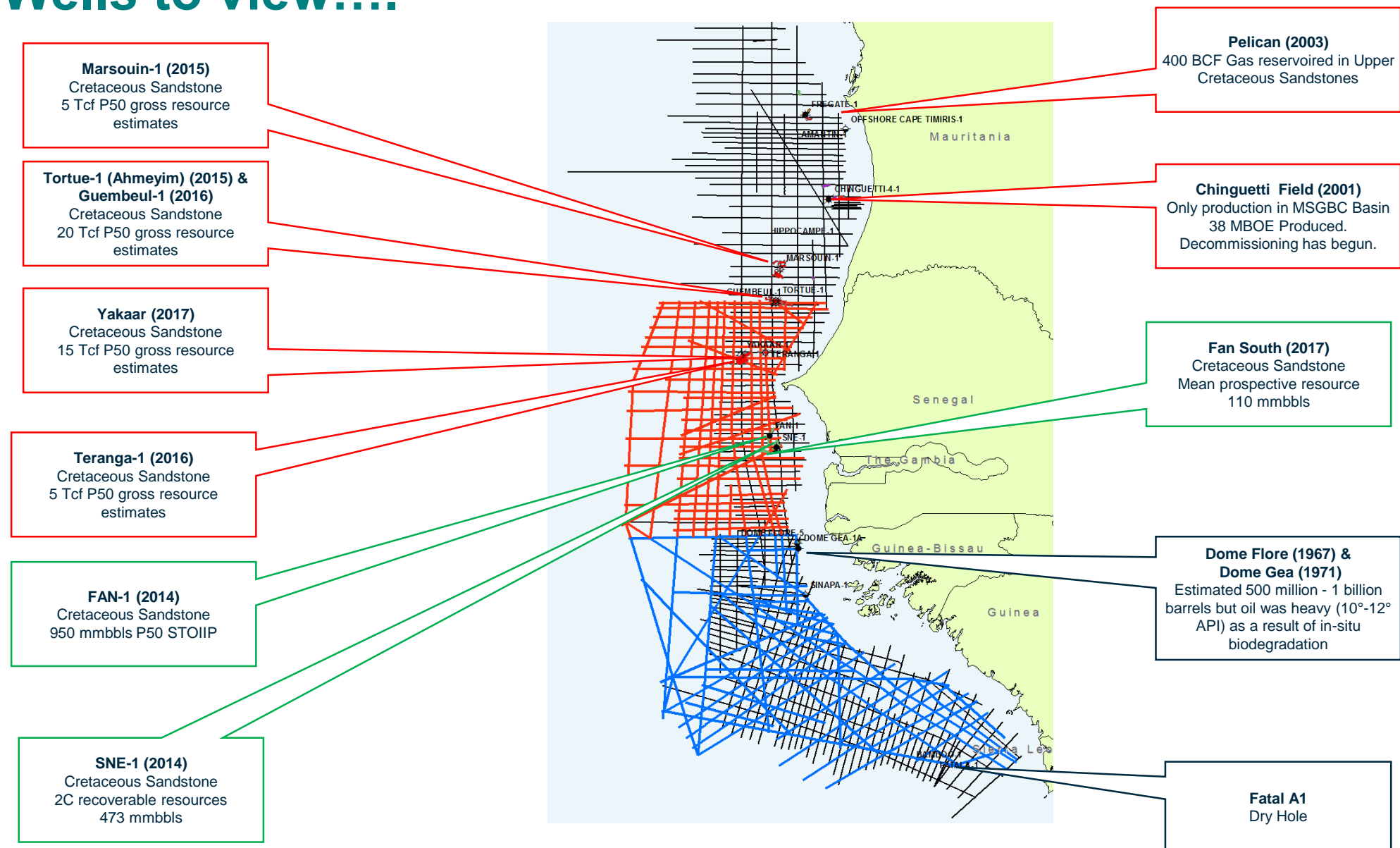
13 s Record Length





# Data Examples

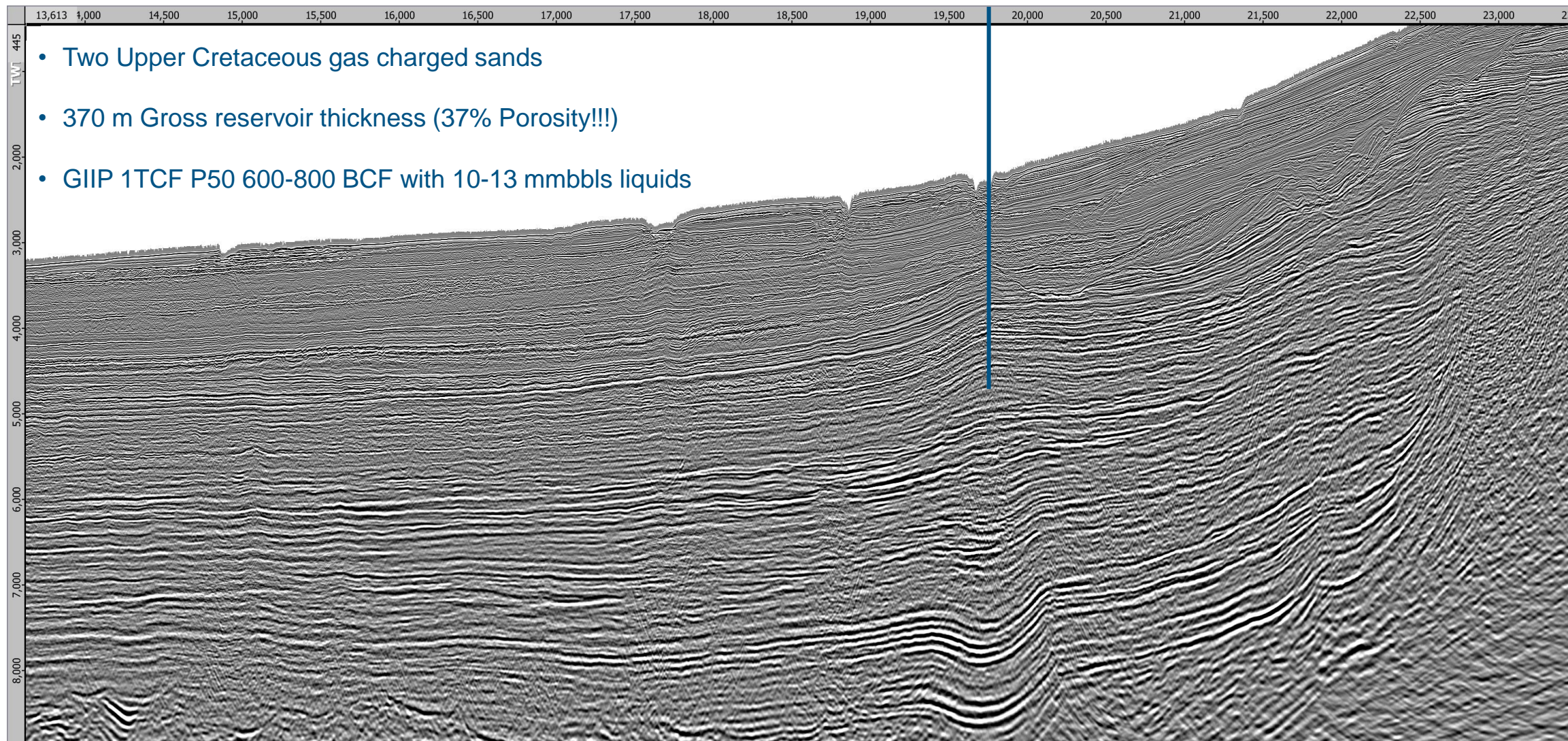
# Wells to view....



— NWAAM2017-Phase 2 2D  
— NWAAM2017-Phase 1 2D  
— NWAAM2012- 2D

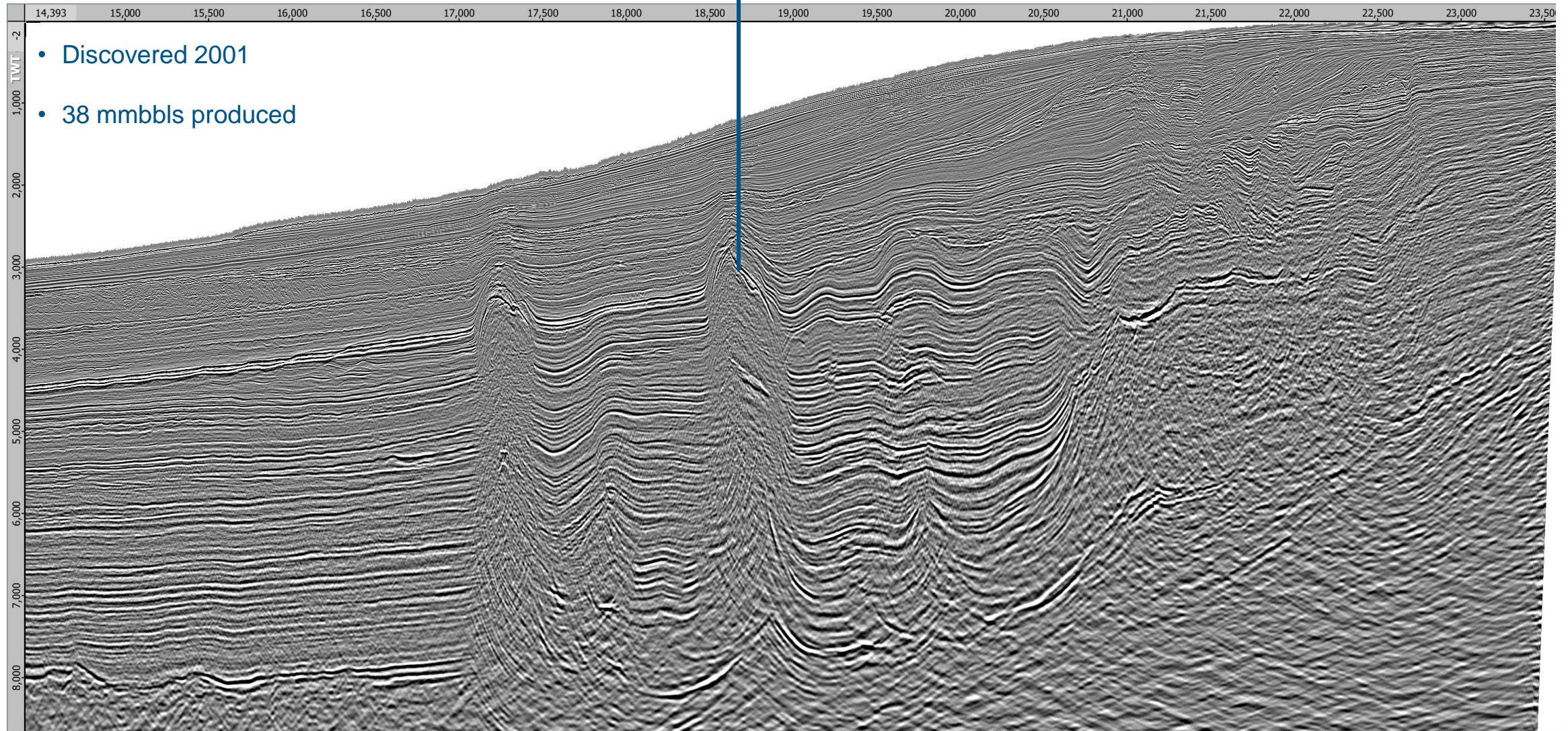
# Pelican-1

Pelican-1  
(WD 1679 m)  
(TD 3825 m)



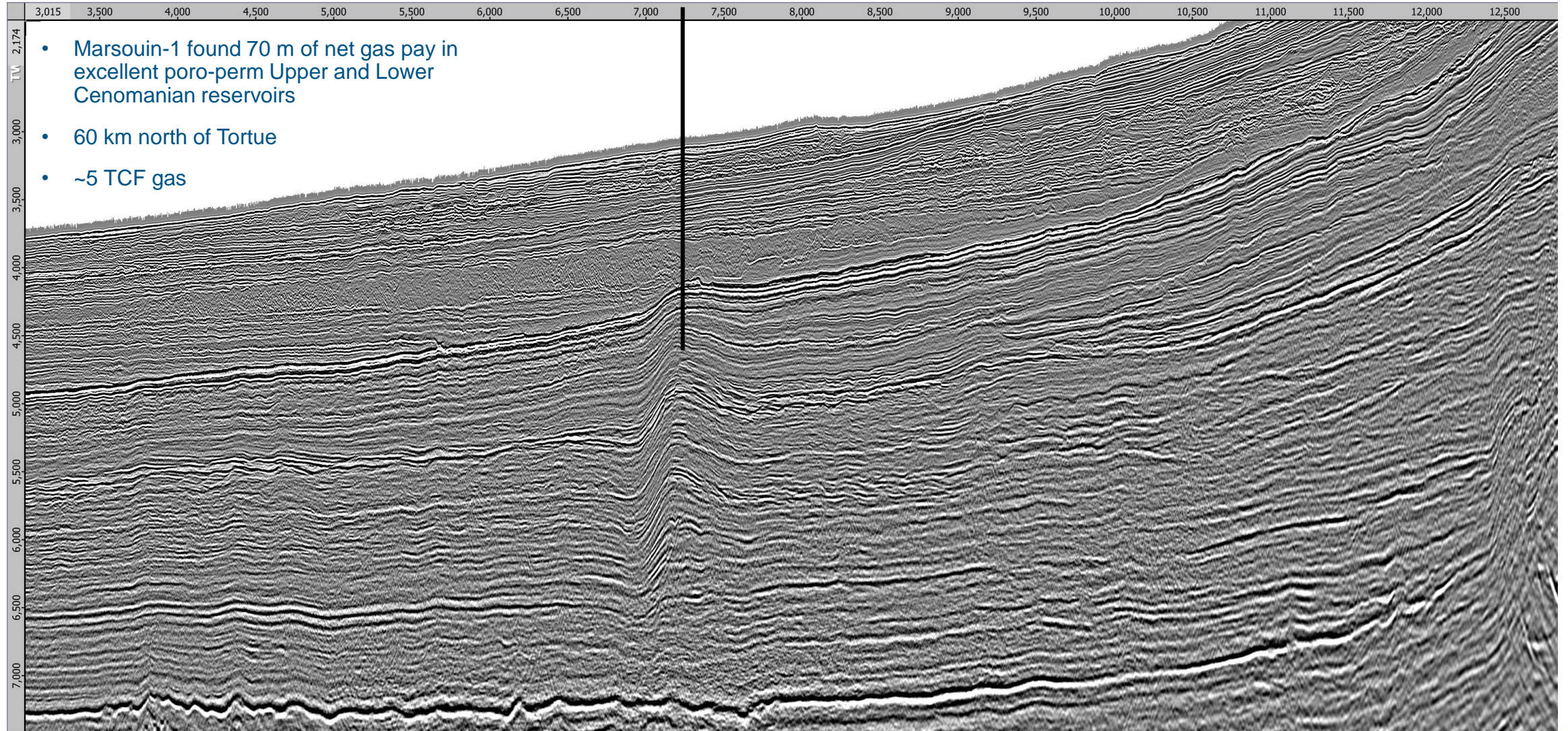
# Chinguetti field

Chinguetti Field  
(WD 815 m)  
(TD 2654 m)

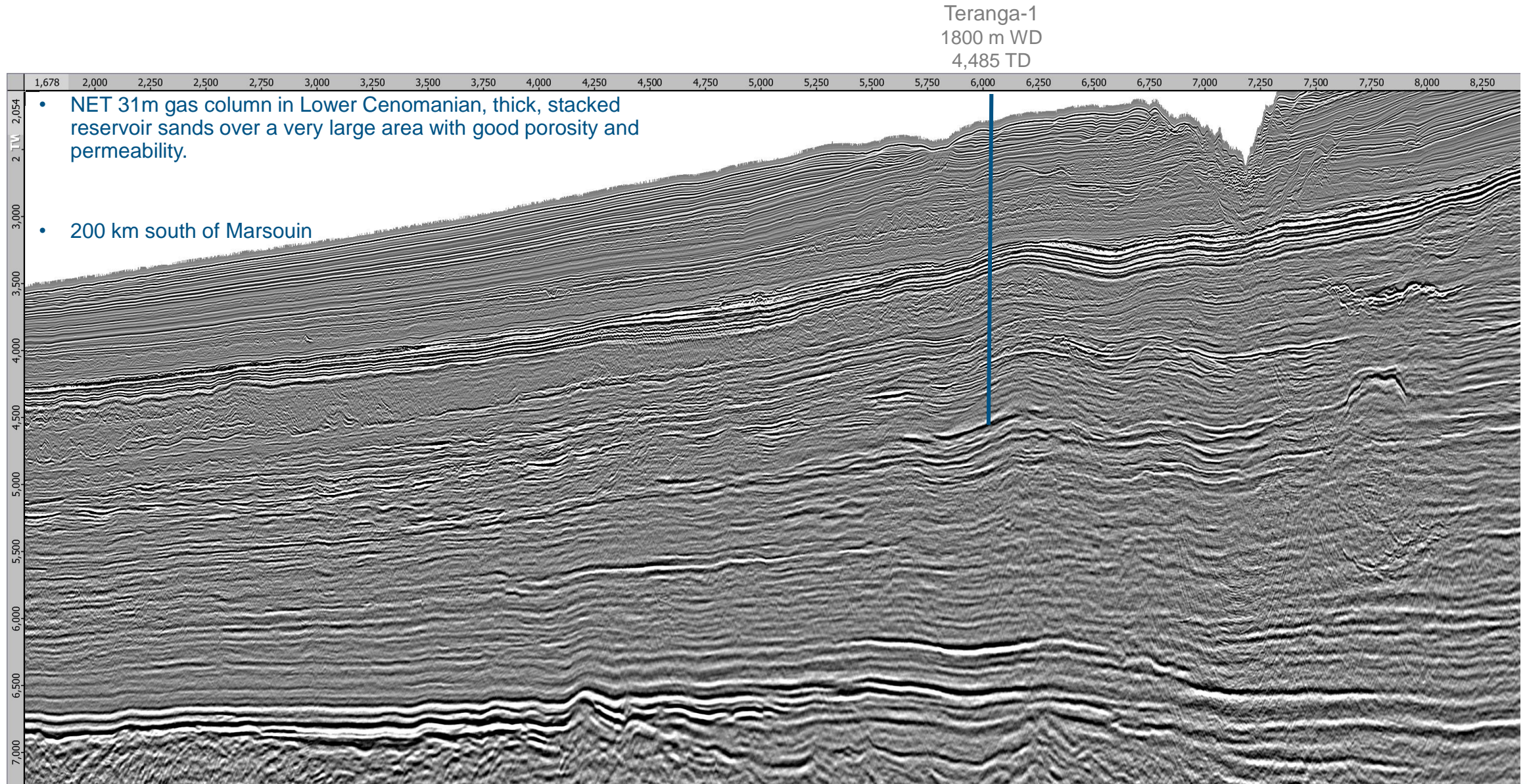


# Marsouin-1

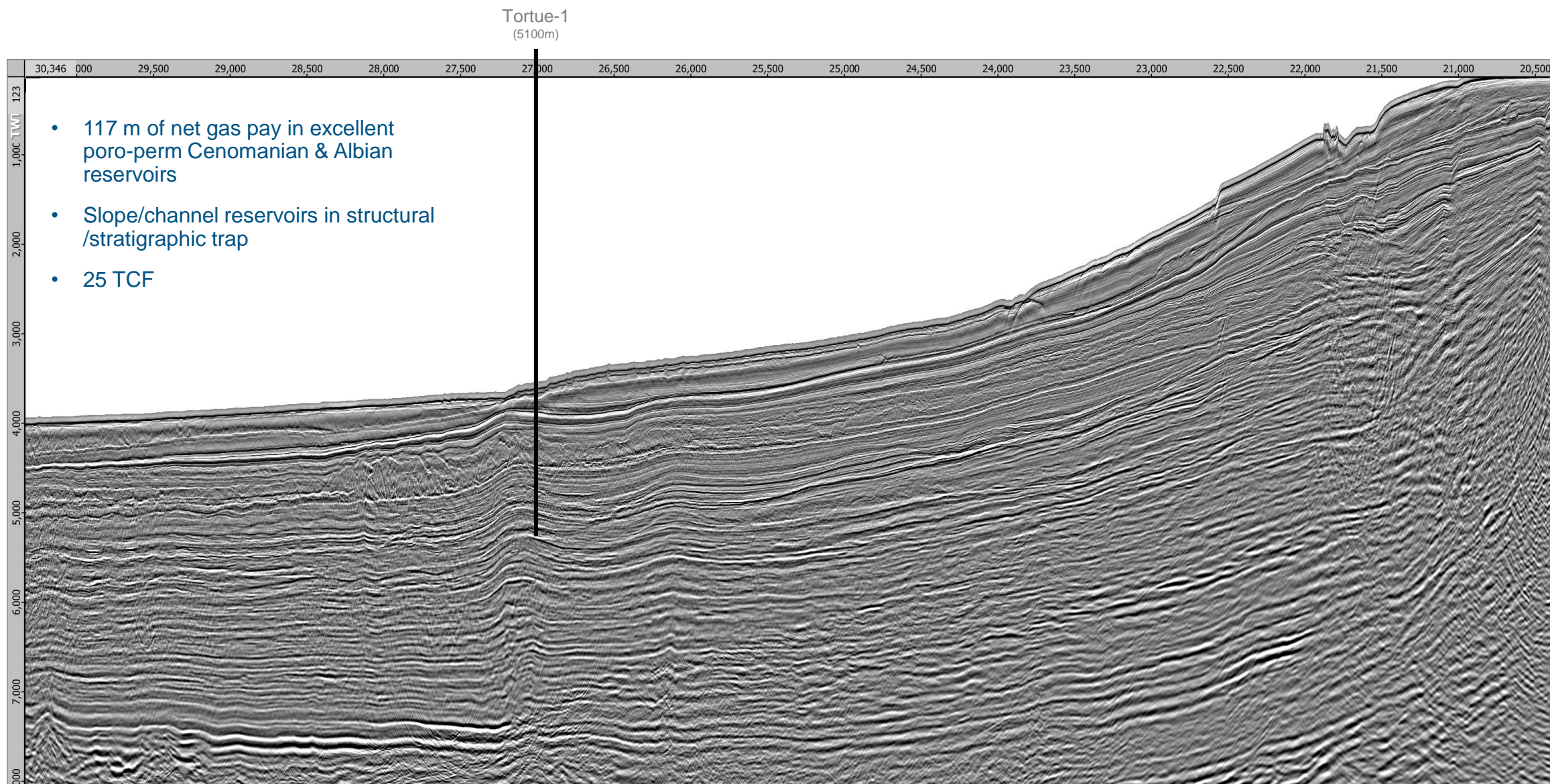
Marsouin-1  
(WD 2400m)  
(TD ~ 5100m)



# Teranga-1

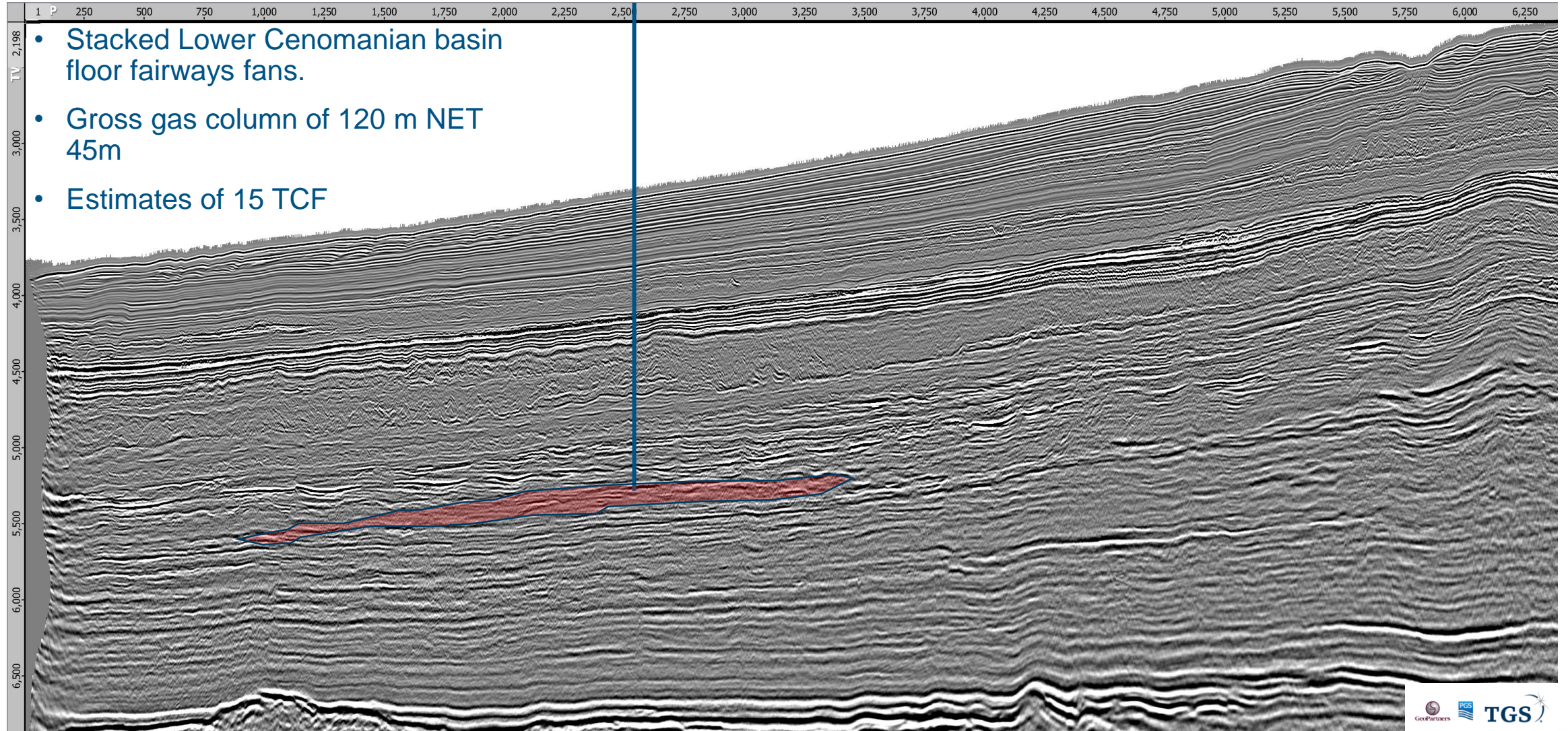


# Tortue Complex



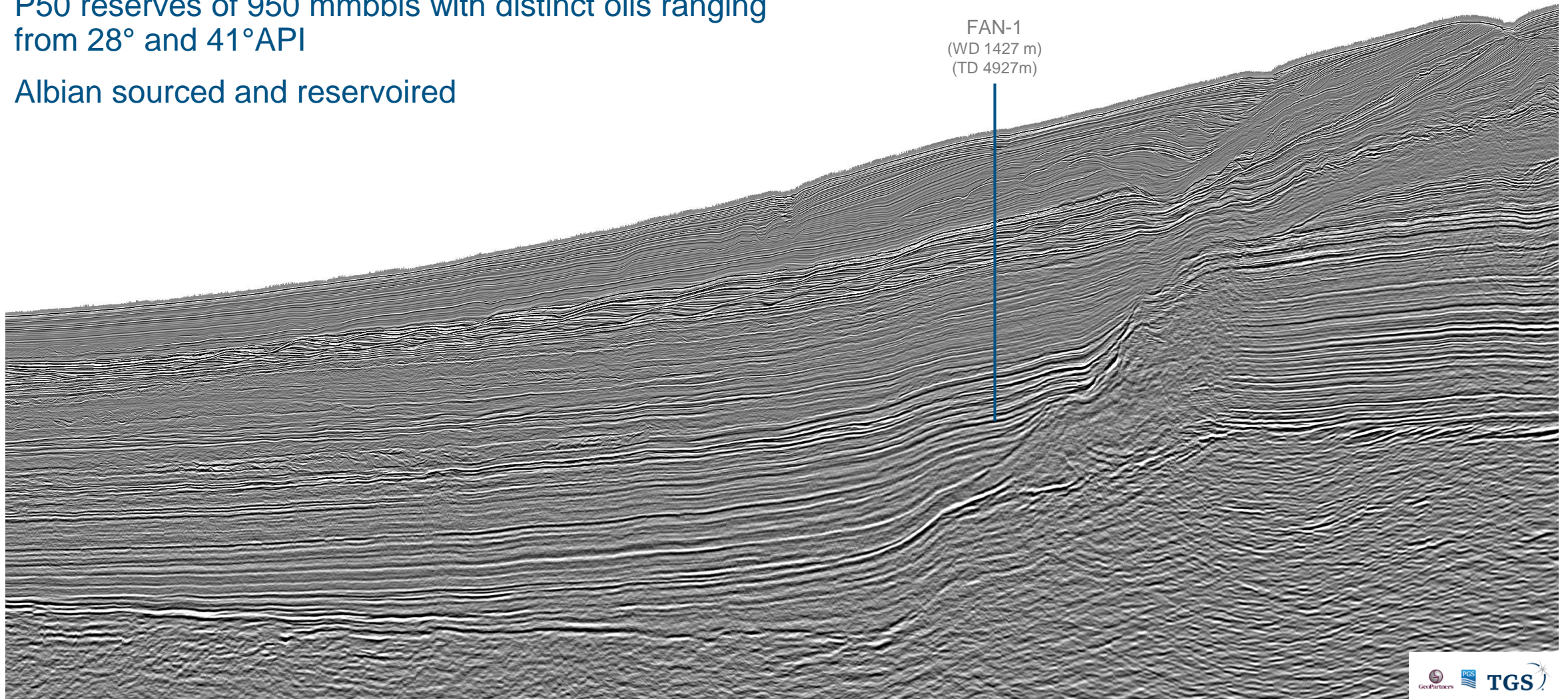
# Yakaar-1

Yakaar-1  
2550 m WD

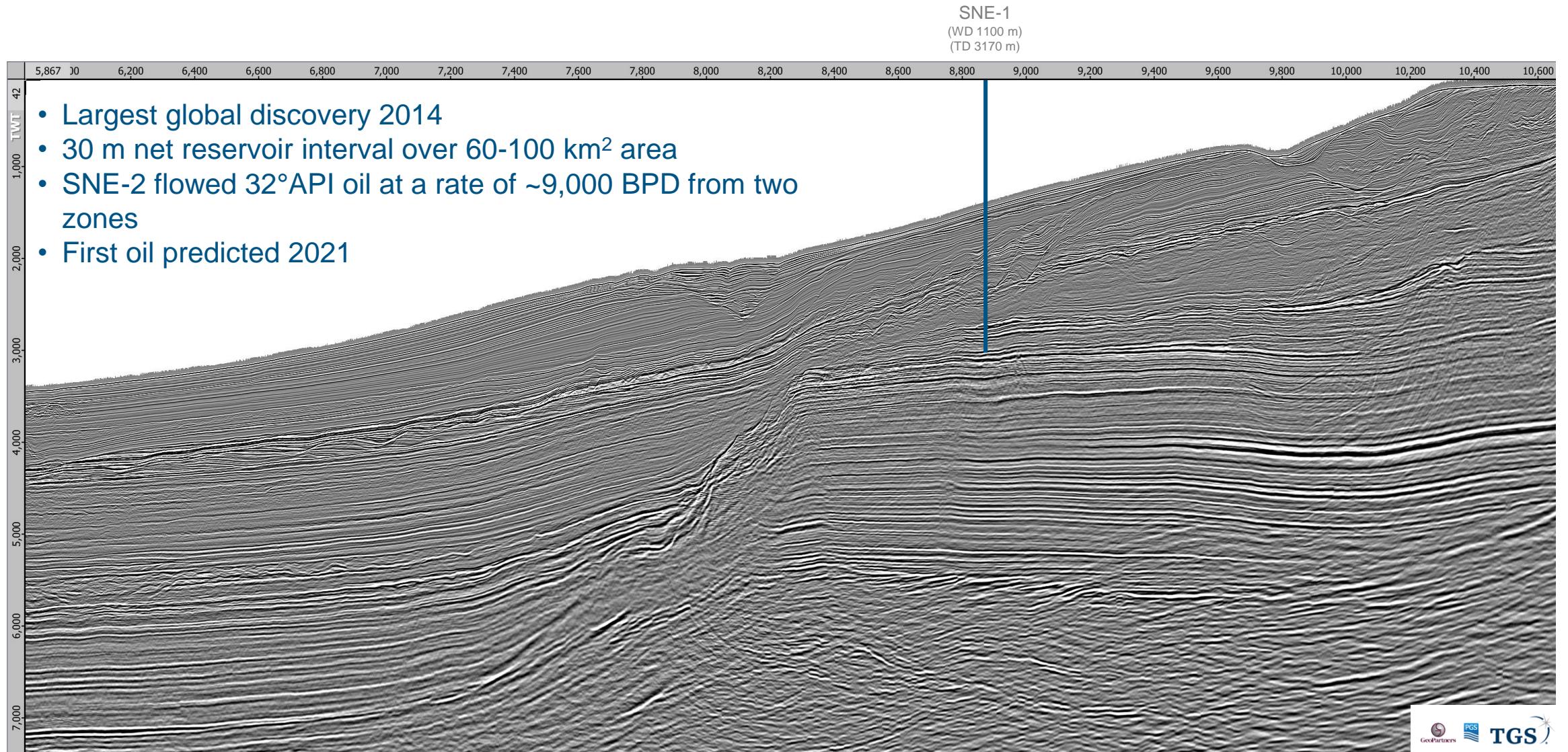


# FAN-1

- P50 reserves of 950 mmbbls with distinct oils ranging from 28° and 41°API
- Albian sourced and reservoired

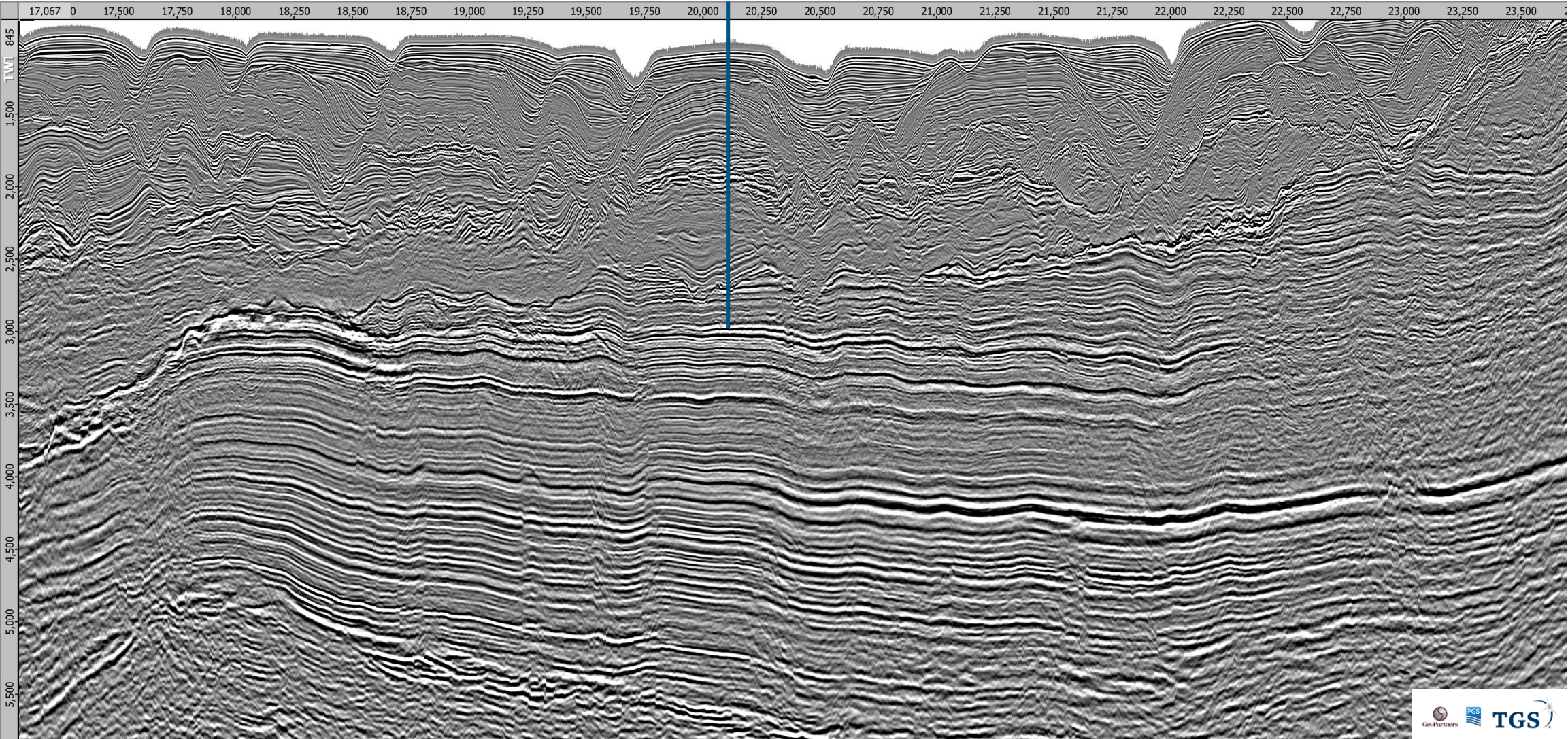


# SNE-1



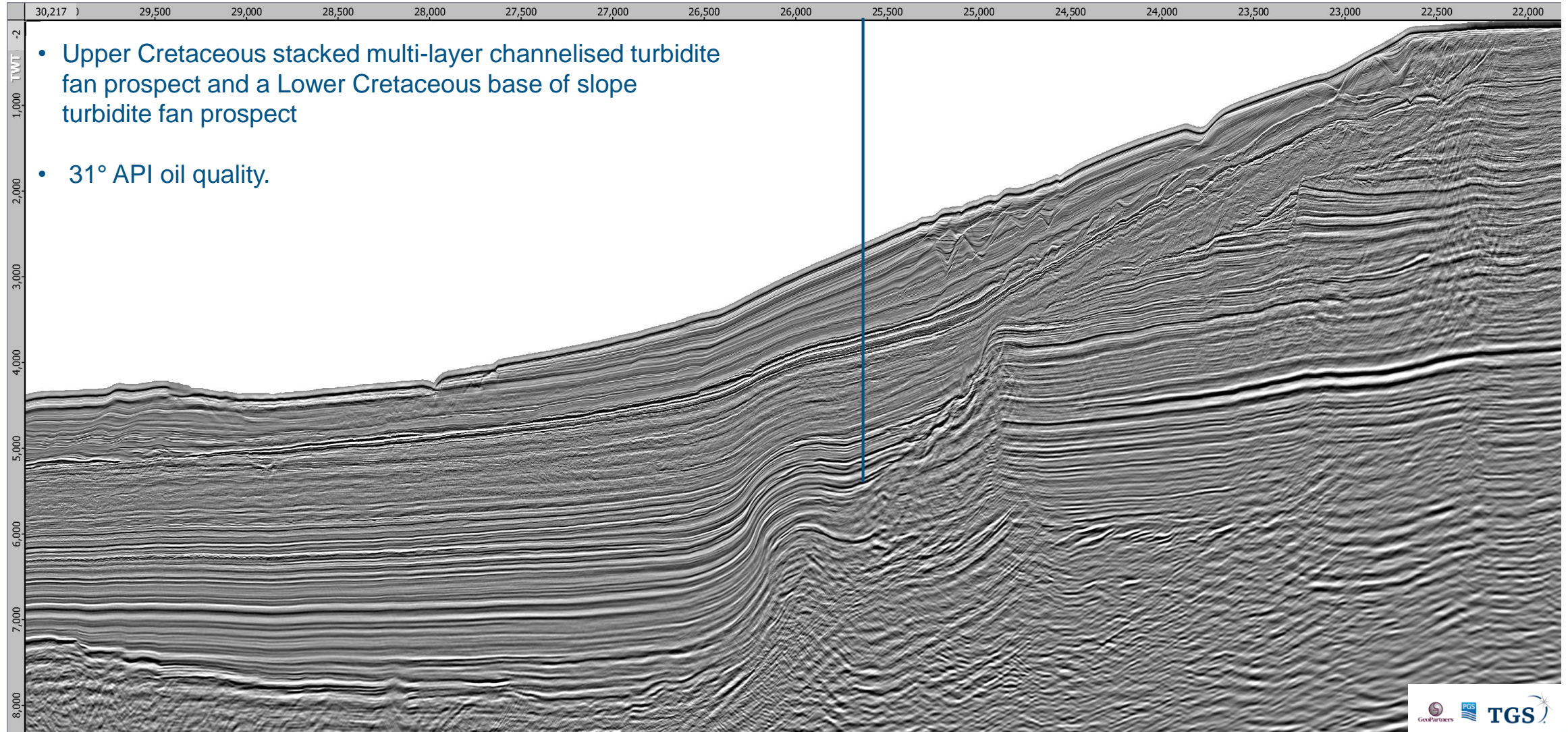
Stellar Energy Advisers stated “The SNE discovery saved African exploration” *(as per Far Presentation Citi Conference Sydney, October 2017)*

SNE  
(WD 1100 m)  
(TD 3170 m)



# Fan South-1

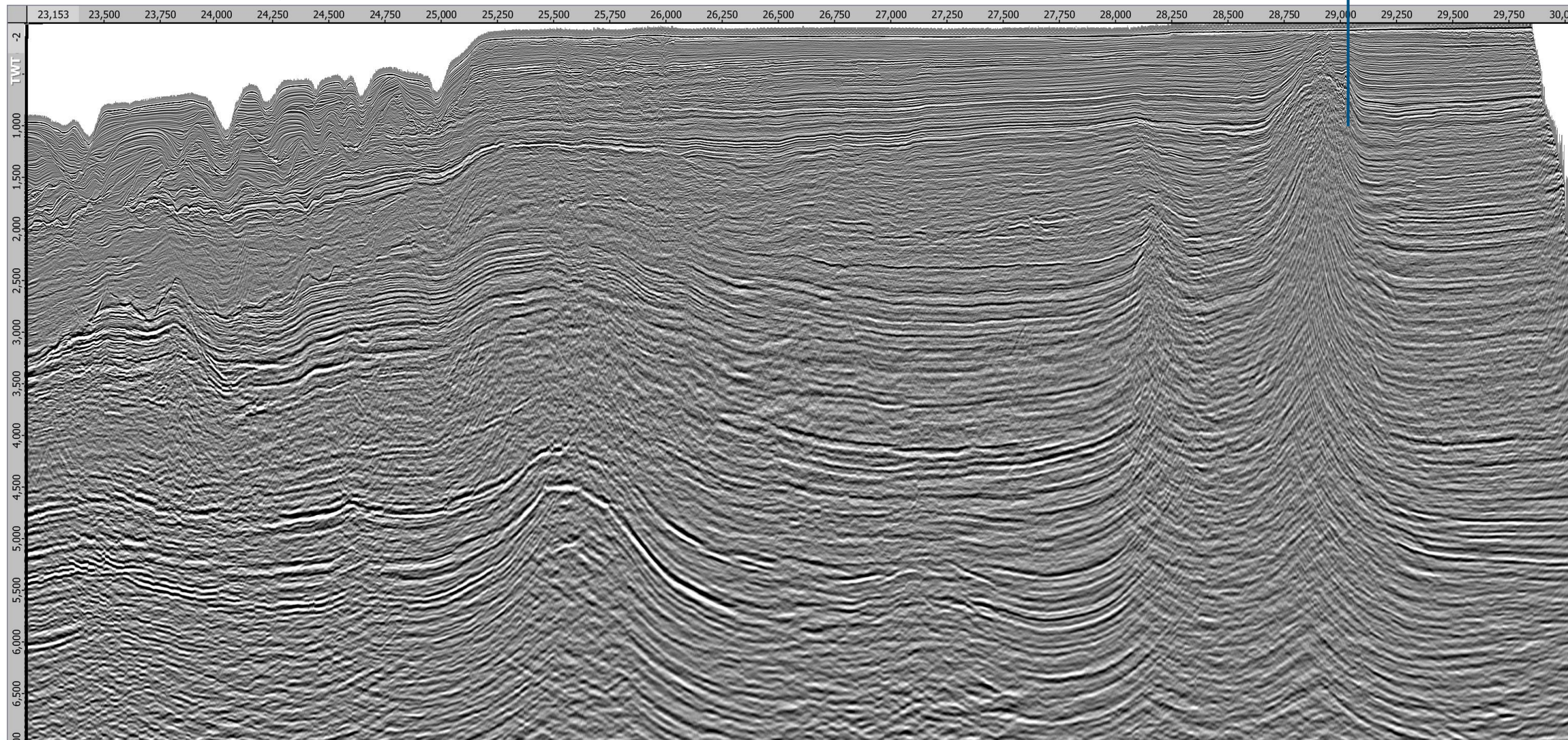
FAN SOUTH-1  
(WD 2,175 m)  
(TD 5,343 m)



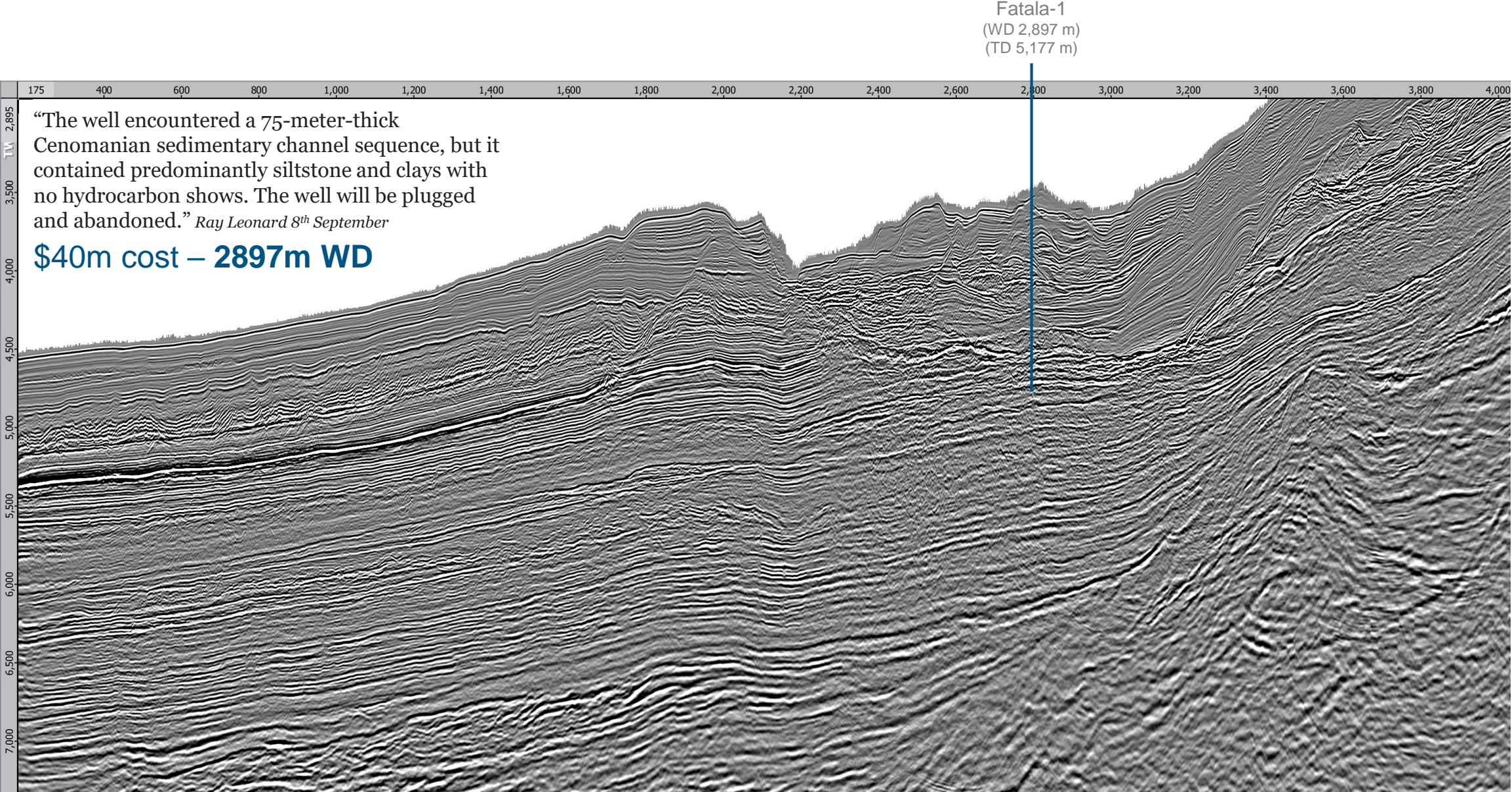
# Dome Flore & Gea

In the early 70s the Dome Flore and Géa wells were drilled discovering over a Billion Barrels over heavy oil in Oligocene

Dome Flore & Gea  
(WD 100 m)  
(TD 1,090 m)

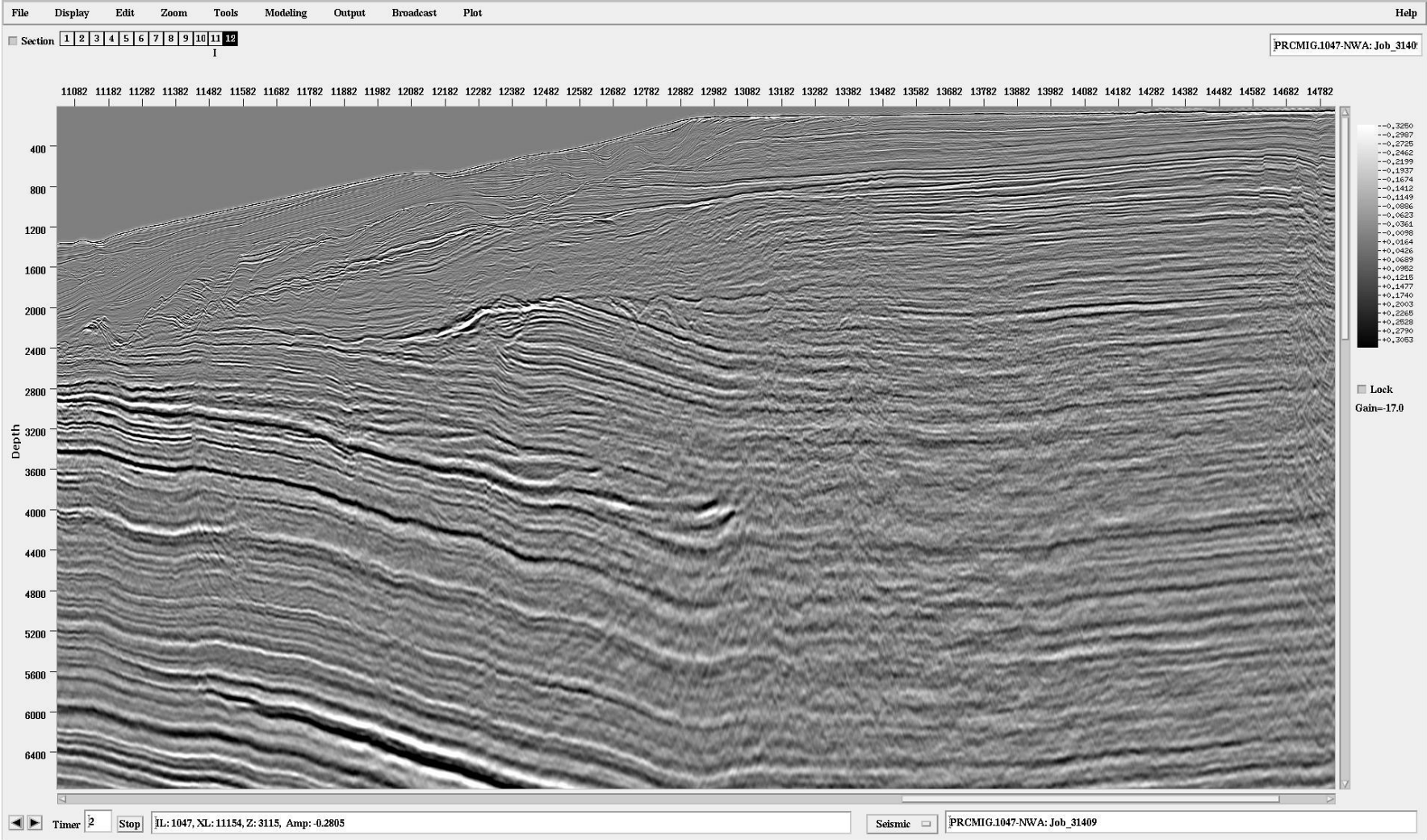


# Fatala-1

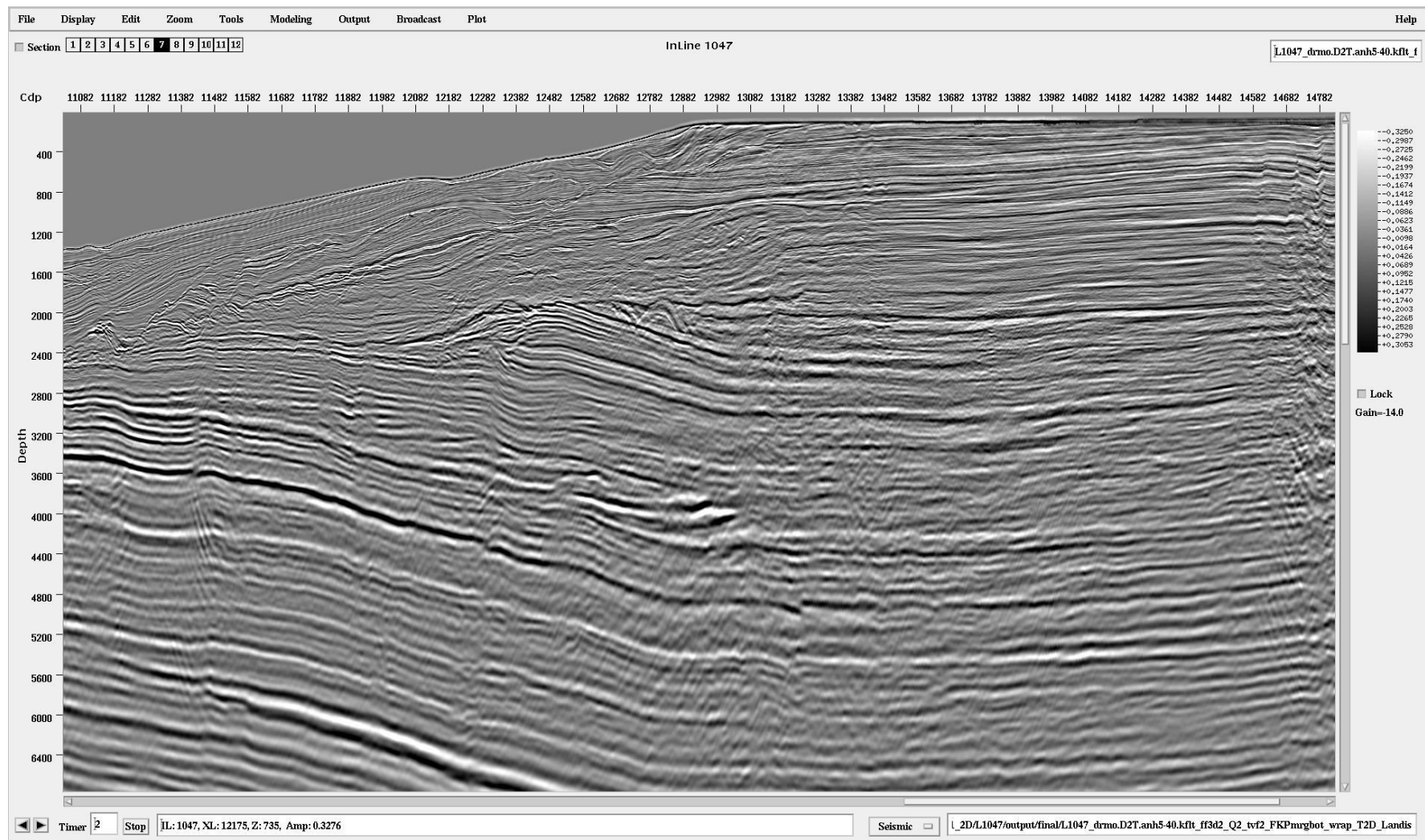


**NWAAM2012RE18**

# Legacy Time Stack stretched to depth



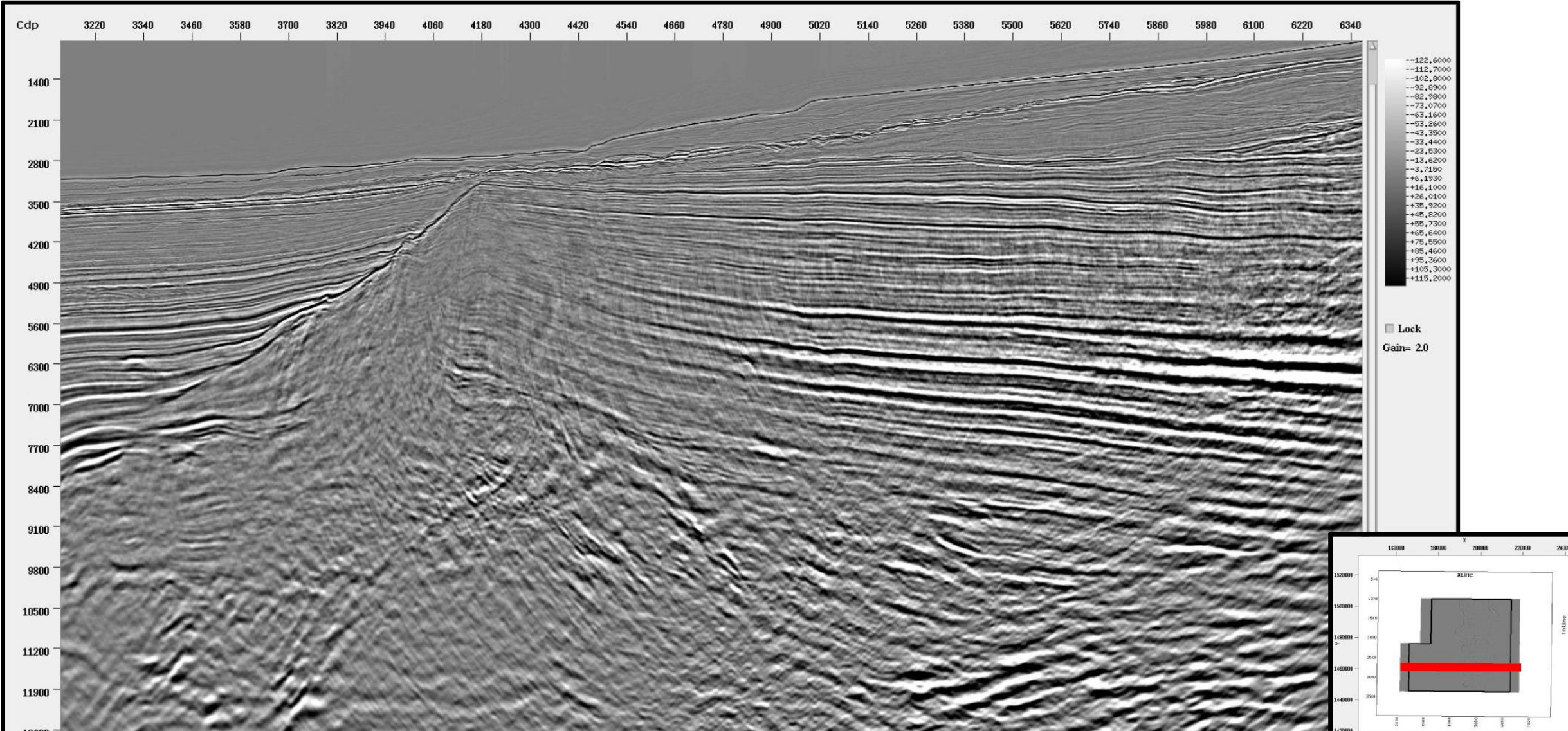
# TGS FT reprocessing PSDM – example uplift



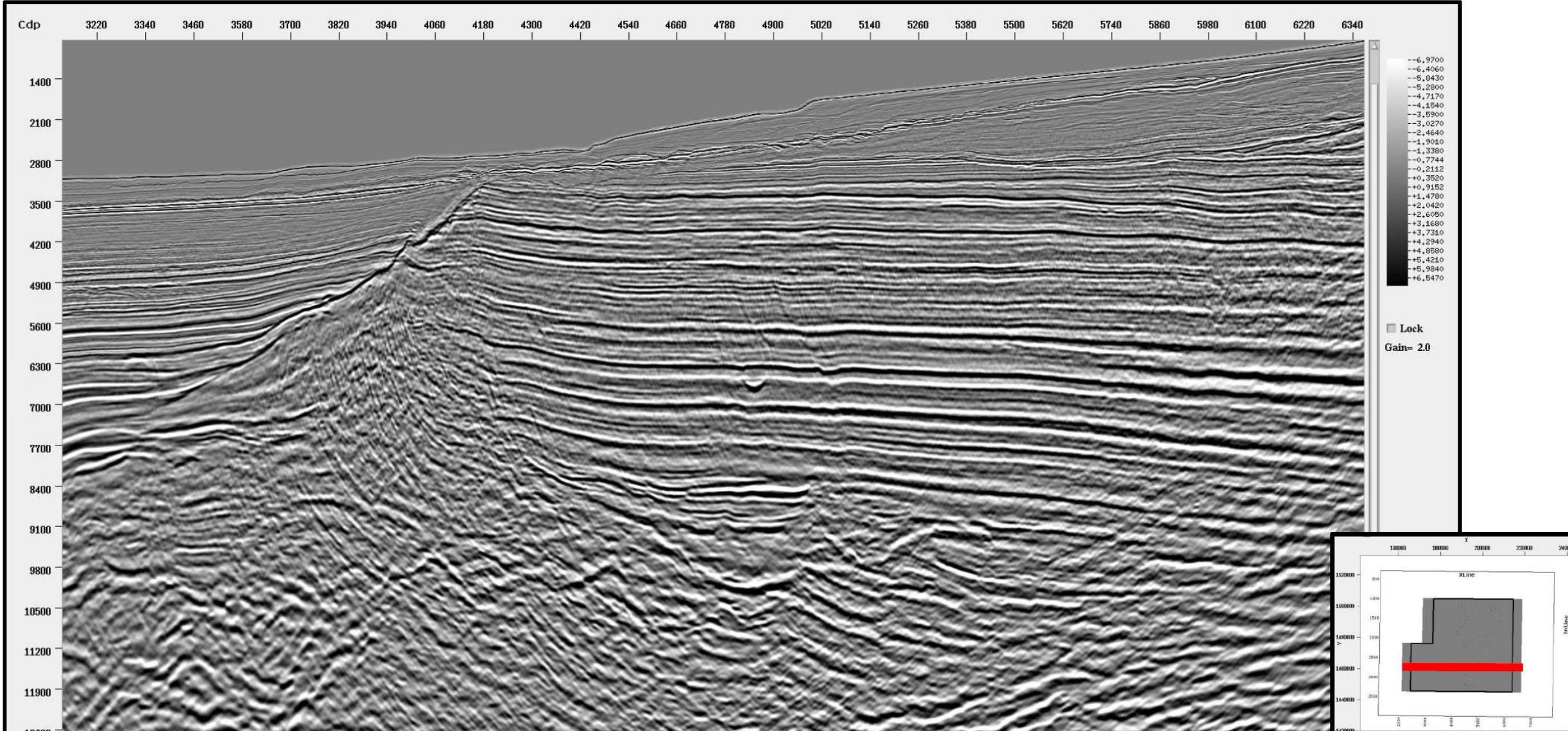


# **Gambia 3D Reprocessing**

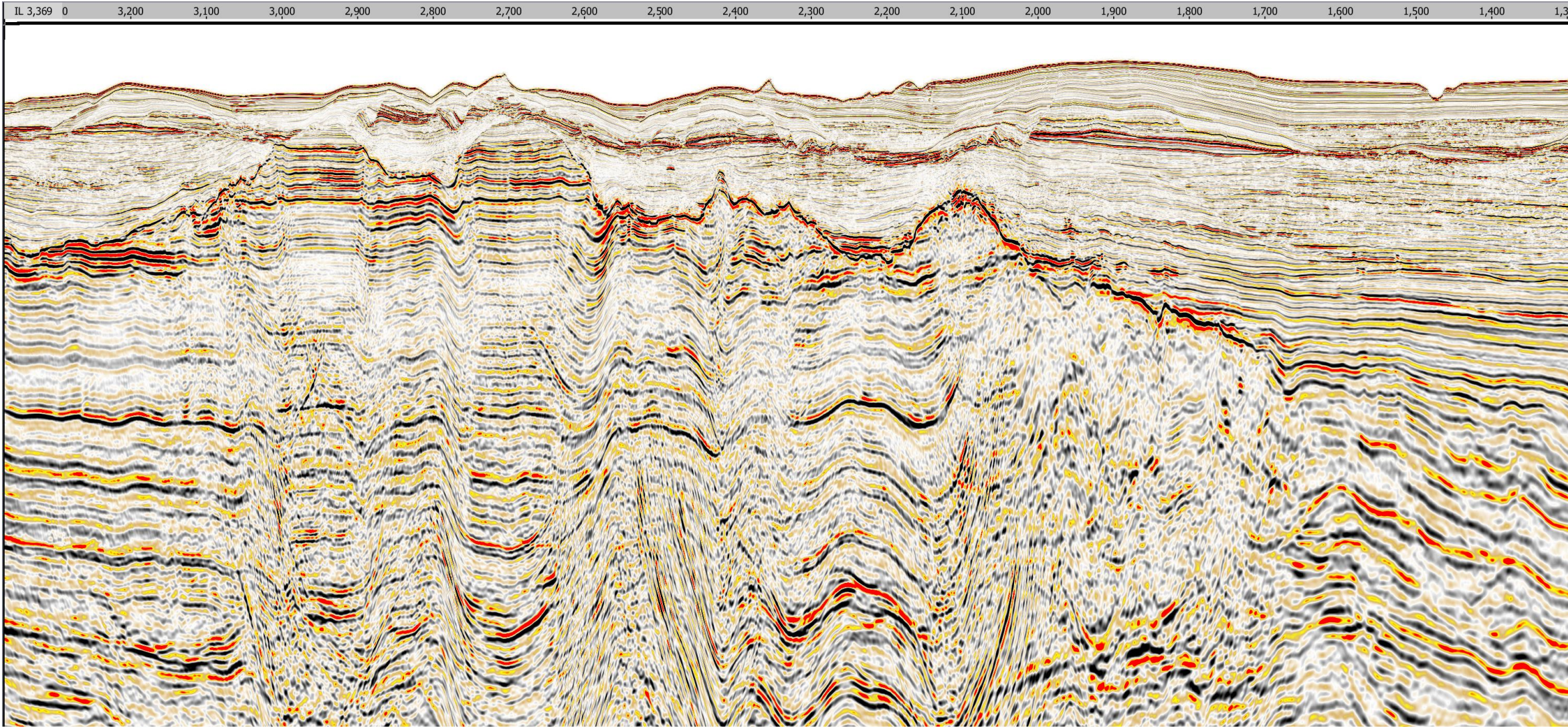
# Gambia Processing -BEFORE



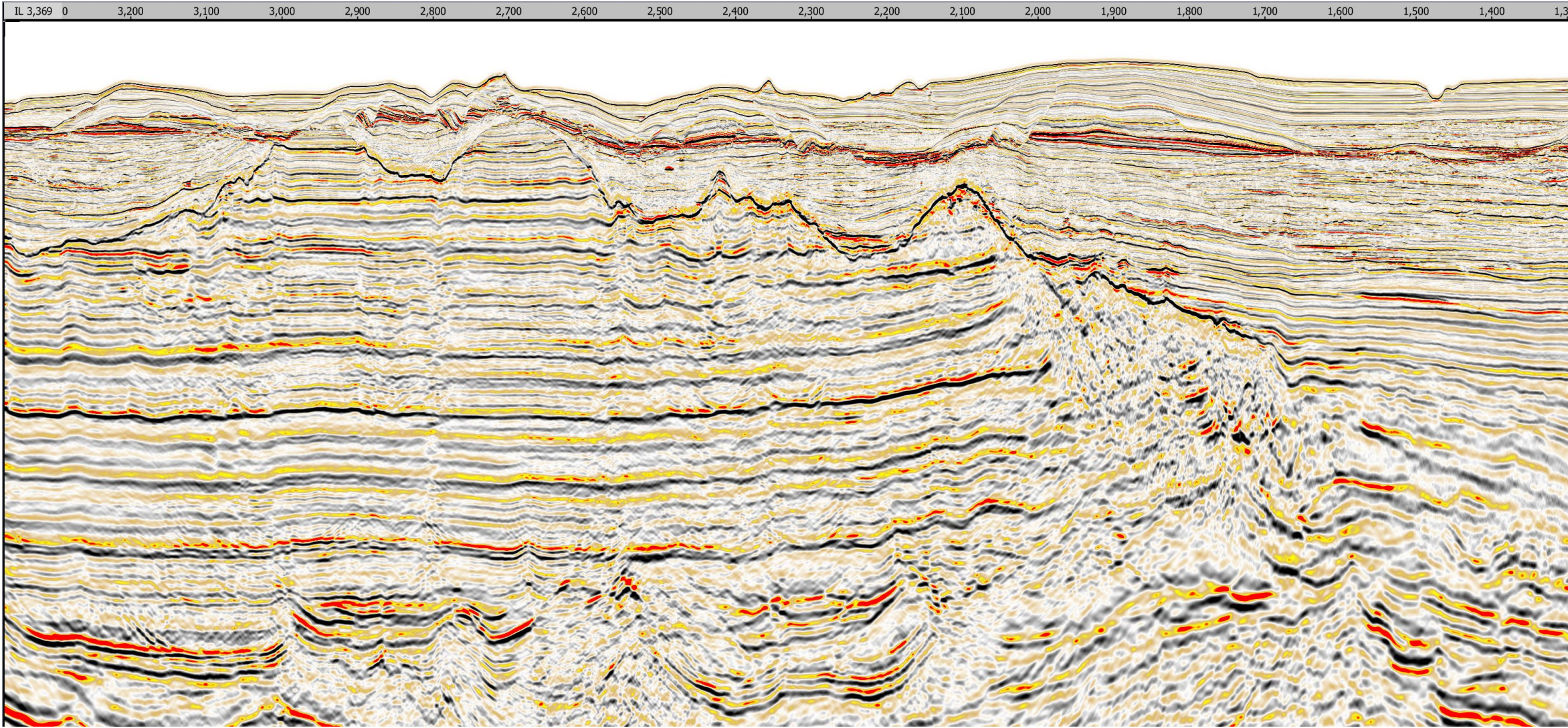
# Gambia Processing - After



# Gambia – Legacy Time Stretched to Depth



# Gambia – 2018 Kirchhoff Depth



# Summary

# In summary...

- The MSGBC Basin is the hottest exploration area in Africa
  - Multiple proven discoveries.
  - Various different play types to hunt.
- There is plenty of access to acreage via farm-ins, bid rounds or direct negotiation.
- The regions are politically stable.
- TGS have the only truly regional data coverage, with over 52,000 km of 2D and almost 20,000 km<sup>2</sup> 3D data.
- 2D enables the leads and features identified.
- 3D develops the drill ready prospects.

# Thank you



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