



**PPL-579**

**OFFSHORE PAPUA NEW GUINEA**

**Alaister Shakerley & Tim Rady**

**SEC 2025**

**6-9<sup>th</sup> MAY 2025, SINGAPORE**

Securing Reliable Energy in Asia Pacific  
Connect, learn and grow with the region's best

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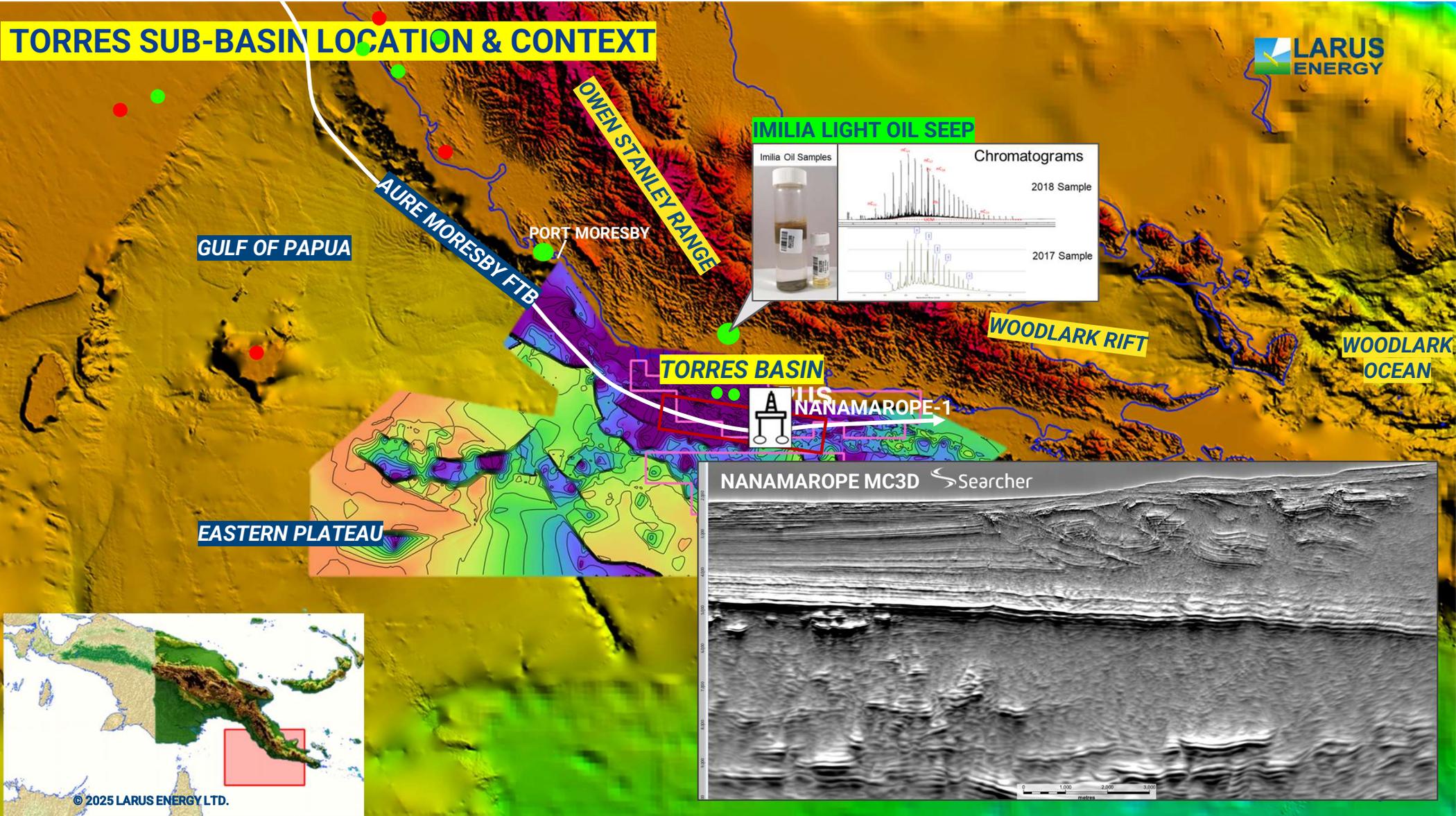
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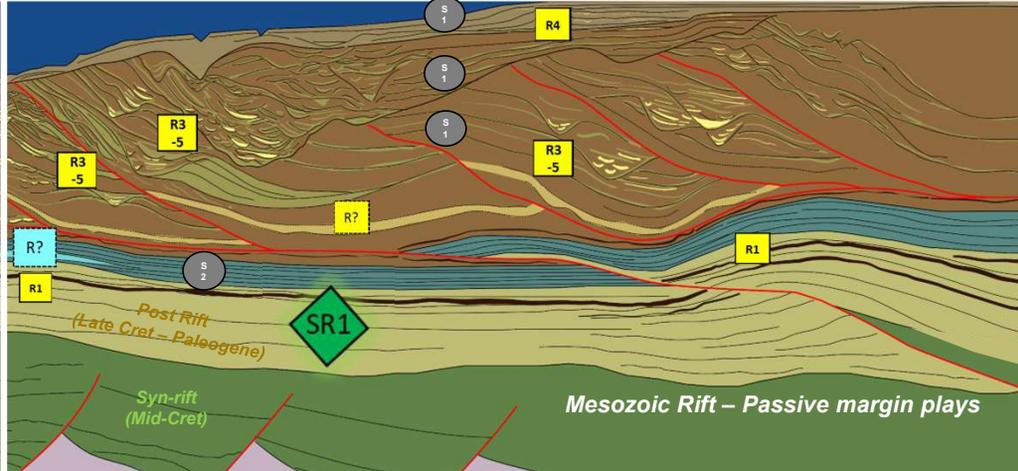
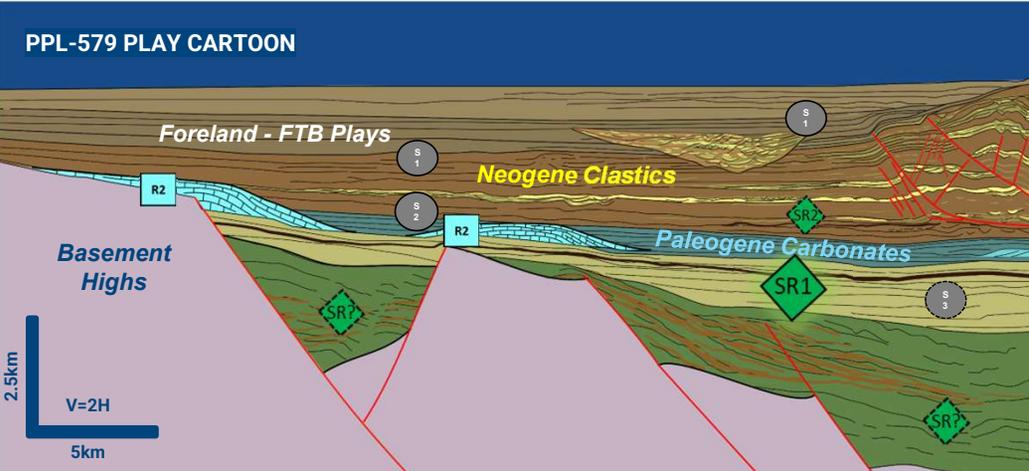
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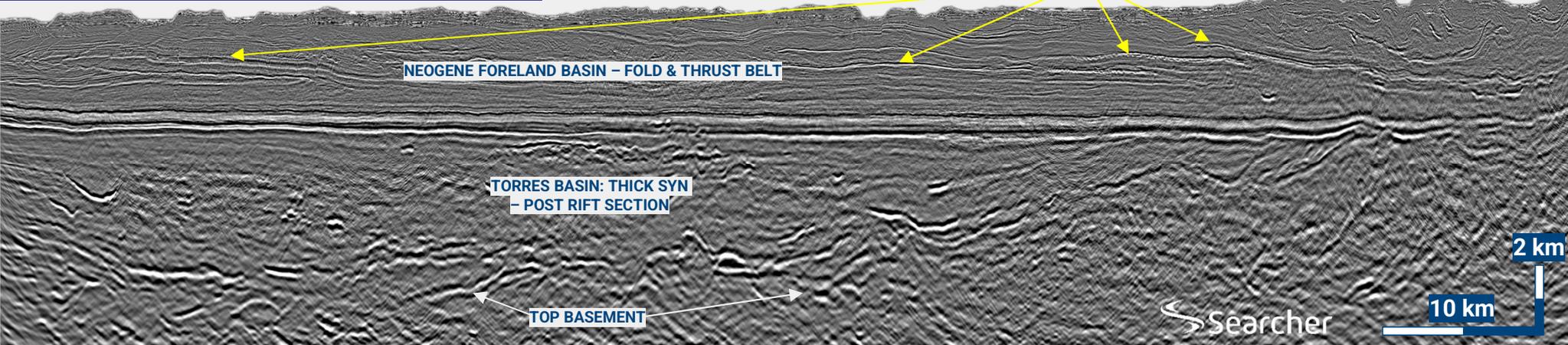
# TORRES SUB-BASIN LOCATION & CONTEXT



# TORRES SUB-BASIN AND PPL579 PLAY ELEMENTS



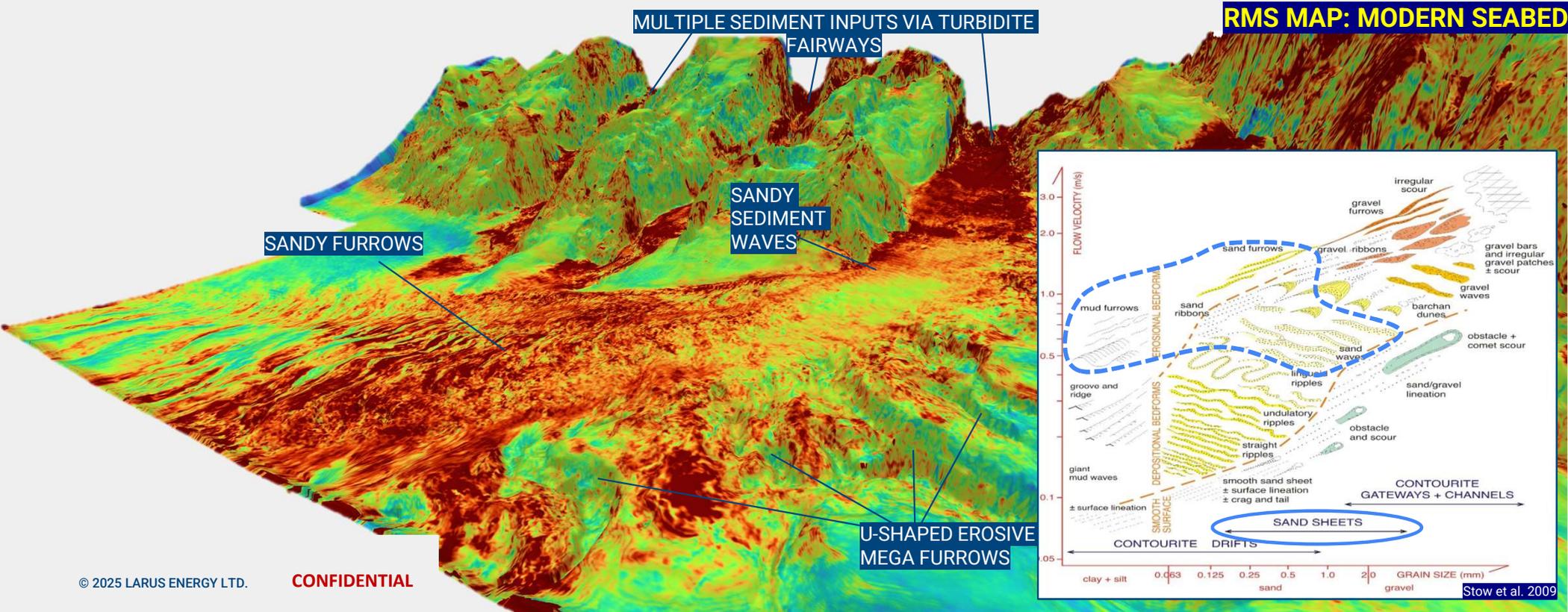
## NANAMAROPE 3D SEISMIC SURVEY - STRIKE LINE



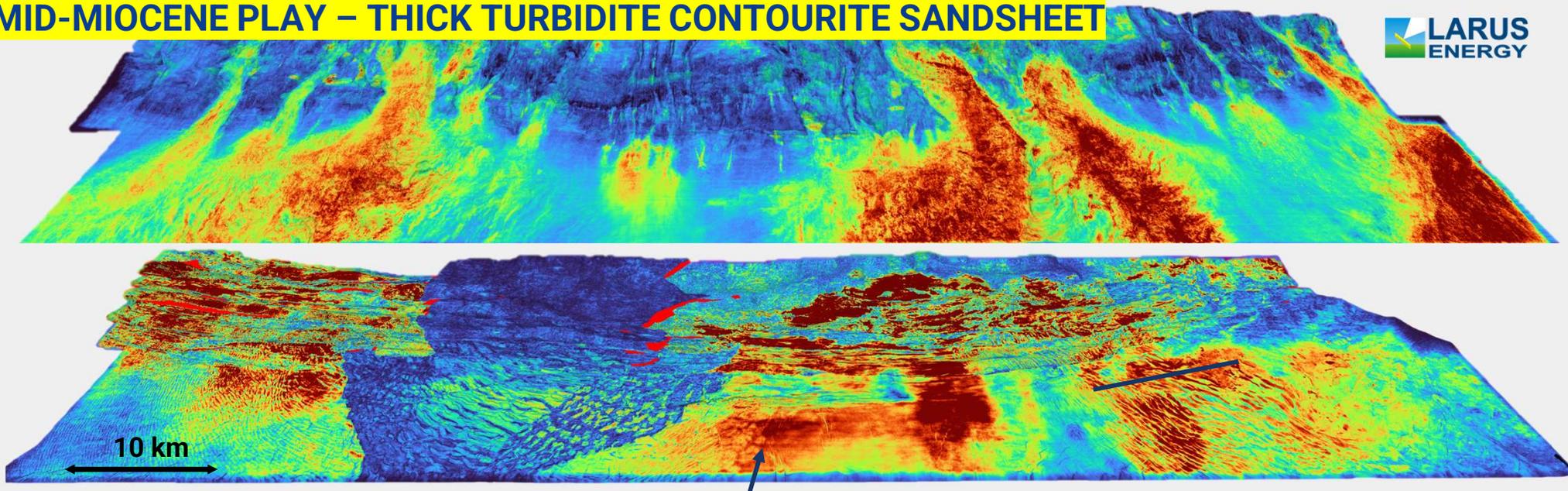
# HYBRID & MIXED TURBIDITE CONTOURITE SYSTEMS – PRESENT DAY SYSTEM



- SEDIMENT INPUT VIA TURBIDITE FAIRWAYS
- REDISTRIBUTION AND REWORKING OF DOWNSLOPE DEPOSITS BY BOTTOM CURRENTS
- SYNCHRONOUS AND ASYNCHRONOUS INTERACTION OF TURBIDITY CURRENTS AND BOTTOM CURRENTS
- GOOD ANALOGUE FOR OBSERVED SUBSURFACE FEATURES



# MID-MIOCENE PLAY – THICK TURBIDITE CONTOURITE SANDSHEET

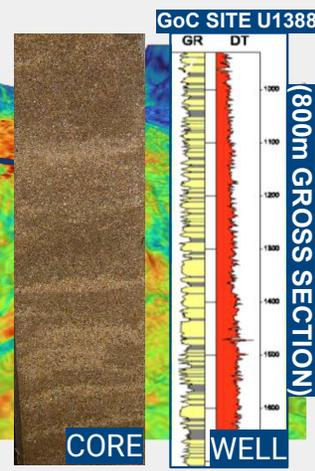


## HIGH NET TO GROSS RESERVOIR POTENTIAL FROM HYBRID/MIXED TURBIDITE/CONTOURITE SYSTEMS ANALOGUES/ORK

GULF OF CADIZ, PLIOCENE	74% (GROSS 800M)
GULF OF CADIZ, QUATERNARY	65-85% (GROSS 220M)
FALKLAND SAND SHEET, PLIO-QT	85% (GROSS 40M)
RYUKYU SAND SHEET, QT	NO GOOD DATA
RIFEAN SAND SHEET, MIOCENE	50-76% (GROSS 100M)
SANTOS BASIN, OLIGOCENE	74-82% (GROSS 100M)
CAMPOS BASIN, MIOCENE	50%
EAST CANADA, PALEOGENE	NO GOOD DATA
OFFSHORE SENEGAL, CRET.	50-60% (GROSS 200M)
OFFSHORE MOZAMBIQUE	>80%



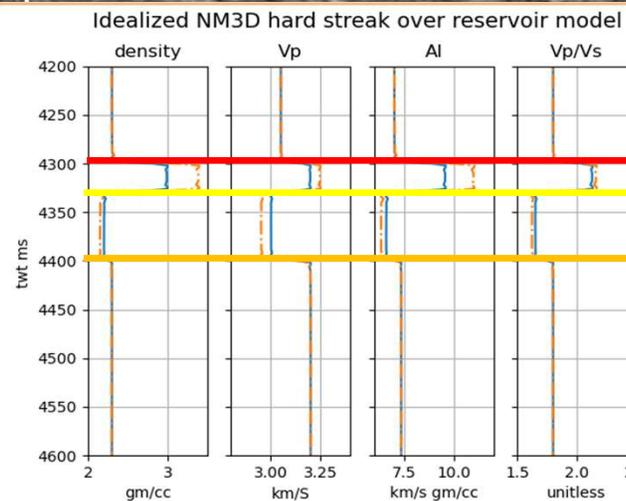
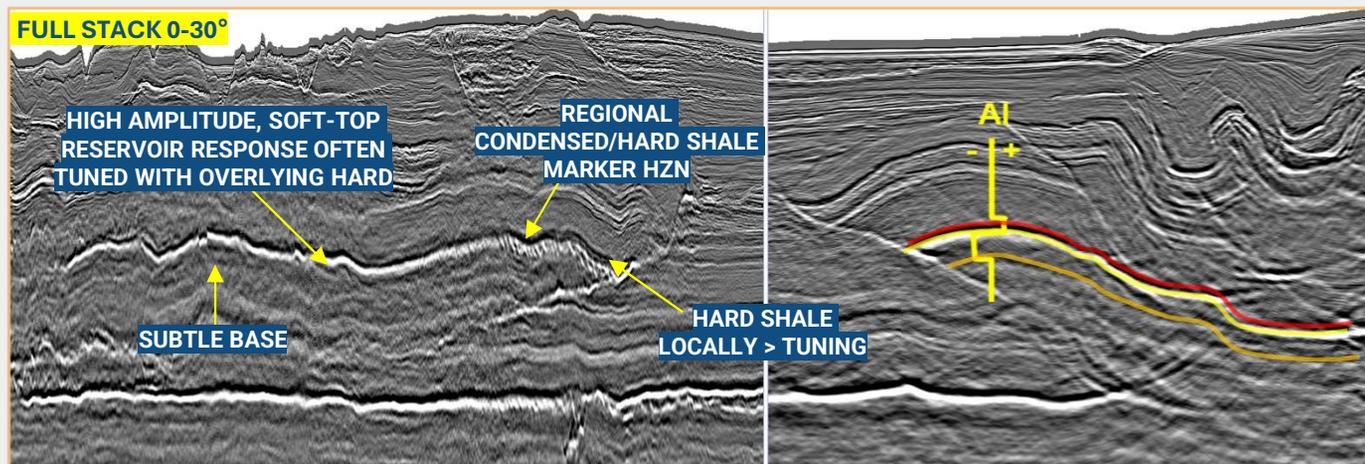
TVD OUTCROP P T SEABED GRAB SAMPLE



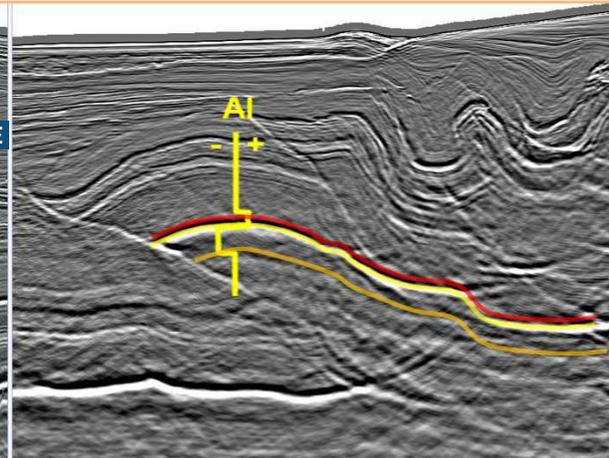
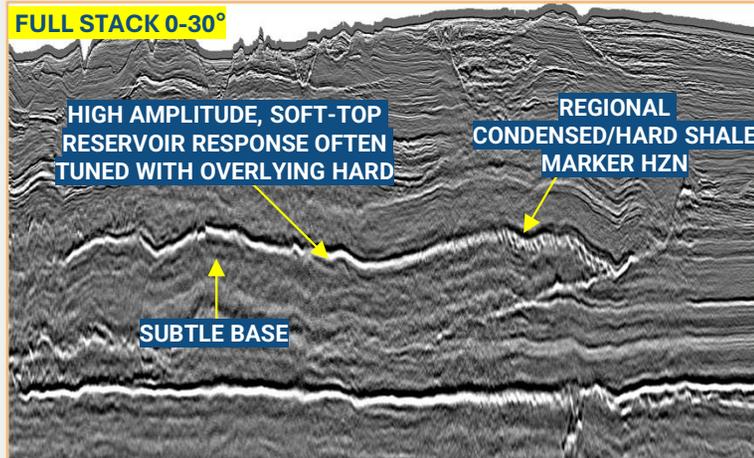
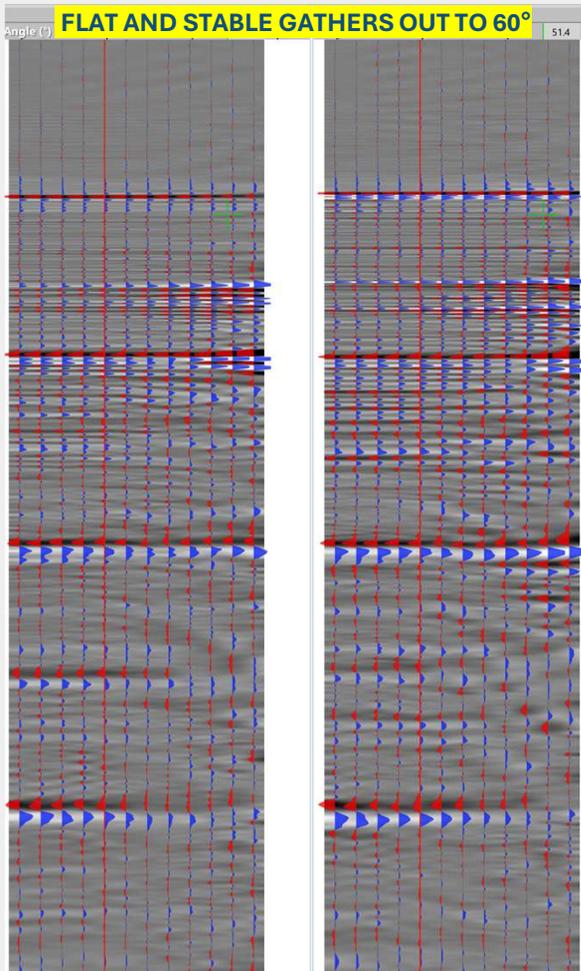
CORE WELL

# RESERVOIR PRESENCE AND REFLECTIVITY MODEL

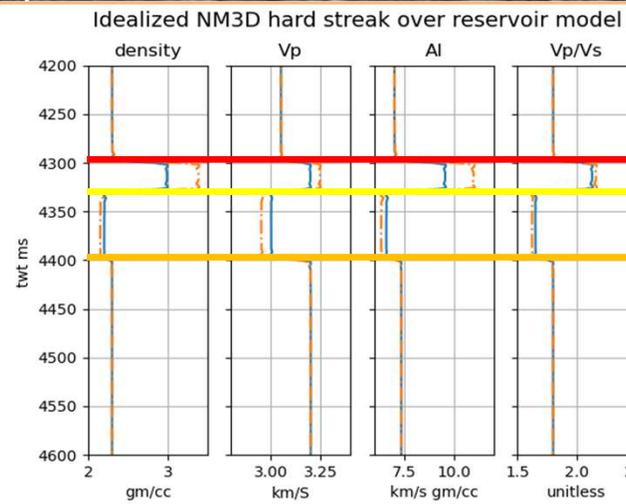
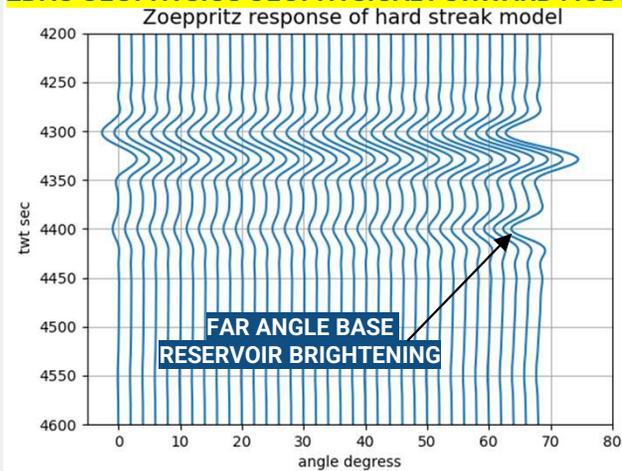
- HIGH IMPEDANCE 'HARD' EVENT INTERPRETED AS REGIONAL CONDENSED INTERVAL, AND:
- WHERE DEPOSITED, AN UNDERLYING SOFT RESERVOIR, CHARACTERISED BY WHITE-ON-BLACK REFLECTOR PAIRS AND INTERNAL DEPOSITIONAL GEOMETRIES.
- TOP RESERVOIR 'SOFT' IS GENERALLY HIGHER AMPLITUDE THAN THE OVERLYING HARD EVENT.
- BASE RESERVOIR OFTEN MORE SUBTLE THAN TOP ON FULL STACK.
- NEAREST WELL CONTROL 300KM NW. EXCELLENT SEISMIC DATA AND VELOCITY MODEL



# RESERVOIR PRESENCE AND REFLECTIVITY MODEL

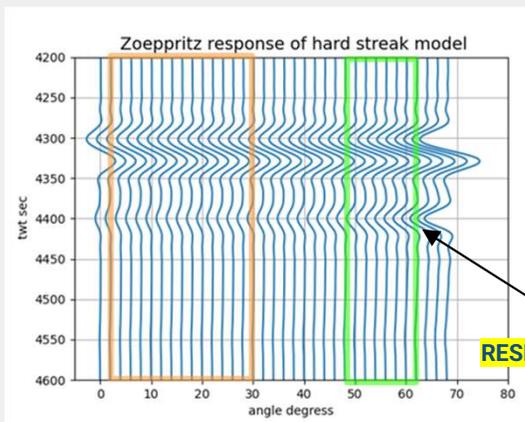
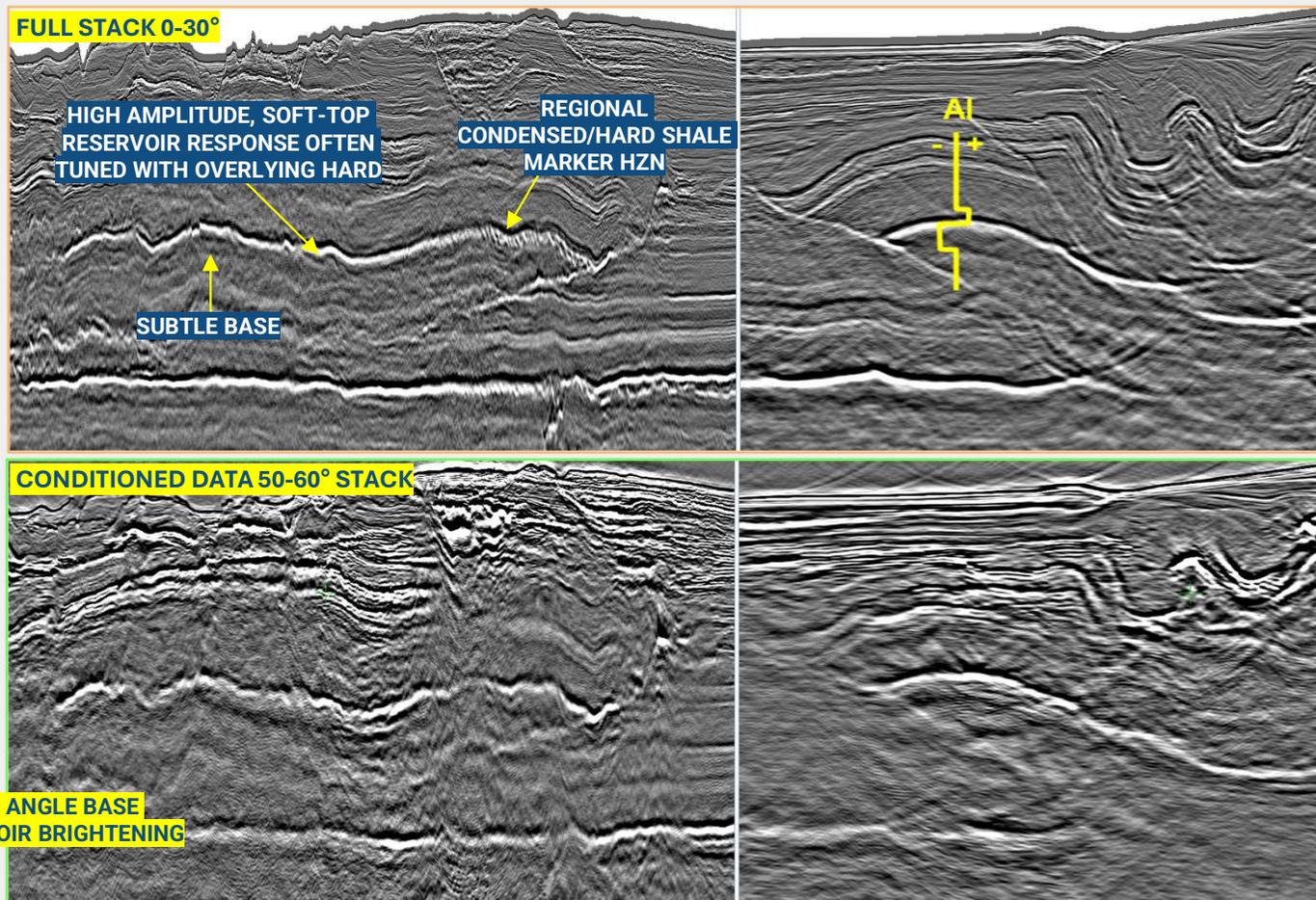


**ZDAC GEOPHYSICS GEOPHYSICAL FORWARD MODEL**



# RESERVOIR PRESENCE AND REFLECTIVITY MODEL: 0-30 ° VS 50-60 °

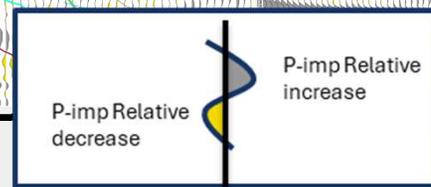
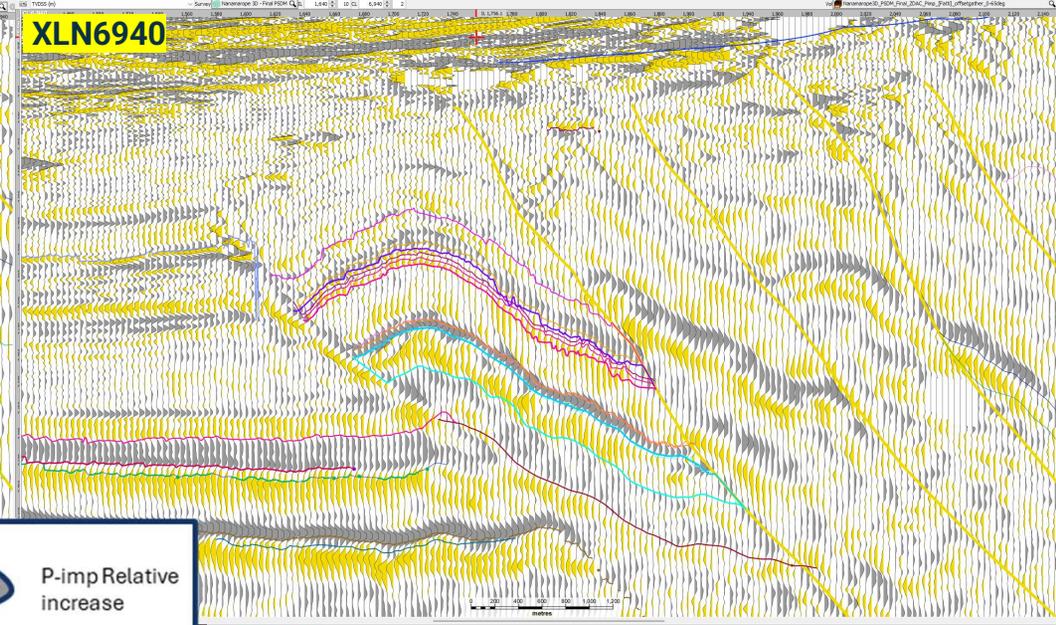
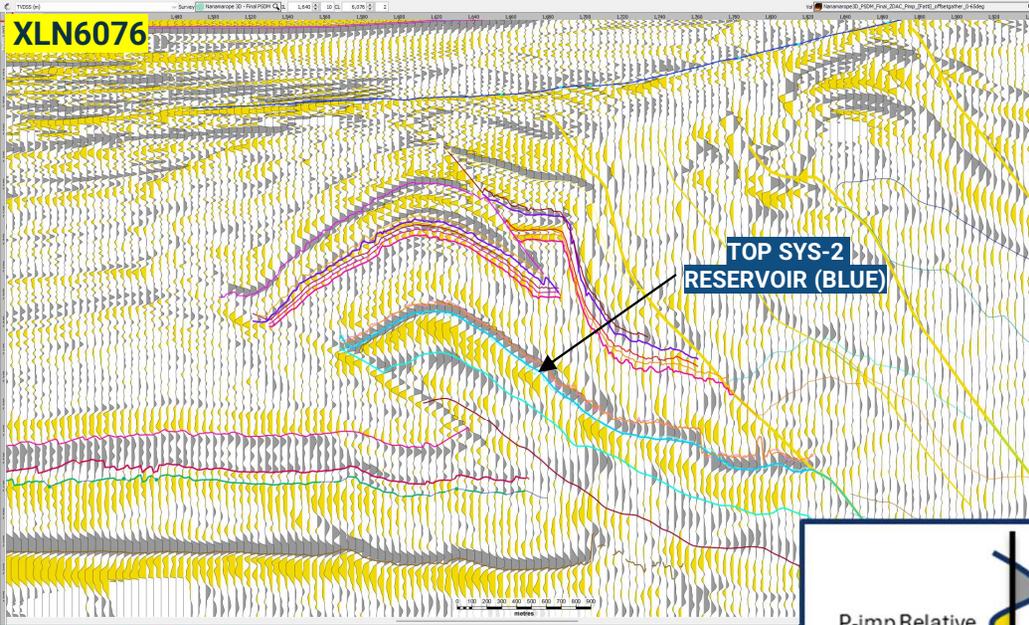
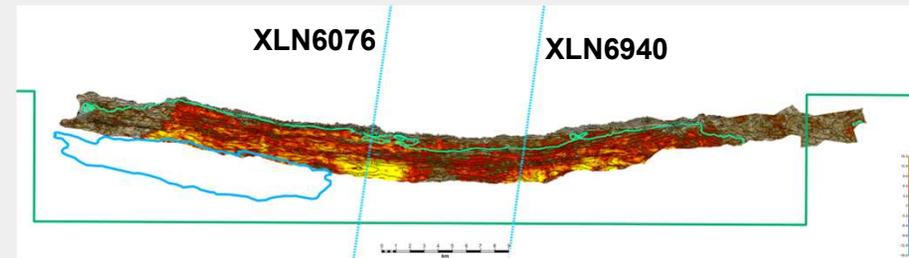
- BASE RESERVOIR MORE VISIBLE AND MAIN RESERVOIR STANDS OUT ON 50-60DEG STACK.



# RESERVOIR PRESENCE: ZDAC INVERSION - RELATIVE P-IMPEDANCE



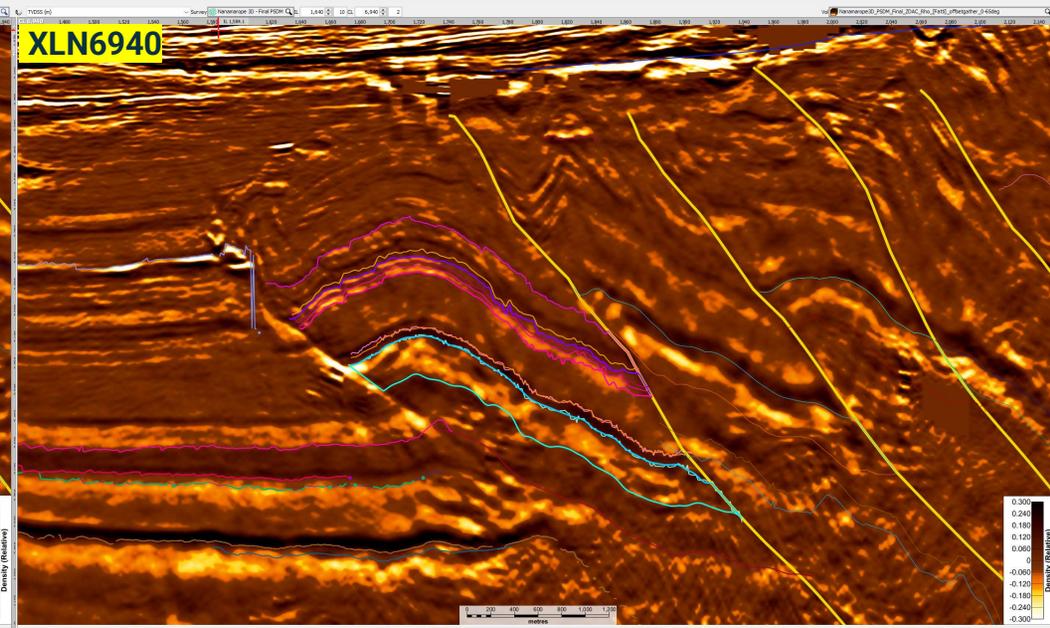
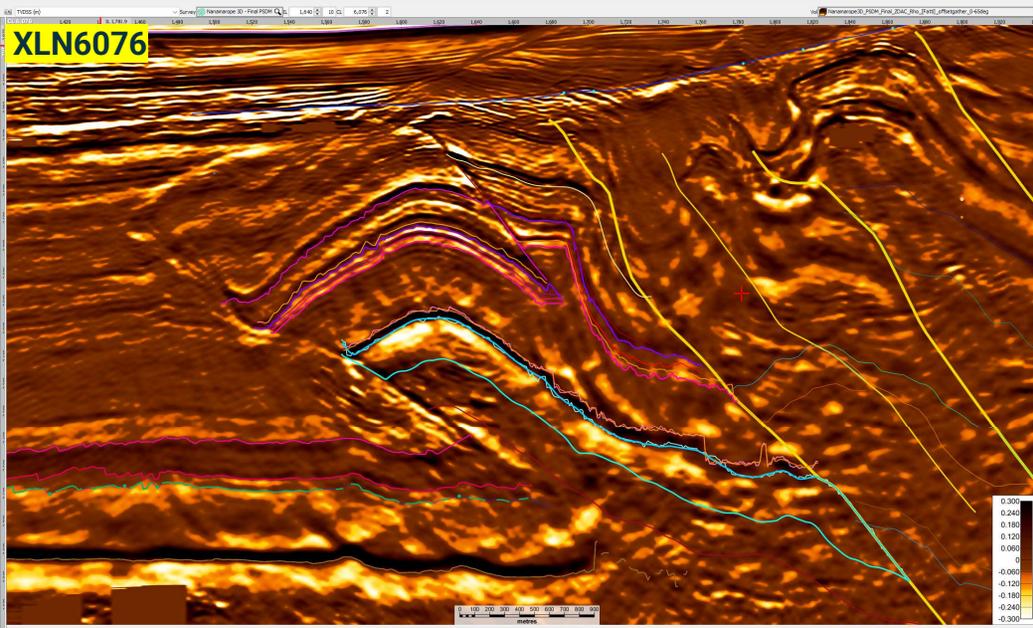
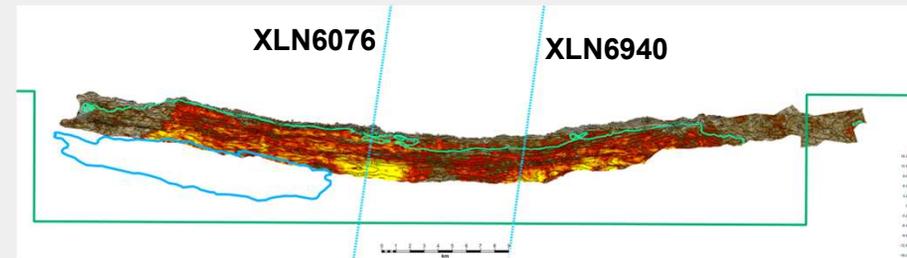
- SYS-2 RESERVOIR SHOWS A BROAD, RELATIVELY LOW IMPEDANCE INTERVAL BELOW A THIN, HIGH-IMPEDANCE STREAK.
- BASE RESERVOIR EVENT CLEAR IN CREST



# RESERVOIR PRESENCE & quality : ZDAC INVERSION - RELATIVE DENSITY (RHO)



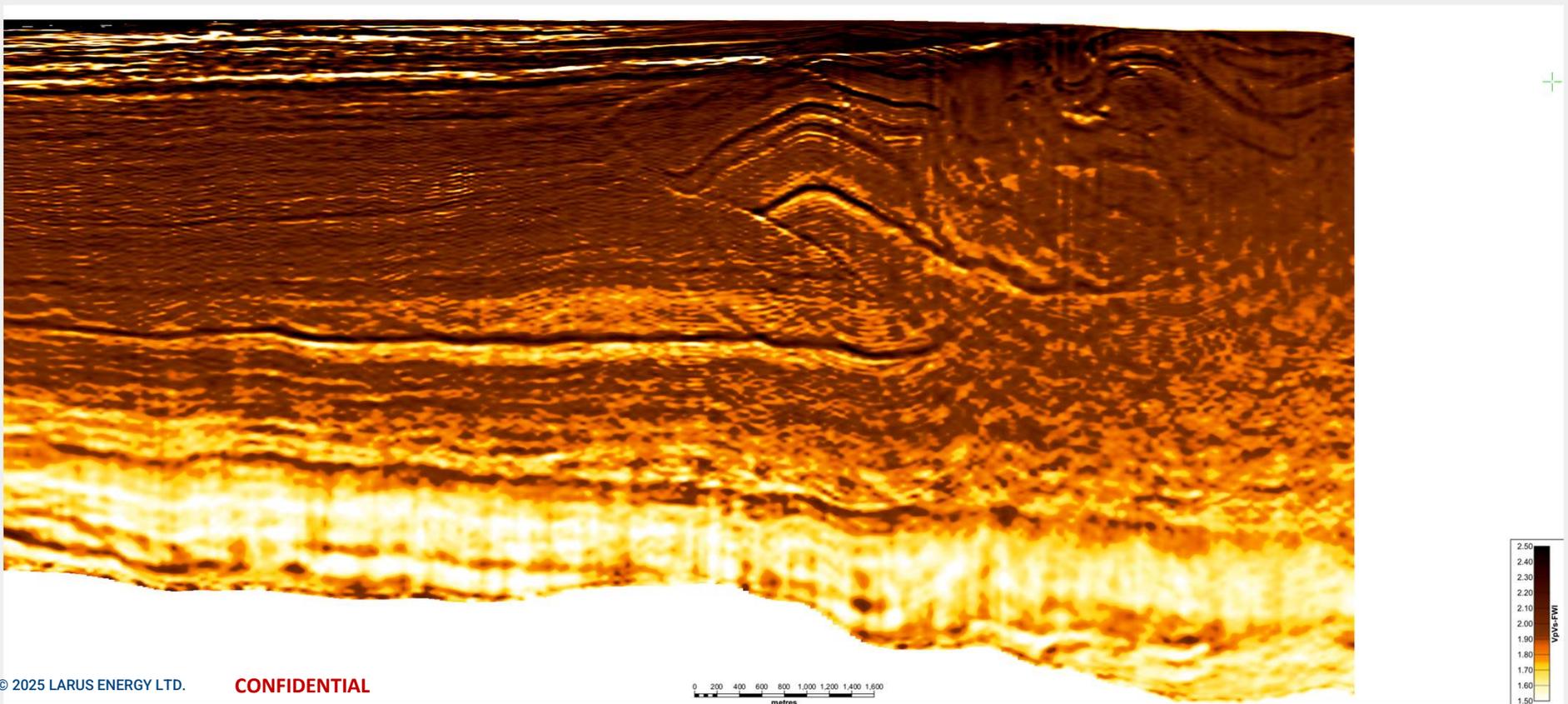
- SYS-3, 2 AND 1 INTERPRETED SANDS ALL SHOWING LOW DENSITY
- GOOD MATCH BETWEEN SYS-2 GROSS RESERVOIR AND DENSITY RESPONSE.
- LOWEST RELATIVE DENSITY VALUES CORRESPOND WITH SPILL/LEAK POINT.



**Low-AI, low-density inversion results support Larus' sandy contourite model for porous sheet sands +/- hydrocarbons below a thin, high-impedance streak**

## RESERVOIR PRESENCE & QUALITY: $V_p/V_s$ – FWI INVERSION

- VP/VS OUTPUTS NOISEY ON DETERMINISTIC INVERSION PRODUCTS
- EXPERIMENTAL ELASTIC FWI INVERSION IN PROGRESS (TAU-P DOMAIN, REMOVES NMO STRETCH, )
- PRELIMINARY TEST LINE SHOWING IMPROVEMENT IN VP/VS RATIO STABILITY
- SYSTEM 2 RESERVOIR SHOWING LOW VP/VS VALUES (CONSISTENT WITH AI AND RHO) WITH MUCH LESS NOISE THAN PREVIOUS OUTPUTS



# CHARGE - AMPLITUDE



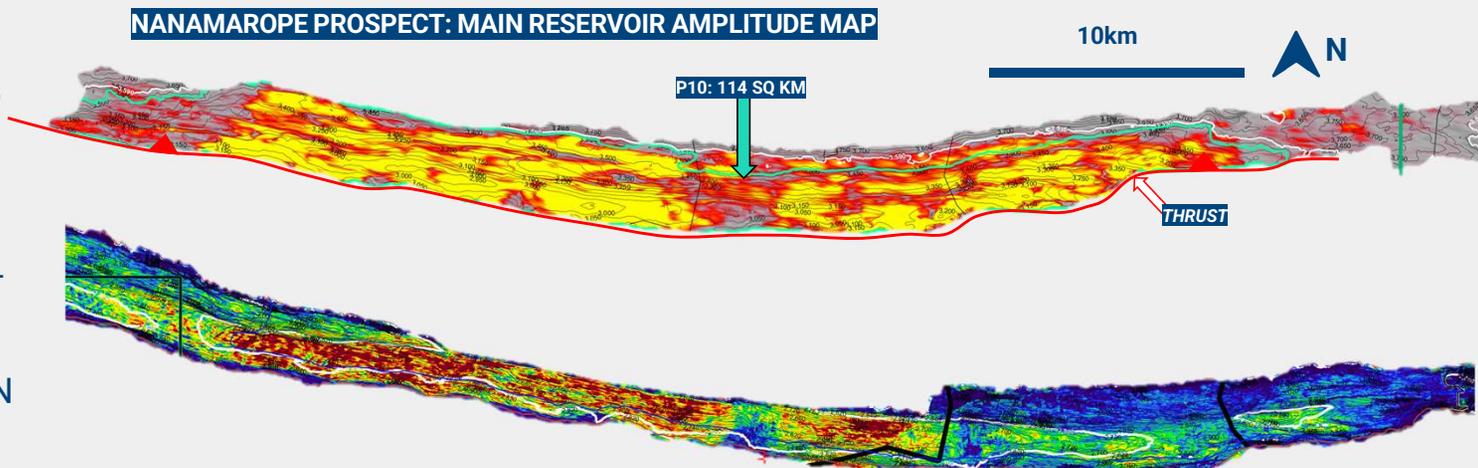
## SEISMIC-HYDROCARBON-INDICATORS DERISK CHARGE TO THE NANAMAROPE PROSPECT:

OVERALL BRIGHTENING WITH CONFORMANCE TO STRUCTURAL SPILL/LEAK POINTS

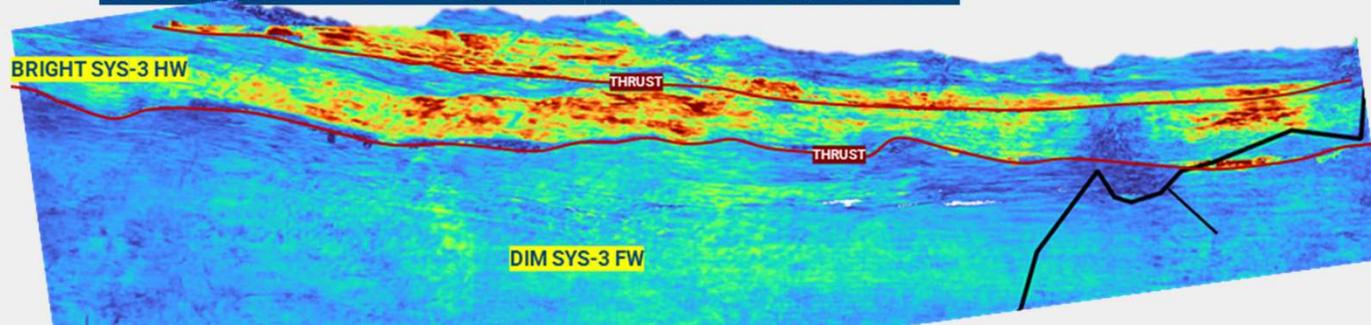
FLAT GRADIENTS AND VARIATION IN INTERCEPT BEHAVIOUR RESULTS IN BRIGHTSPOTS RATHER THAN STRONG AVO

REALISATION THAT U-FAR AVA BEHAVIOUR (CURVATURE) COULD BE USED TO DERISK RESERVOIR POROSITY AND SEPARATE FLUID RESPONSE.

NANAMAROPE PROSPECT: MAIN RESERVOIR AMPLITUDE MAP

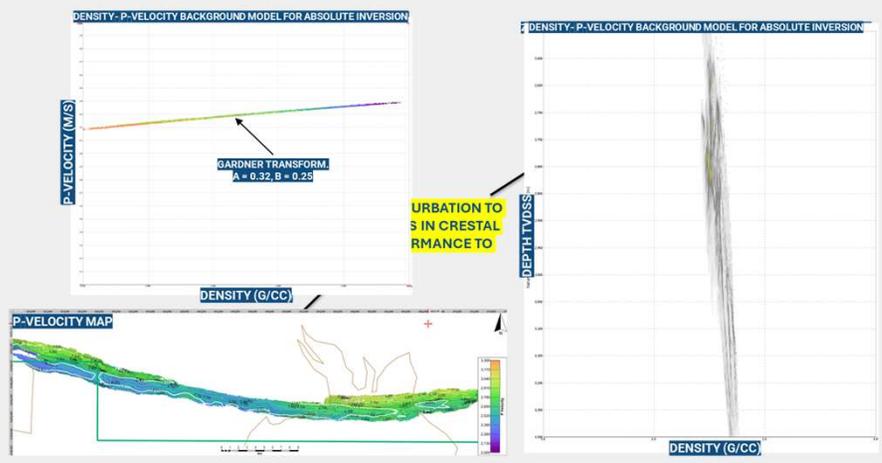


SYSTEM-3 RESERVOIR AMPLITUDE MAP – HANGINGWALL TRAPS VS FW



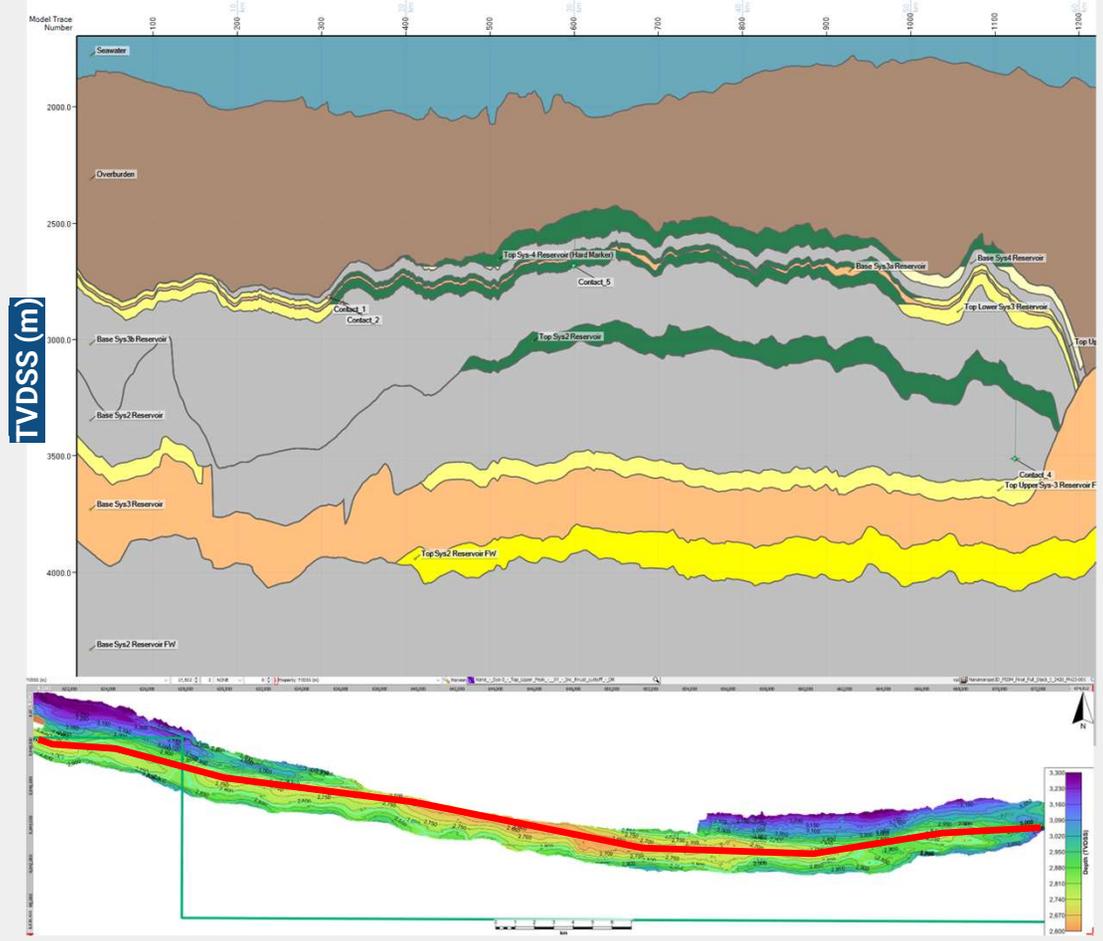
# DENSITY FORWARD MODELLING

COMFORMABLE AND ANOMALOUSLY LOW DENSITIES OBSERVED IN RESERVOIRS THAT COULD INDICATE THE PRESENCE OF HYDROCARBONS



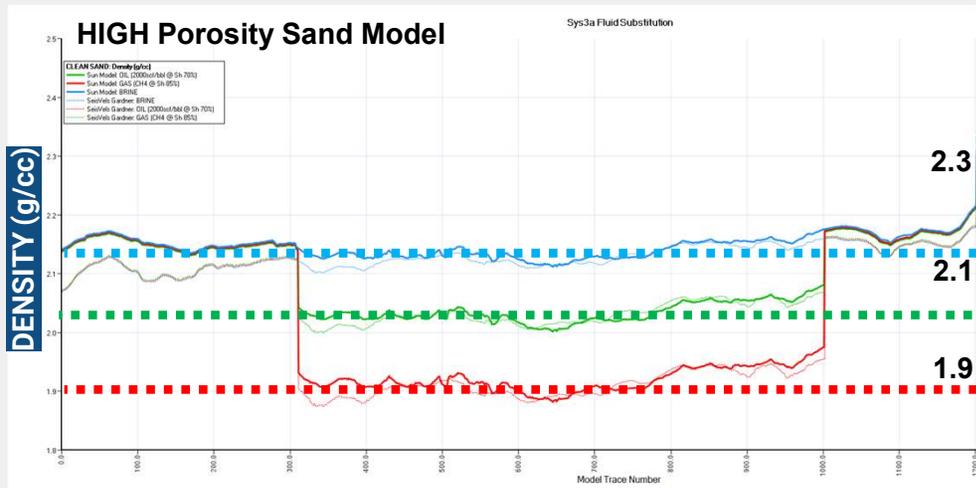
OBJECTIVE: MODEL THE DENSITIES WE SHOULD EXPECT FOR SANDS AT THESE BURIAL DEPTHS, WITH BRINE, OIL OR GAS FILL AND COMPARE TO THE ZDAC ABSOLUTE RHO ATTRIBUTE TO DETERMINE LIKELIHOOD OF HYDROCARBON PORE FILL

## LAYER MODEL WITH INTERPRETED OIL CONTACTS (DEPTH)

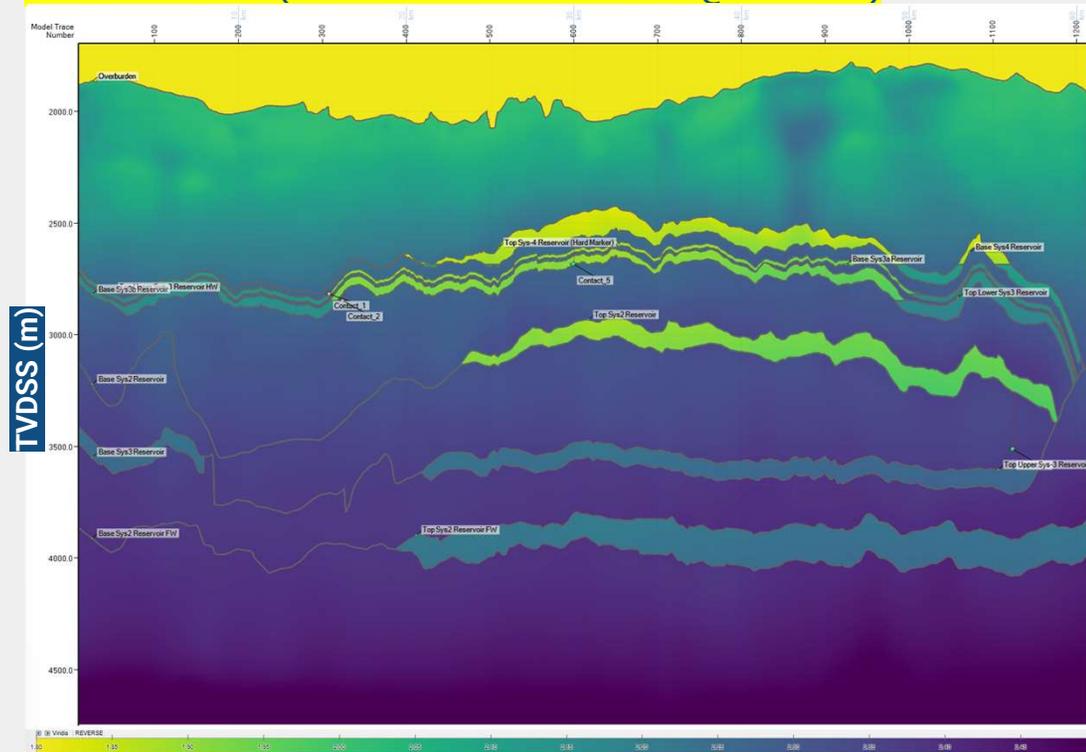


# FLUID SUBSTITUTION EFFECTS ON DENSITY - HIGH POROSITY SAND MODEL

- HIGH POROSITY BRINE SAND DENSITY = 2.15G/CC
- ADDING 2000SCF/BBL OIL REDUCES MODELLED DENSITIES FROM ~2.15 TO ~2.05G/CC
- ADDING METHANE @ SH = 85% FURTHER DROPS DENSITIES TO BELOW 2G/CC

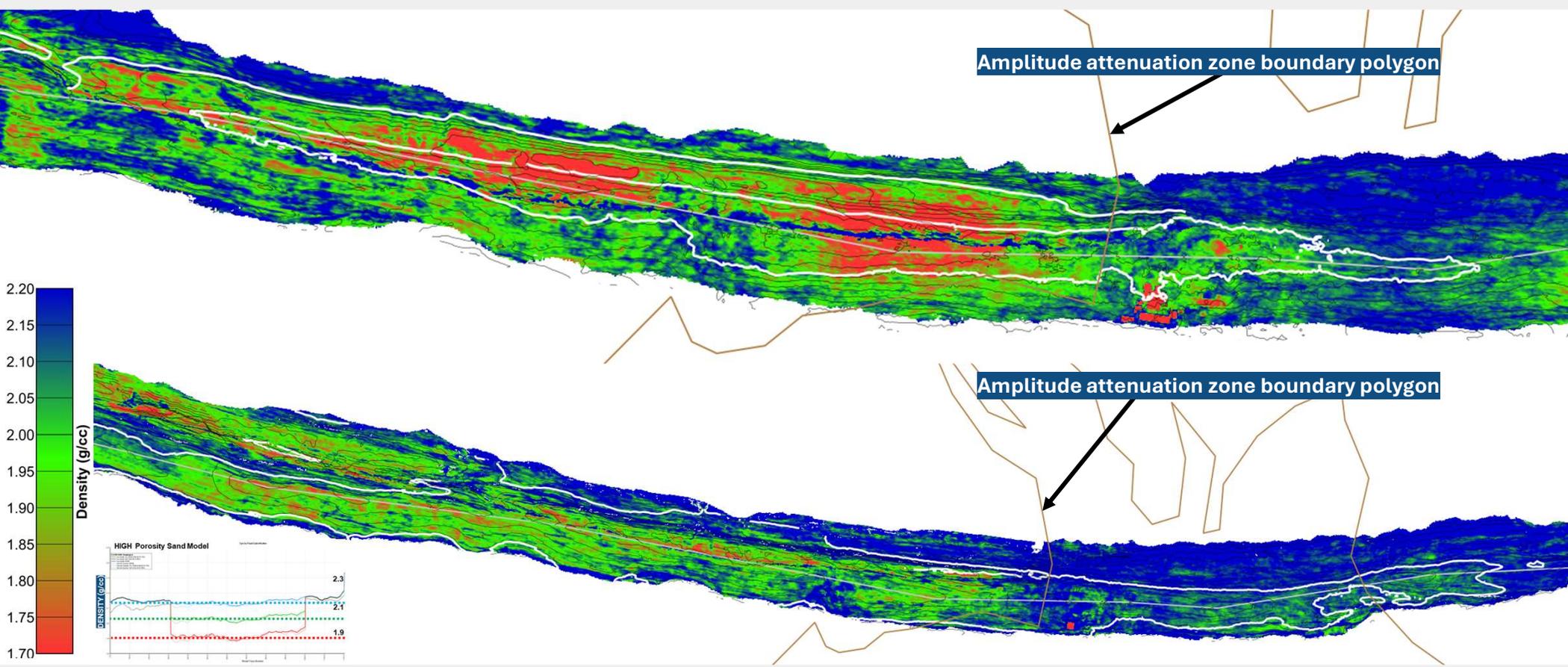


## DENSITY MODEL (HIGH POROSITY SAND GAS @ Sh = 85%)



**Conclusion: Densities around 2.05g/cc or less could indicate oil or gas fill in sys-4 and sys-3 reservoirs**

# ZDAC INVERSION: ABSOLUTE DENSITY EXAMPLES



**LOW DENSITIES FIRMLY WITHIN RANGE FOR HYDROCARBONS WITH CONFORMANCE TO STRUCTURE DERISKING CHARGE**

# PPL579 – OPPORTUNITY SUMMARY

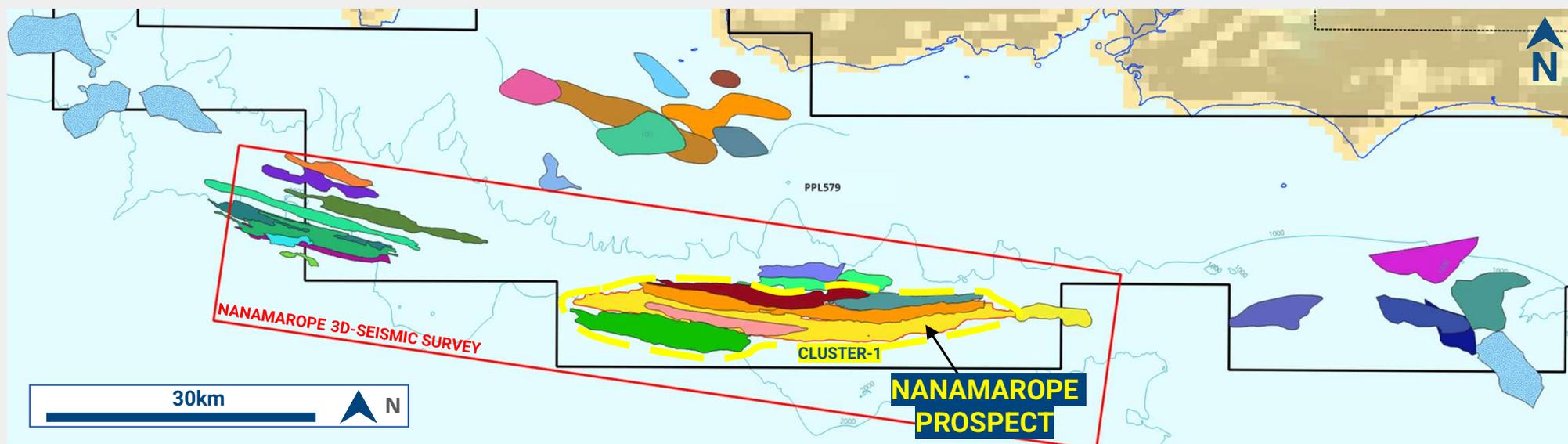


MULTI-PLAY CAPTURING, **5.6 BILLION-BARREL** PORTFOLIO

SIGNIFICANT RESOURCE DEFINED IN 3D SEISMIC DATASET - WITH FURTHER VALUE ADDITION POTENTIAL WITH ONGOING MAPPING

**STRATIGRAPHIC AND STRUCTURAL CONFIGURATION RESULTS IN CLOSE-PROXIMITY PROSPECTS AND CLUSTERED RESOURCE POTENTIAL**

THE NANAMAROPE PROSPECT IS THE CLEAR FRONTRUNNER (1,785 MMBBLS\*). DISCOVERY DERISKS A LARGE PORTFOLIO OF LOOKALIKE PROSPECTS



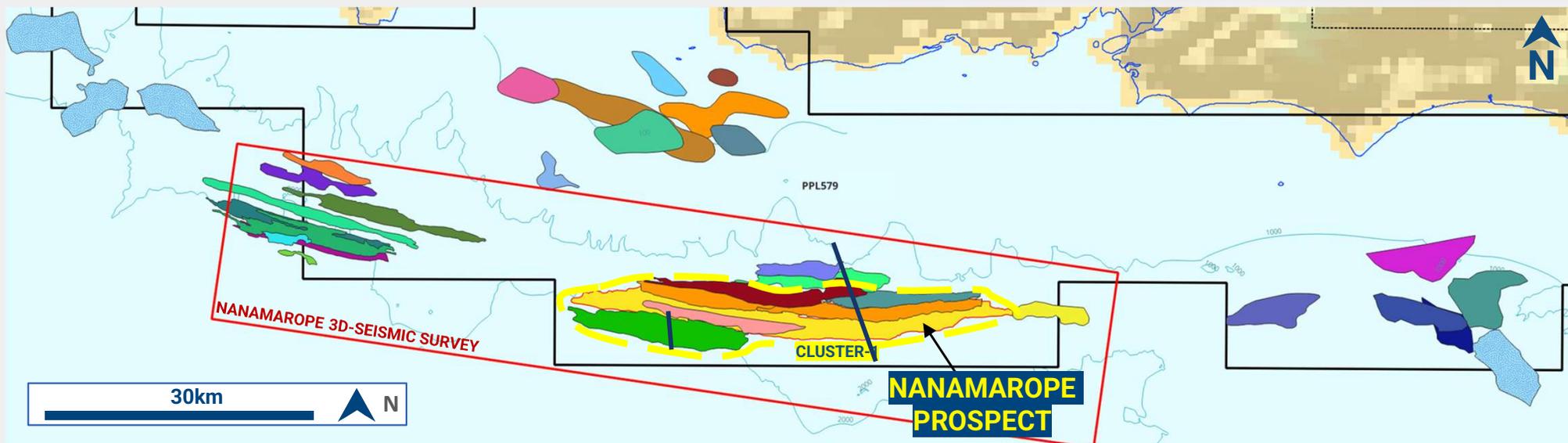
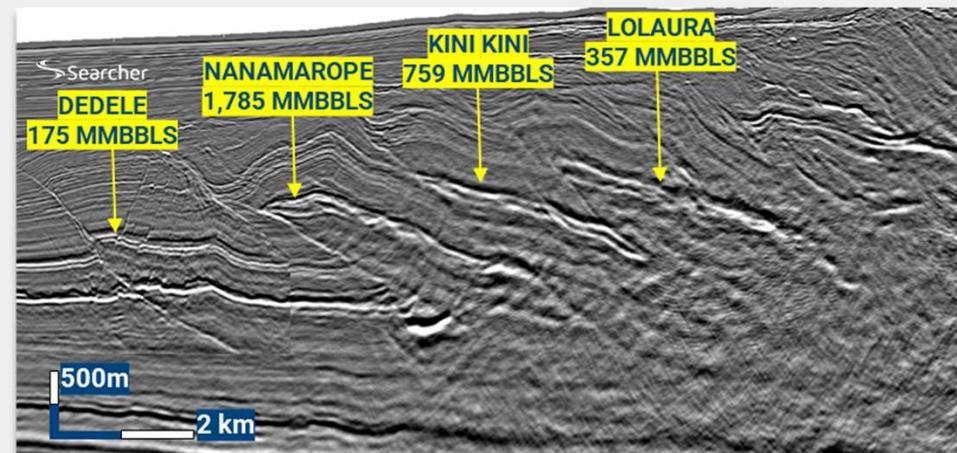
# PPL579 – OPPORTUNITY SUMMARY

MULTI-PLAY CAPTURING, 5.6 BILLION-BARREL PORTFOLIO

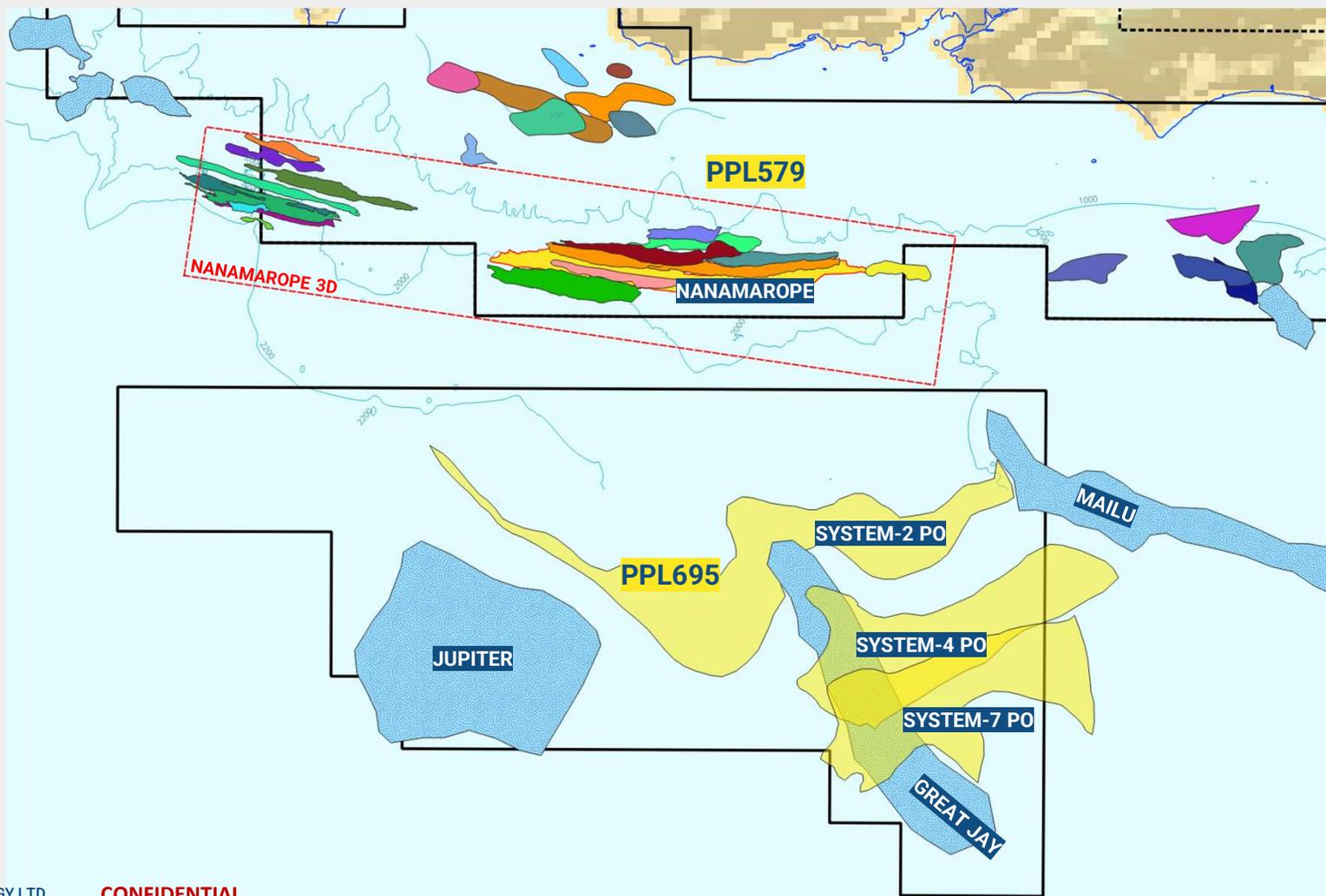
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# PROSPECT PORTFOLIO SUMMARY



# CHARGE, MIGRATION & DEEP WATER CHEMOSYNTHETIC REEFS



**IMILIA LIGHT OIL SEEP ANALYSIS**

- Light oil, thermogenic origin, from source rocks in peak oil window
- Low biodegradation, indicating active replenishment.
- Typed to Late Cretaceous - Paleogene source rocks.
- Similar SR as: Elk Antelope, Bujon-1, Subu wells & Aure scarp seeps, extending source fairway >500km to SE PNG.

