New insights into the exploration potential of the Plio-Pleistocene foreland basin of NE Seram



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Lion Energy Ltd

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View across Bula Bay towards Bula township / Bula Field

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Prospective Resources

Prospective Resources are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects. Prospective Resources have both an associated chance of geologic discovery and a chance of development. Prospective Resources are further categorized in accordance with the range of uncertainty associated with recoverable estimates, assuming discovery and development, and may be sub-classified based on project maturity. Further exploration, appraisal and evaluation is required to determine the existence of a significant quantity of potentially moveable hydrocarbons.

Competent Persons Statement: Qualified Petroleum Reserves and Resources Evaluator

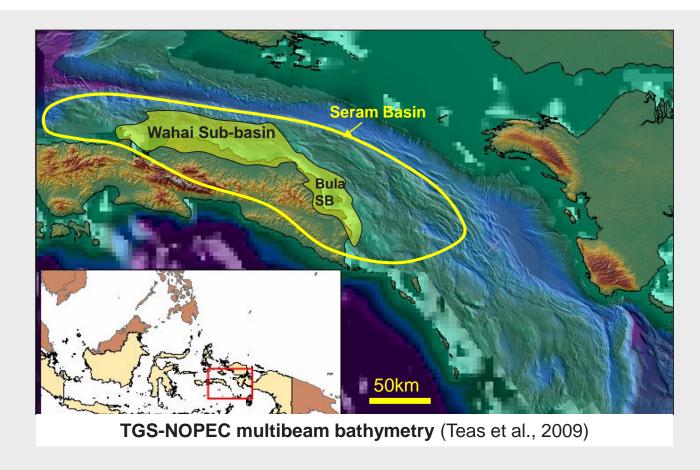
Pursuant to the requirements of the ASX Listing Rules Chapter 5, the technical information, reserve and resource reporting provided in this presentation are based on and fairly represent information and supporting documentation that has been prepared and/or compiled by Mr Kim Morrison, Exploration Manager of Lion Energy Limited. Mr Morrison holds a B.Sc. (Hons) in Geology and Geophysics from the University of Sydney and has over 30 years' experience in exploration, appraisal and development of oil and gas resources - including evaluating petroleum reserves and resources. Mr Morrison has reviewed the results, procedures and data contained in this website. Mr Morrison consents to the release of this report and to the inclusion of the matters based on the information in the form and context in which it appears. Mr Morrison is a member of AAPG.

Conversion from gas volume to barrels of oil equivalent (BOE) in this document is based a BOE conversion ratio of 6 mcf:1 bbl.

Presentation Outline



- *Introduction
- ⋆Plio-Pleistocene play
 - *Tectonic setting
 - ★Petroleum system
 - **★**Exploration to date
 - **★**New marine seismic
 - *Results
- *Conclusions

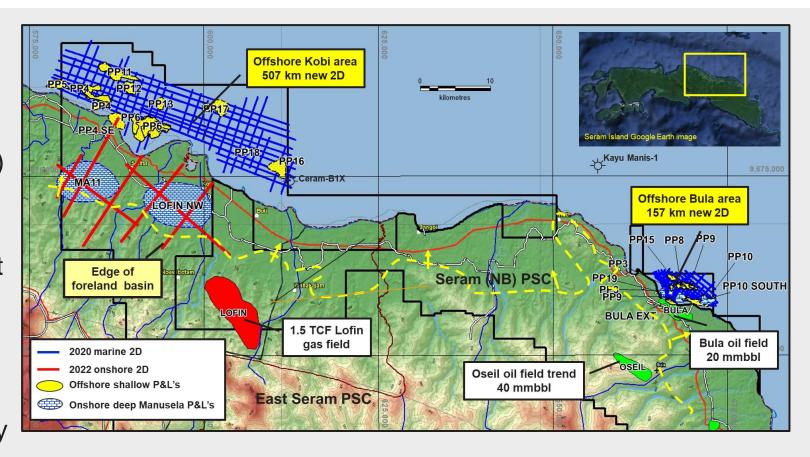


Introduction



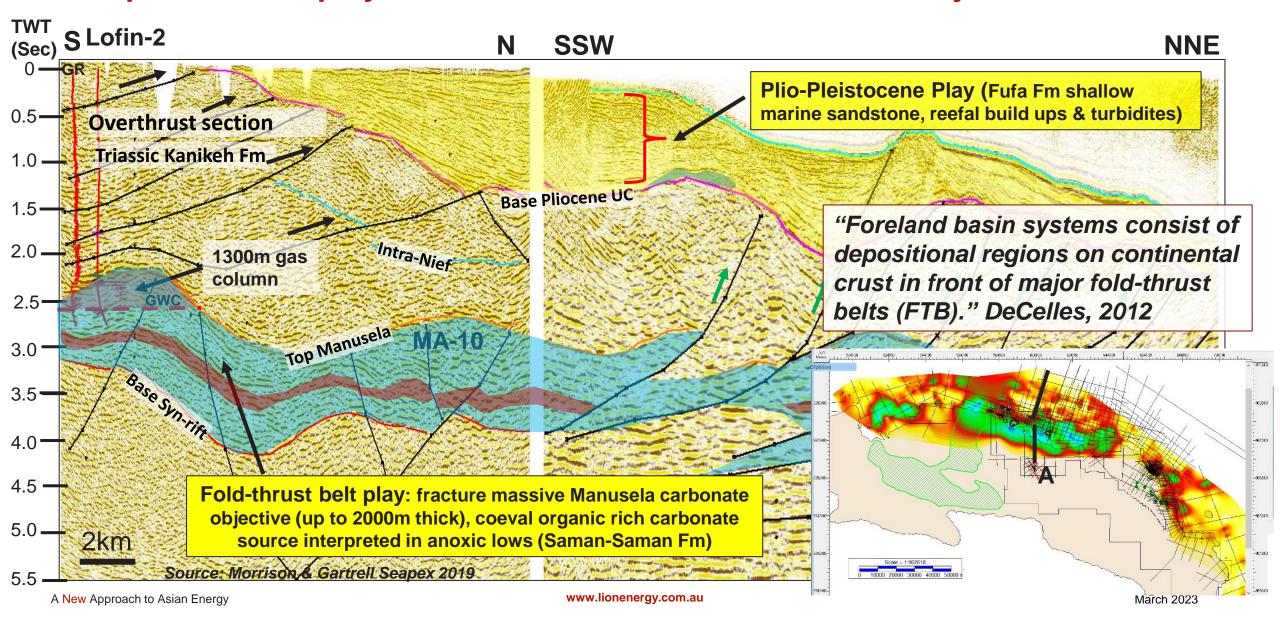
New data has significantly improved understanding of the underexplored Seram basin

- ★ Lion Energy Operator of East Seram PSC (60%) & 2.5% interest in Seram (NB) PSC
- ★ Involved in Seram since 2000 (previous operator of Bula Field)
- ★ Active East Seram PSC program since signed in 2018
- ★ 664km high-res 2D seismic shot in 2020 (5-600m WD) resulting in new prospects in shallow Plio-Pleistocene section
- ★ Just completed 200km onshore 2D & 1000 station gravity survey targeting deep fold belt structures



East Seram contains two main plays: Plio-Pleistocene foreland basin & deeper fold belt play with massive Manusela carbonate objective

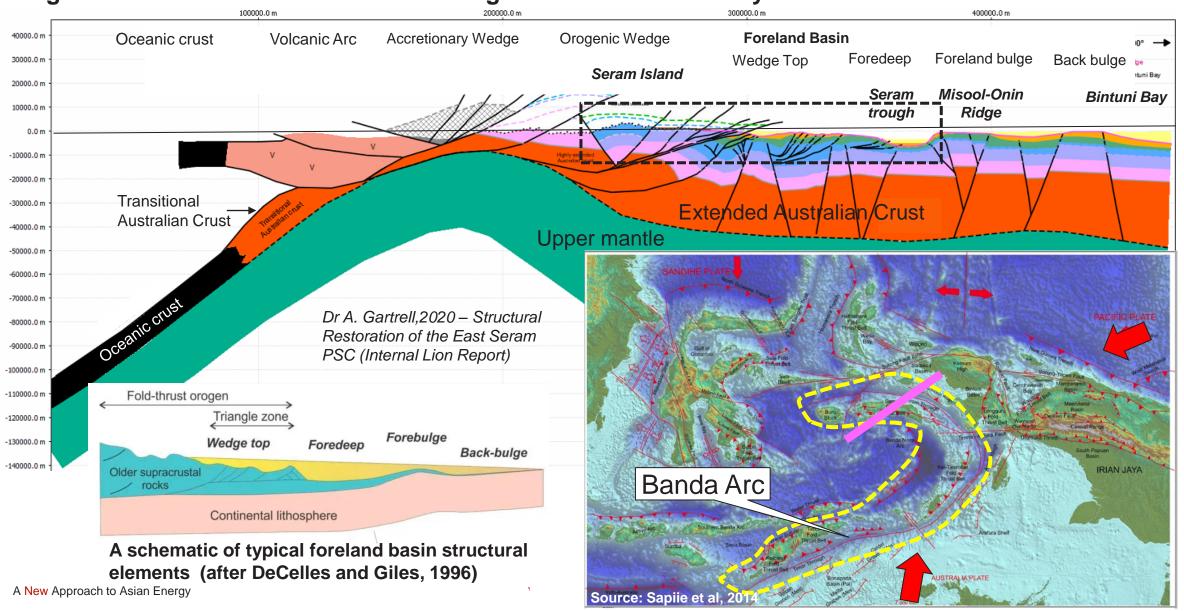




Convergence along Banda Arc with extended Australian plate created Seram FTB & conditions for foreland basin development



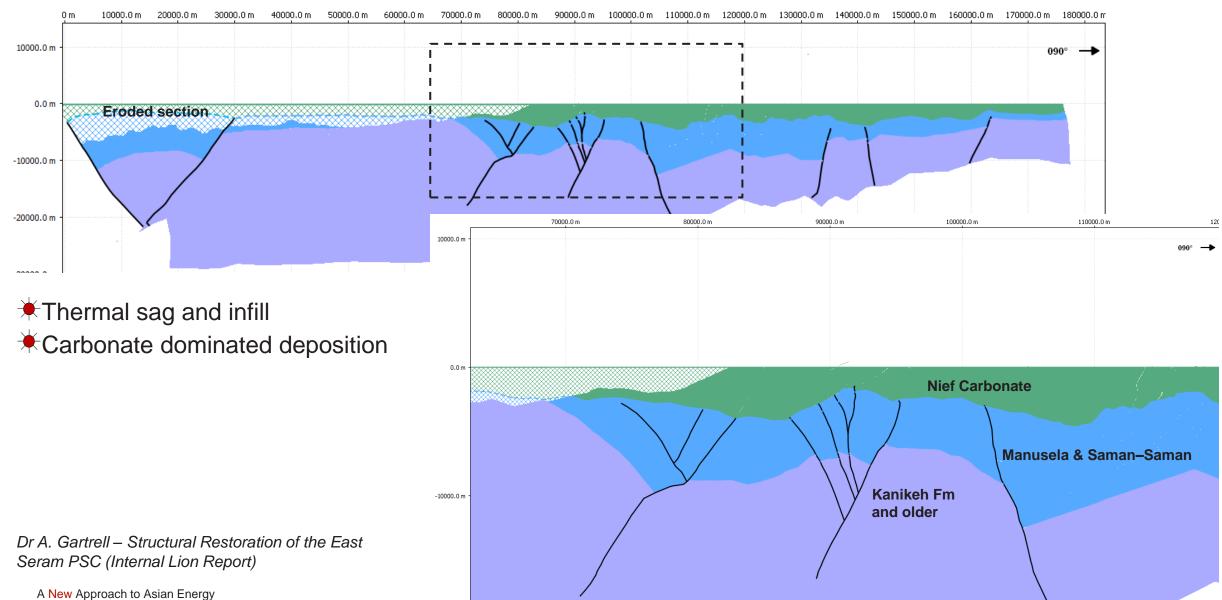
Regional SW-NE schematic section through Seram shows the key tectonic elements



Early Cretaceous to Late Miocene

Passive margin Australian plate deposition

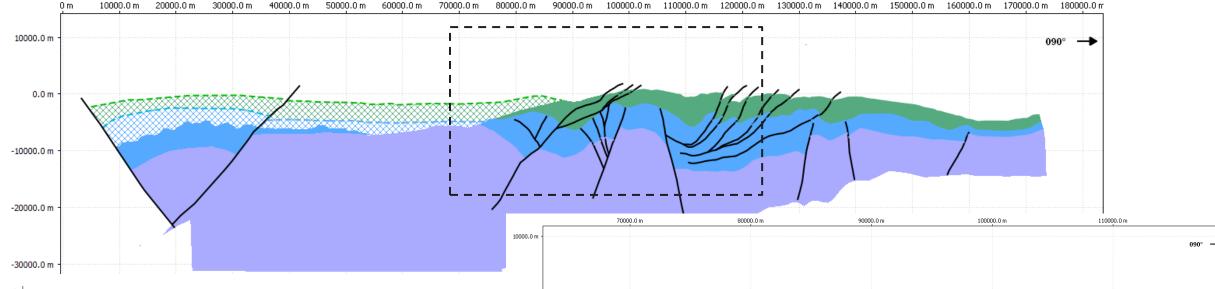




Late Miocene

Collision phase



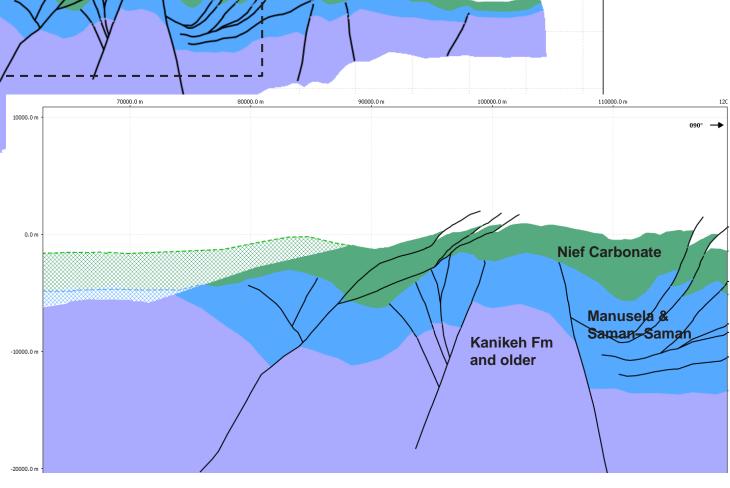


★Initial stages of collision between Australia and Banda Arc micro-continents

- ★Probably related to entry of transitional crust in to collision zone
- Reactivation of inversion structures and initiation of fold-thrust structures
- *Formation of foreland basin with synclinal sub-basins

Dr A. Gartrell – Structural Restoration of the East Seram PSC (Internal Lion Report)

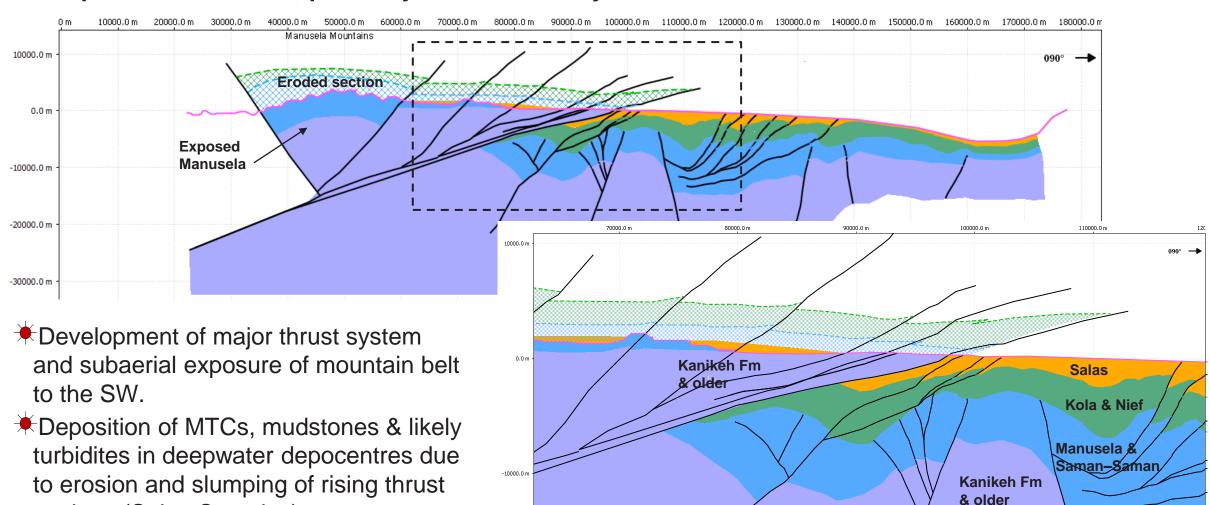
A New Approach to Asian Energy



Early Pliocene

LICN

2nd phase of collision, probably related to entry of continental crust into collision zone



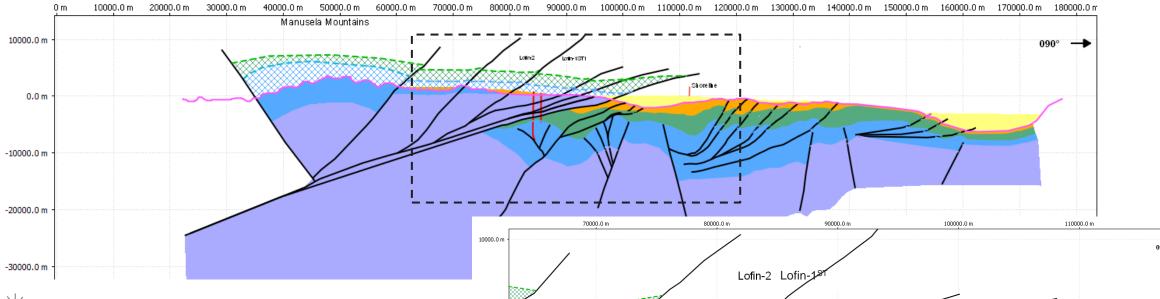
Dr A. Gartrell – Structural Restoration of the East Seram PSC (Internal Lion Report)

wedges (Salas Complex)

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Late Pliocene to Present

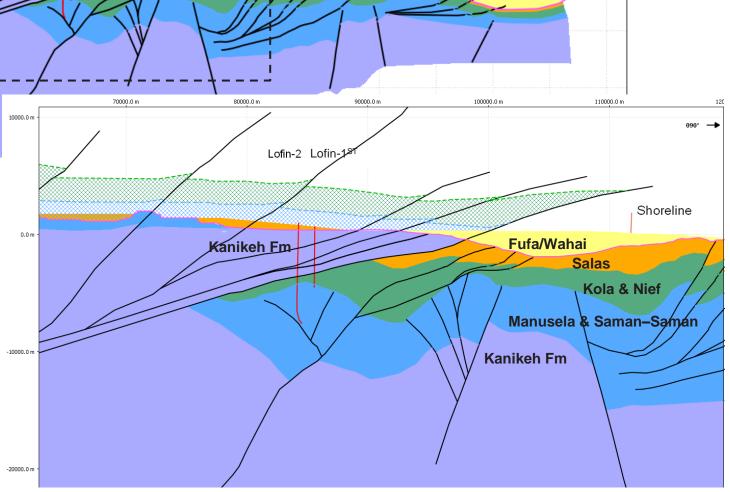
Ongoing collision



- **★**Uplift of mountain belt
- ★ Deposition of prograding shallow marine shelf margin
- ★Development of delta-top growth faults
- Carbonates on highs removed from main sediment input
- **★MTCs & turbidites deposition in** deepwater

Dr A. Gartrell - Structural Restoration of the East

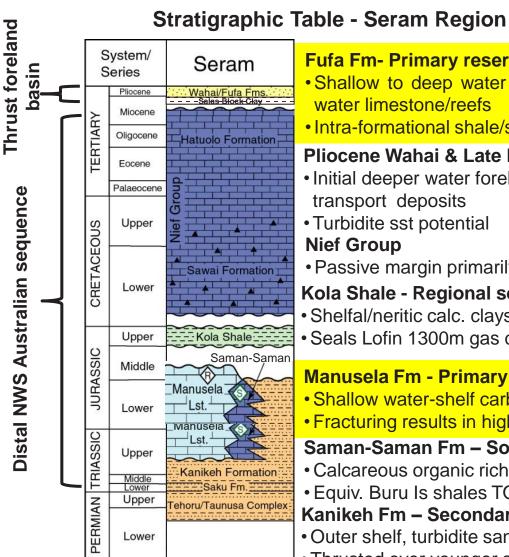
Seram PSC (Internal Lion Report) A New Approach to Asian Energy



Seram Island stratigraphy



Initial chaotic fill in foreland basin, followed by progradation Plio-Pleistocene section



Fufa Fm- Primary reservoir

- Shallow to deep water sandstone & shallow water limestone/reefs
- Intra-formational shale/siltstone seal

Pliocene Wahai & Late Miocene Salas

- Initial deeper water foreland basin fill, mass transport deposits
- Turbidite sst potential

Nief Group

Passive margin primarily carbonates

Kola Shale - Regional seal

- Shelfal/neritic calc. claystone & siltstone
- Seals Lofin 1300m gas column

Manusela Fm - Primary reservoir

- Shallow water-shelf carbonate,
- Fracturing results in high flow rates

Saman-Saman Fm - Source

- Calcareous organic rich shales, marl
- Equiv. Buru Is shales TOC to 16% HI 540

Kanikeh Fm – Secondary objective

- Outer shelf, turbidite sandstone, siltstone & shale
- Thrusted over younger stratigraphy in places



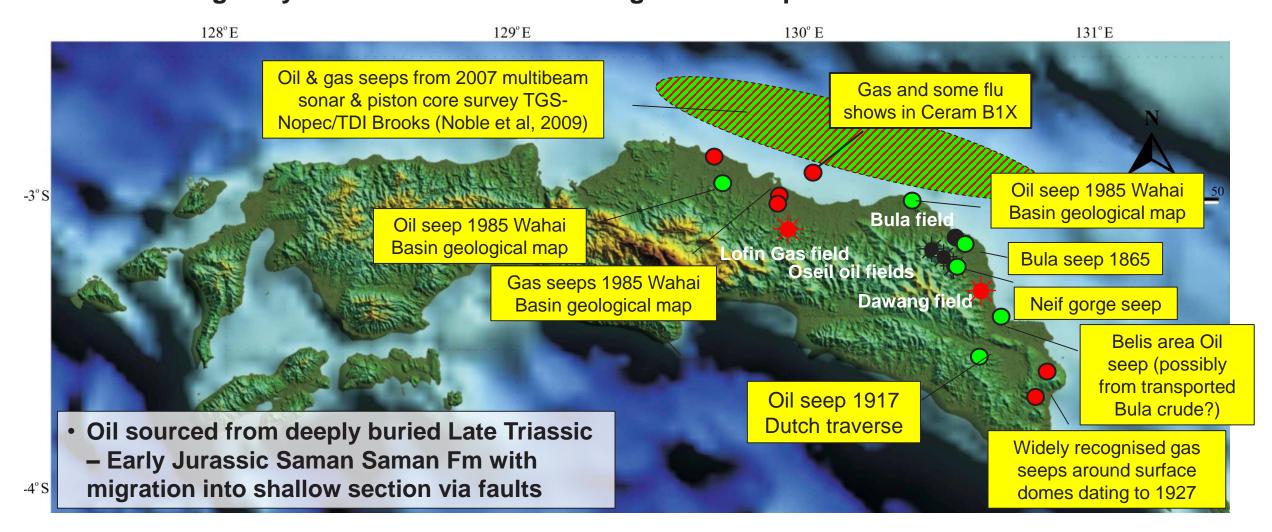
(after Charlton, 2004; also Kemp et al. 1996) A New Approach to Asian Energy

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Numerous oil and gas seeps onshore & offshore east Seram



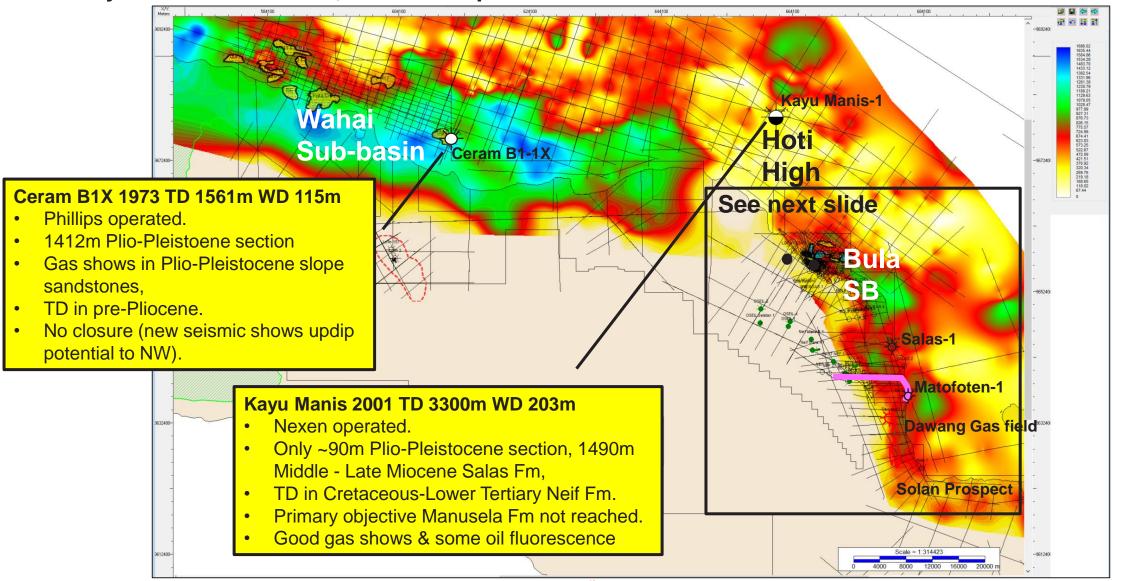
Active ongoing oil & gas generation driven by over-thrusting Bula Field originally discovered in 1897 drilling near a seep documented in 1865



Plio-Pleistocene Isopach Map



- Clear separation of Wahai & Bula sub-basins, thickest section in underexplored Wahai SB
- Only two offshore wells, onshore exploration focussed in eastern Bula Sub-basin area



Plio-Pleistocene discoveries all in eastern area

~20 mmbbl oil produced to date almost all from Bula field area



57X-1 well (1971) G&W 55' porous oil filled Pleistocene reef carbonate reservoirs of the Lemun Oilfield

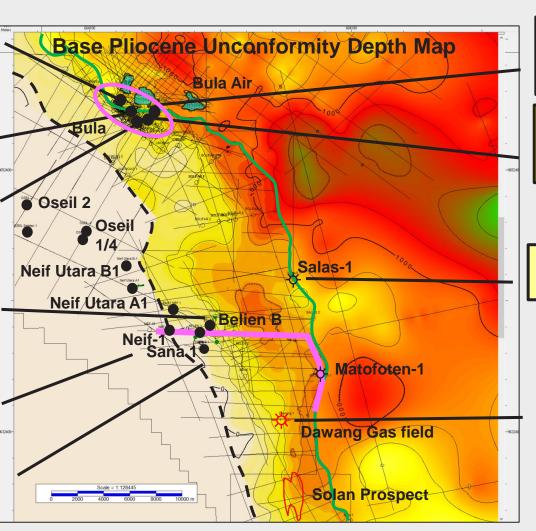
Bula Lemun 1 (1925) Offshore (tidal) part of Bula developed in 1930 with significant increase in production

Bula 2 (1897) Oil discovery 200bopd. Original resource 25mmbbl¹, ~20 mmbbl produced

Belien 2 (1921) TD 457m ~25bopd (15 API) 1925 to 1930 from Triassic Kanikeh (Resource 0.3 mmbbl) Minor Pleistocene production

Neif 1 (1913) TD 749m. (Original resource <0.1 mmbbl)

Sana 1 (1983) Swabbed oil on test (Resource est. 0.01 mmbbl)



8S-18 Bula Air Field* (1989) unfaulted anticline first identified on 1981 seismic, minor gas cap

Kampung Denser Field (1987) Small field (12,000 bbl from 1989-2001). inferred fault separation from Bula field

Salas 1 (1971) Shallow gas pocket encountered

Dawang -1 (2008) TD 2390m ,10 bcf gas discovery (3C, D&M)

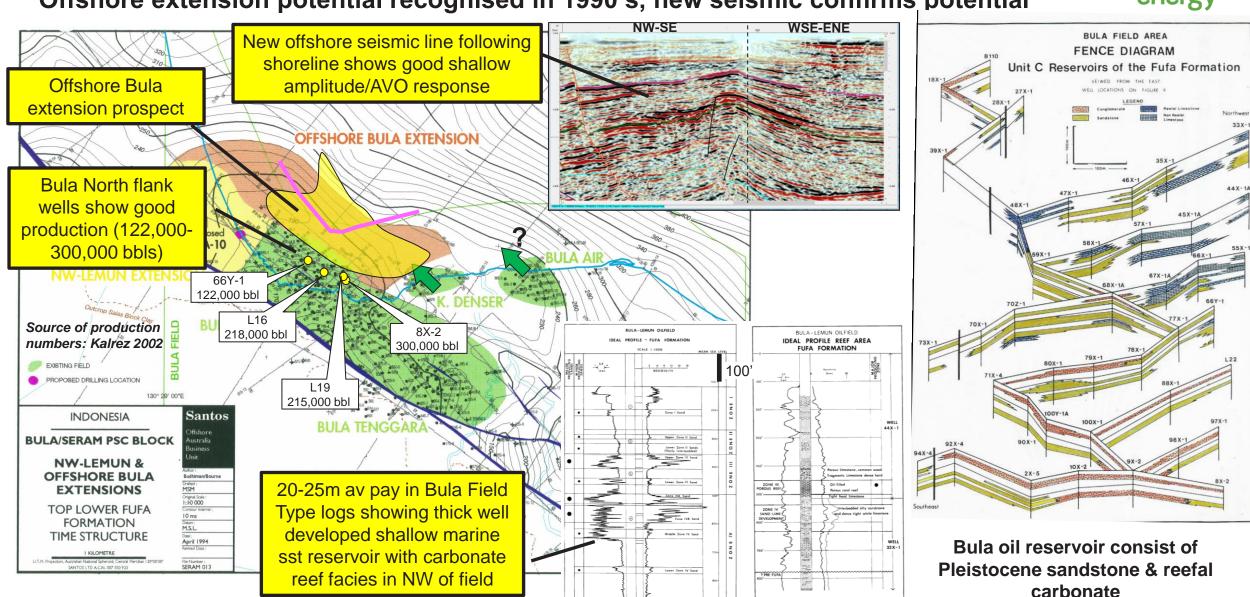
¹ Resource estimate includes Bula, Bula Tengarra (Fufa sst), Bula Lemun (sst & Imst, Kampung Denser and Bula Air fields

Bula Field 1897 discovery ~20mmbbl produced

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Offshore extension potential recognised in 1990's, new seismic confirms potential

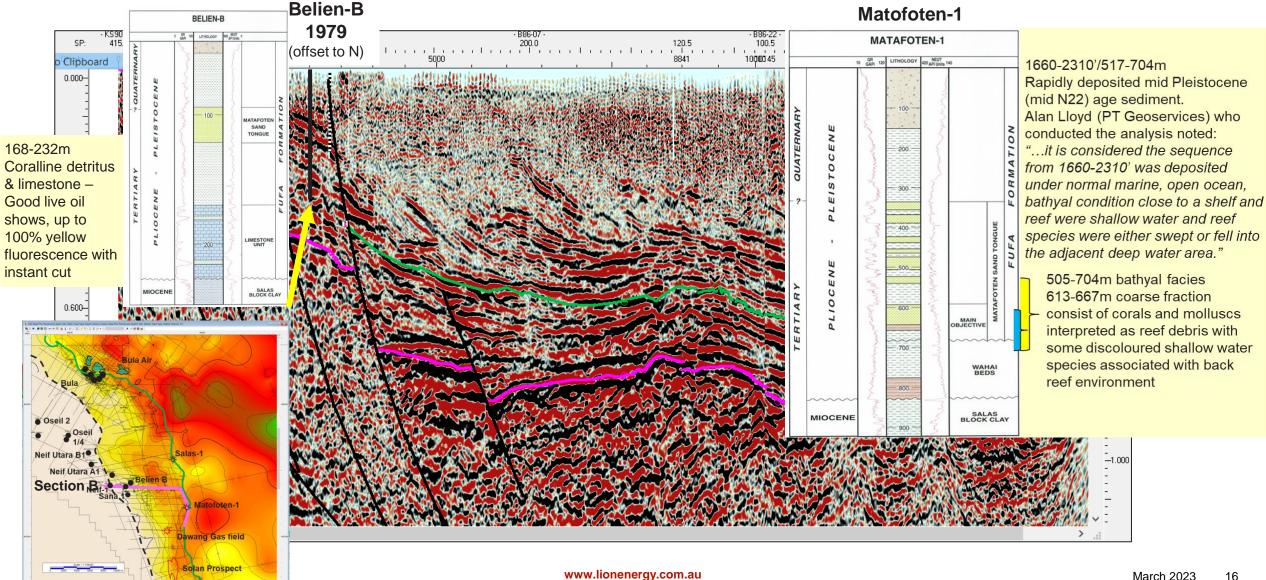


March 2023

Stratigraphic analysis of composite line onshore Bula Sub-Basin



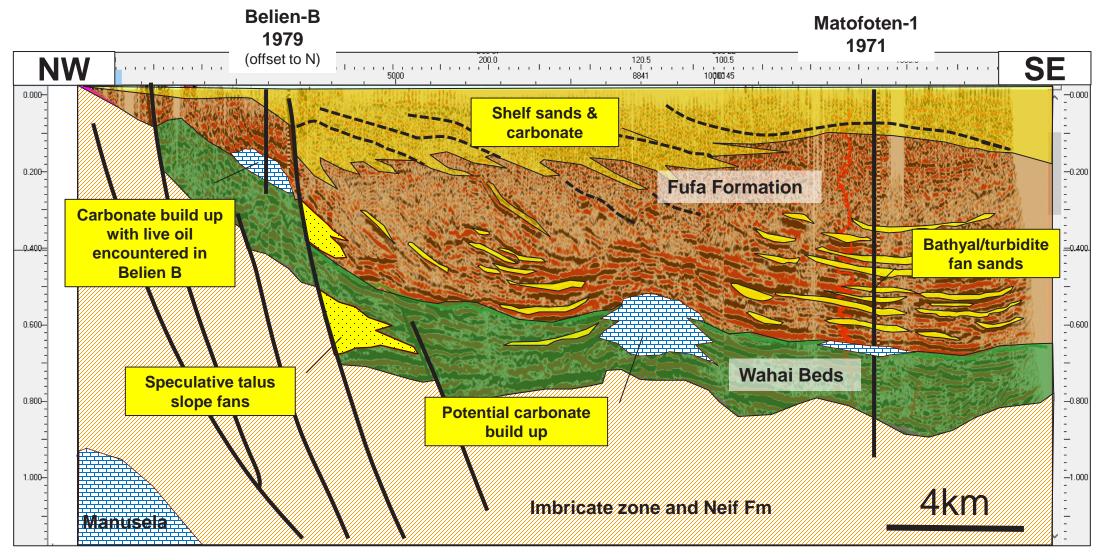




Section B

Composite geoseismic section onshore SE Bula area – Fufa Fm progradation, delta front bathyal turbidite sands & actual/speculative carbonate build ups

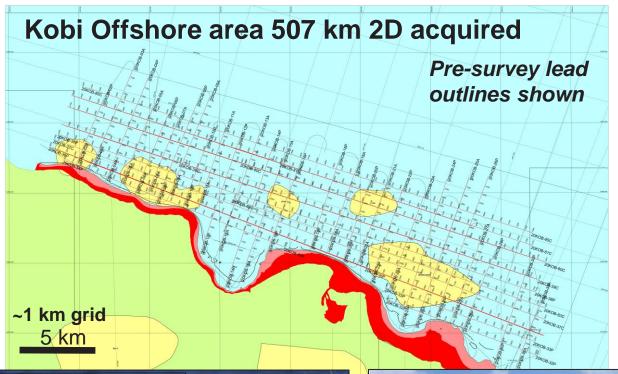


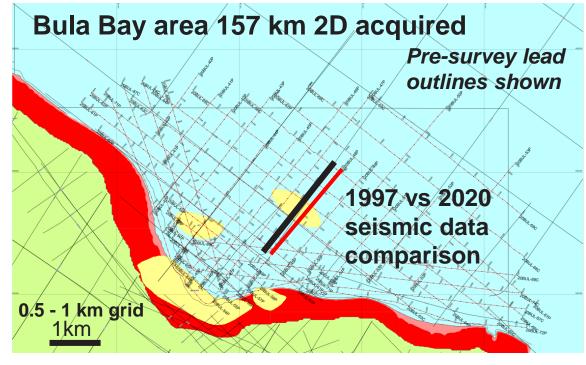


2020 Offshore Seismic Shot Point Basemaps

Two area targeted – offshore Kobi and Bula Bay area







Bula Bay Majuru East Seram Bagan Rogercy



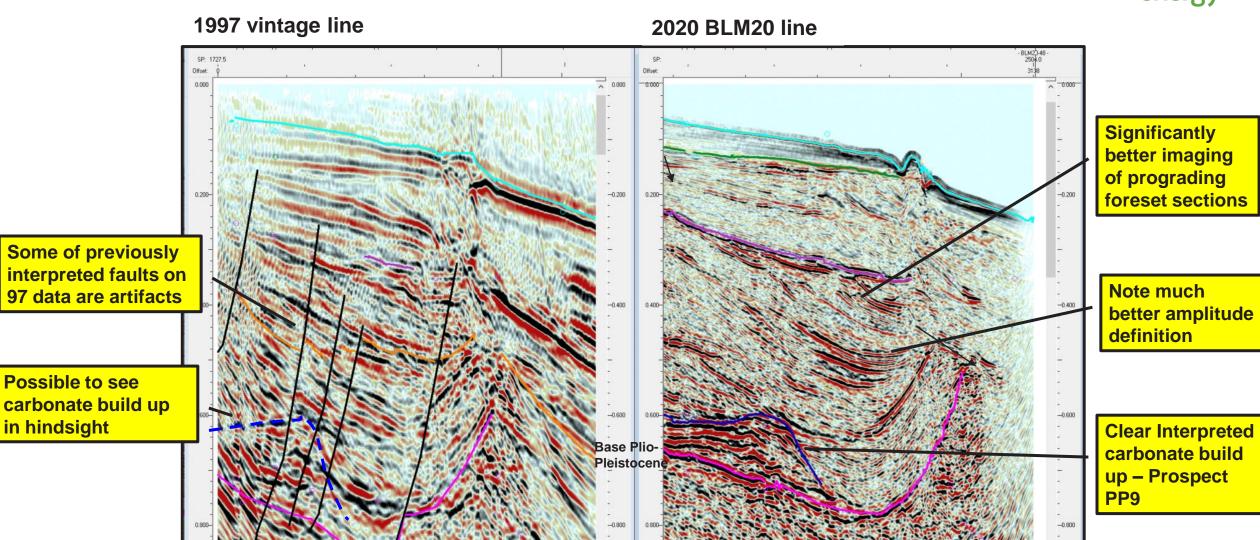
Site survey vessel utilized for survey

- · Easy to mobilise/operate, relatively small crew
- Able to acquire data in less than 10 m water depth
- Short cable (300m) allows good maneuverability close to shore
- Overall good quality product: High resolution 2D seismic., data focused on section <1 sec TWT
- Cost effective survey cost ~USD700K

Example of CP97 data vs BLM20 data in Bula Bay area



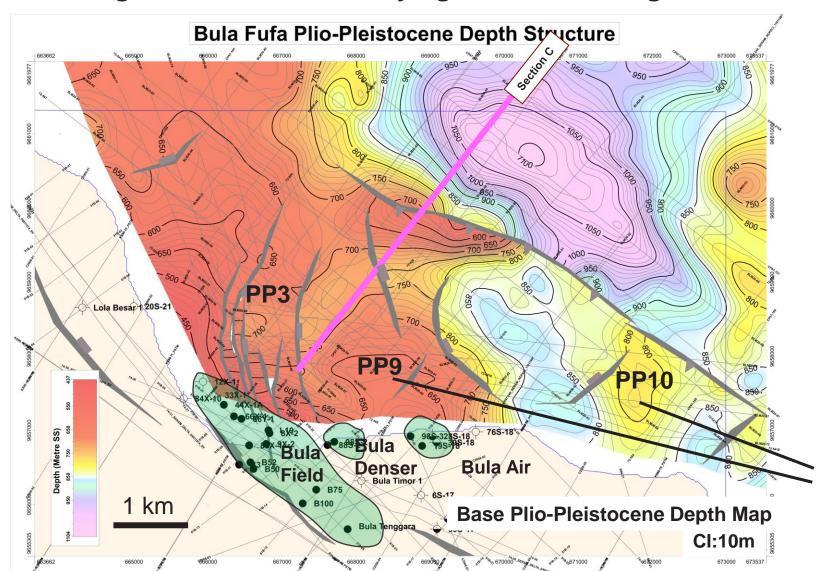
Lines essentially overlap – significantly more stratigraphic information on latest BLM20 line



Base Plio-Pleistocene Depth Structure - Bula Bay Area



Interaction of arcuate growth faults & underlying NW-SE trending thrust faults

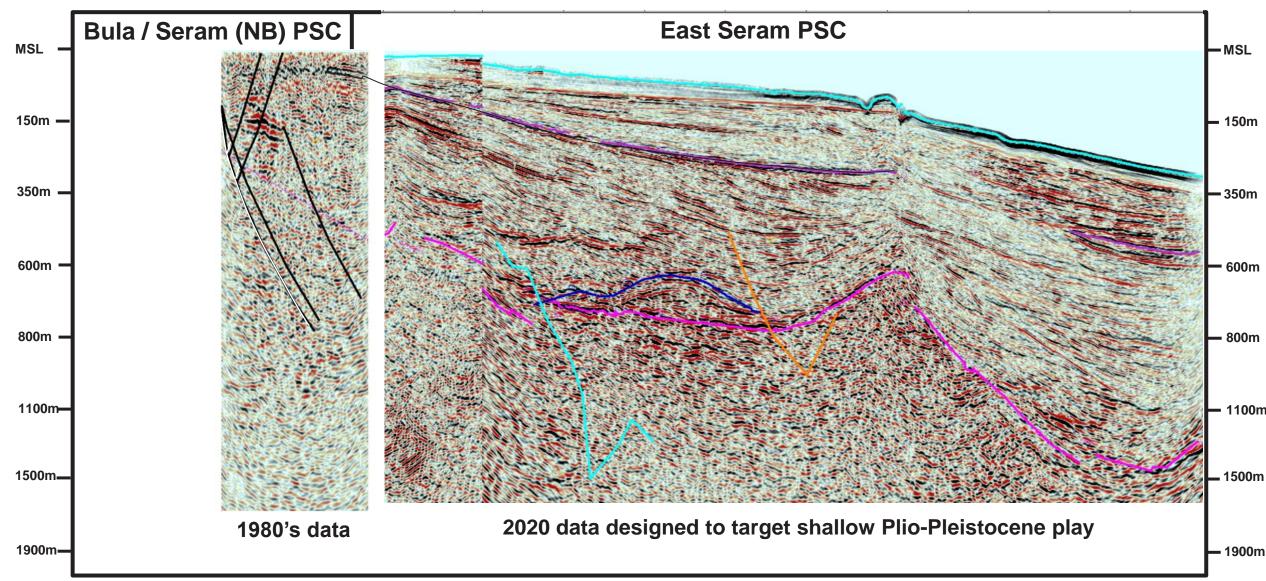


Carbonate growth on some of paleo-highs

Composite seismic data underlying Geoseismic section Bula Bay



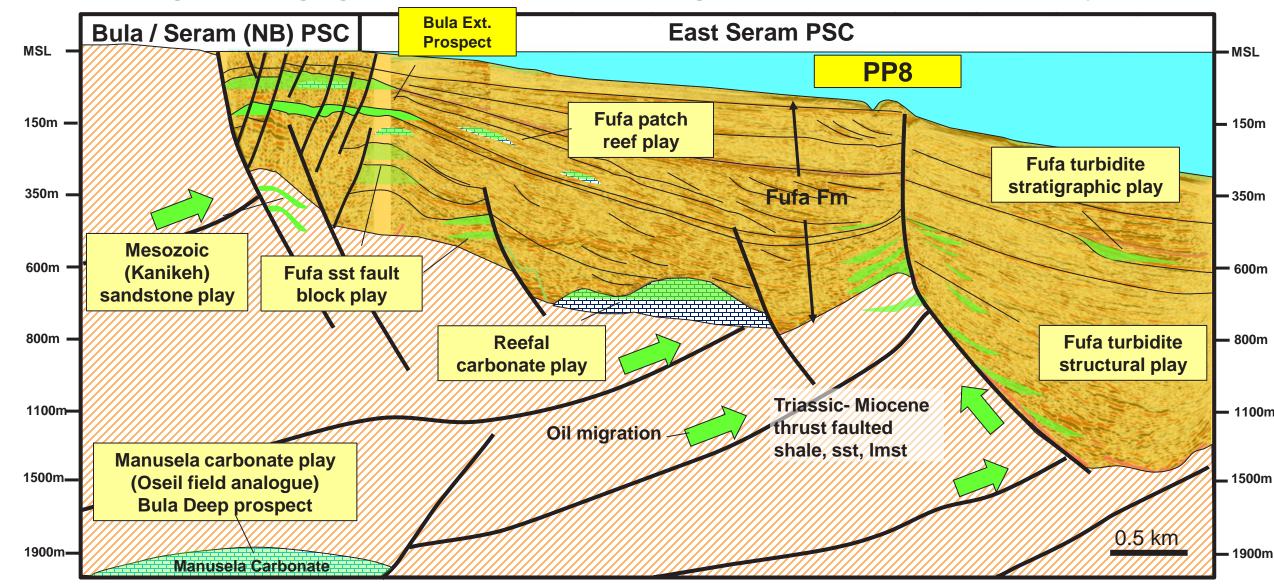
Poor quality imaging of vintage data over Bula Field, 202



Geoseismic section showing plays in Bula Bay area

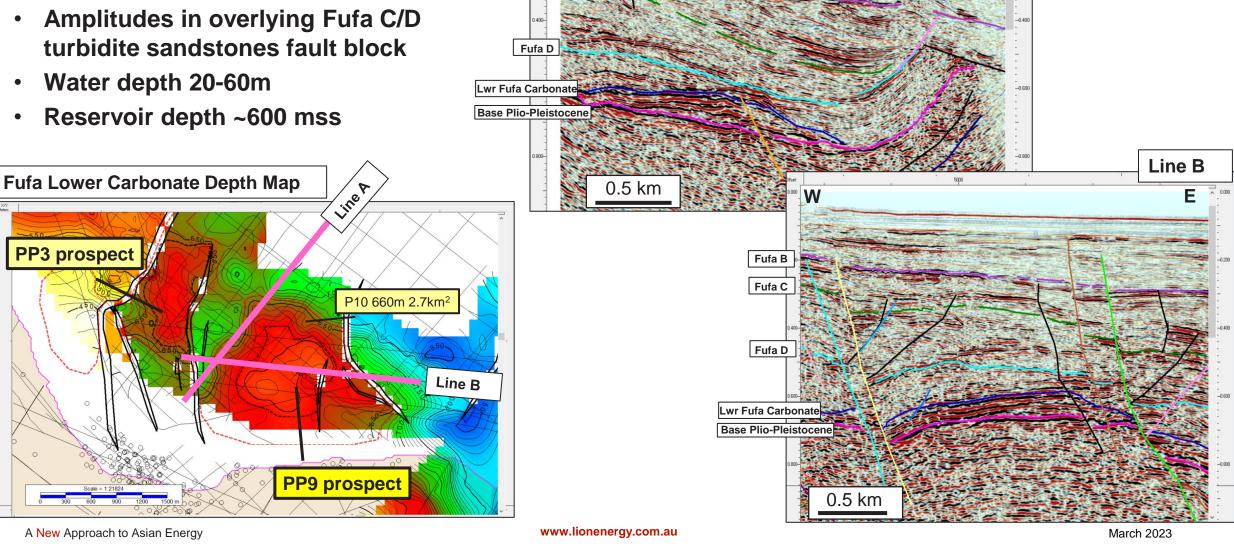


Multiple targets emerging from new seismic including carbonate reef & turbidite play



PP9 Prospect

- Newly identified, well defined Plio-Pleistocene reefal buildup up to 2.7 km² with 80m relief
- turbidite sandstones fault block



SW

Line A

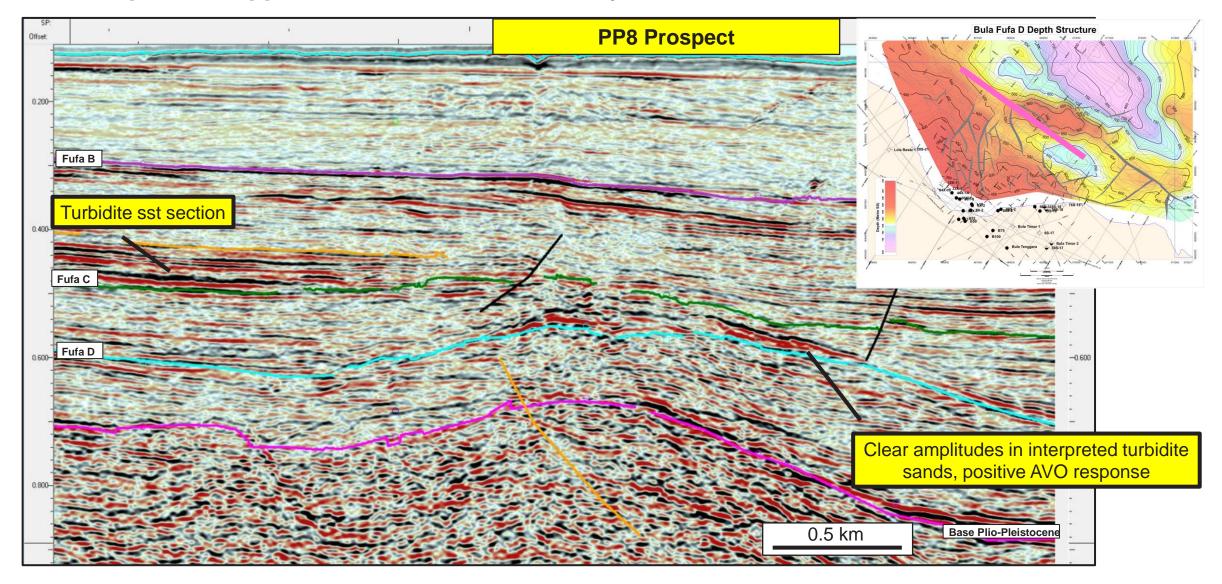
NE

LICN energy

Bula Bay NW-SE Section F over PP8 Prospect



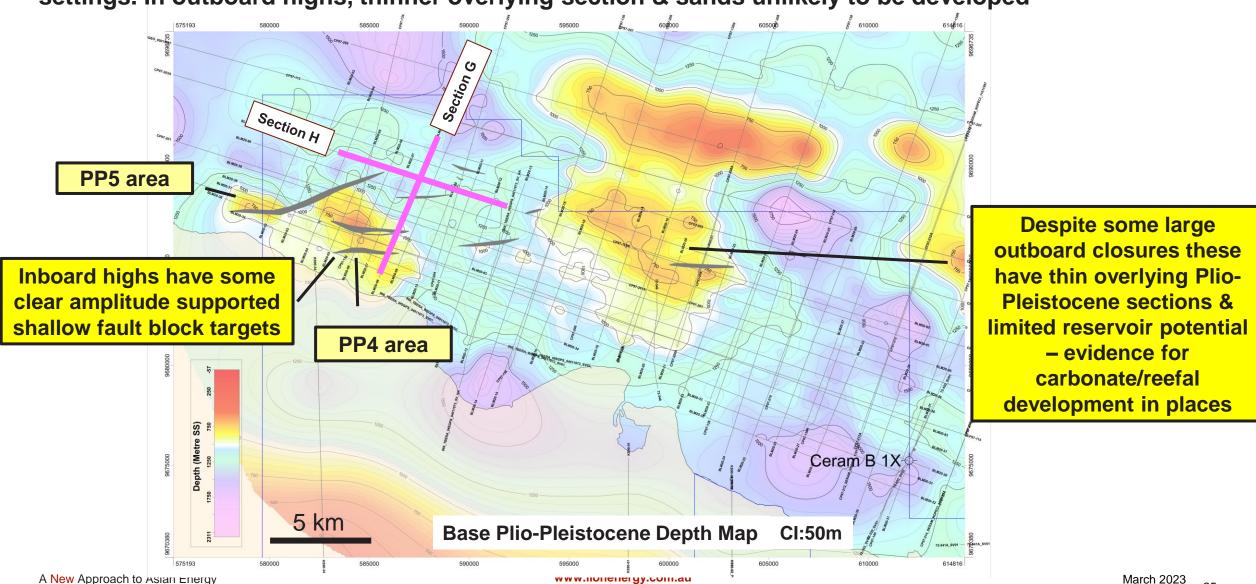
Clear amplitude support within PP8 faulted 4-way anticlinal structure



Kobi Area Plio-Pleistocene Unconformity Depth Structure Map



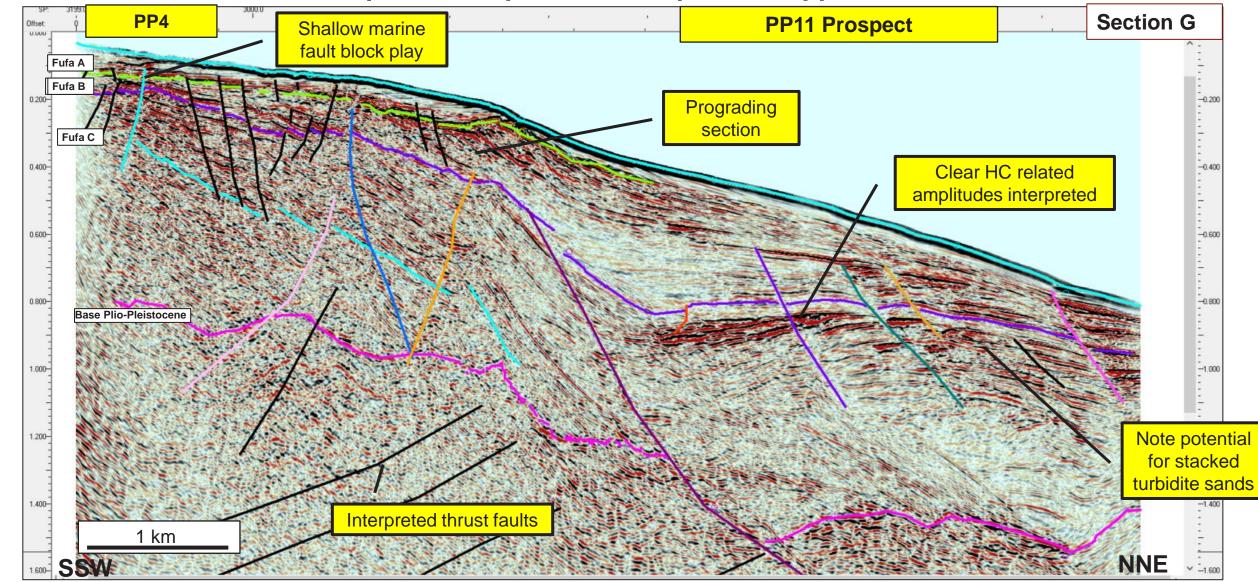
Paleo-structure controls subsequent deposition - overlying prospective fault blocks in inboard settings. In outboard highs, thinner overlying section & sands unlikely to be developed



Kobi area NNE-SSW seismic line

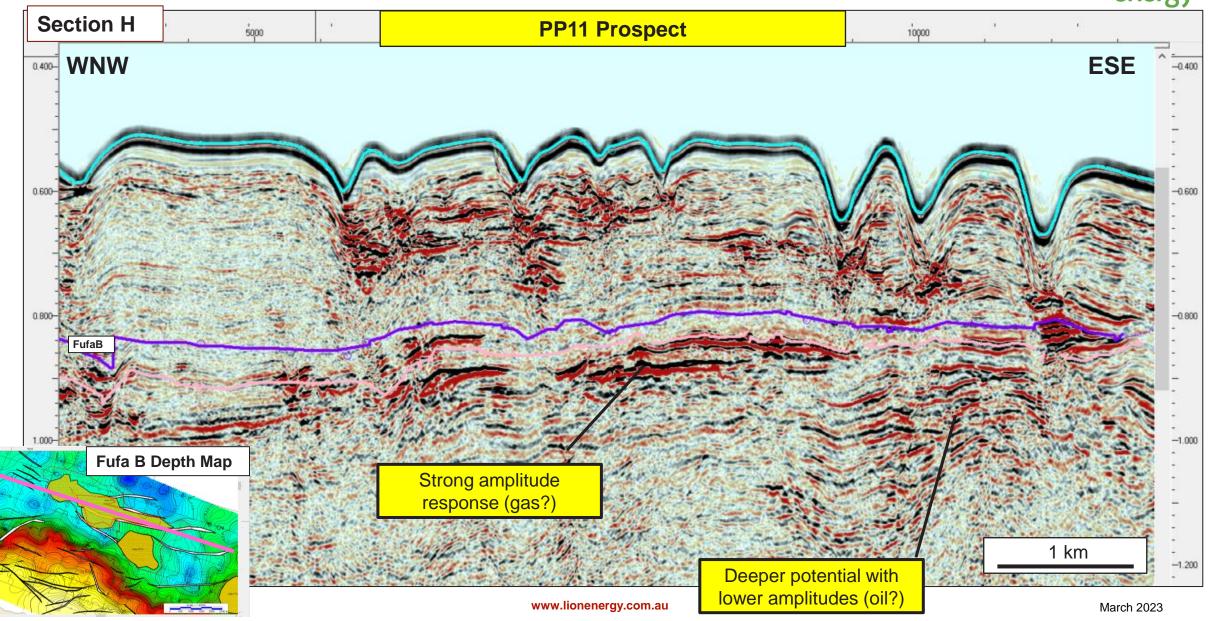


Faulted shallow marine traps and deeper water, amplitude supported trend



Clear channelised & fan turbidites in deeper water

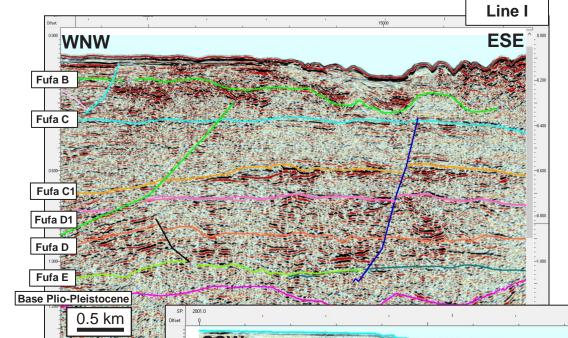




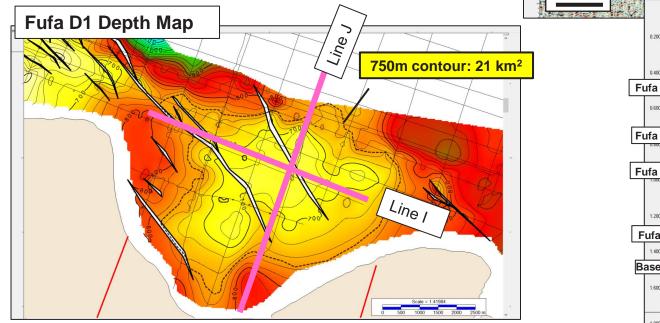
PP6 Prospect

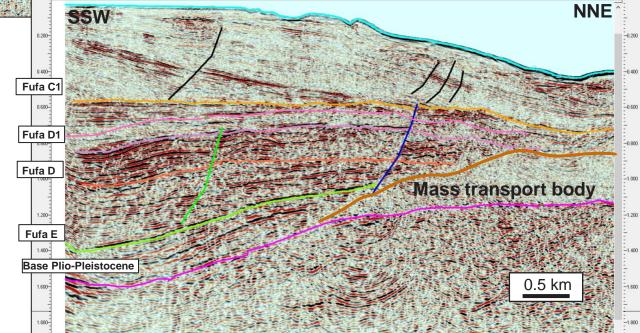
- 4-way dip closure up to 20 km², 4 potential zones & 100m+ relief
- Good amplitudes response over crest of feature
- Channelised turbidite reservoir development interpreted
- Water depth: 50-150m

Objective interval 550-1200 mss





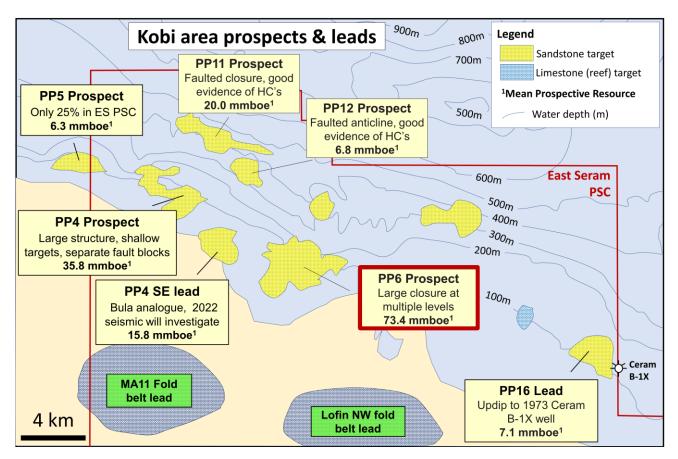




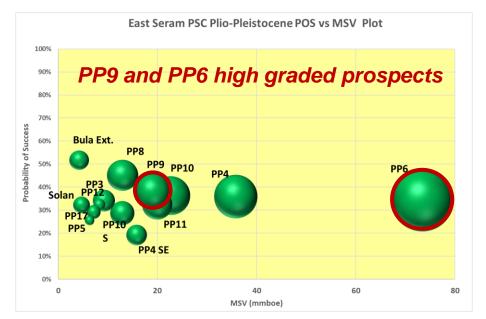
New Plio-Pleistocene Inventory

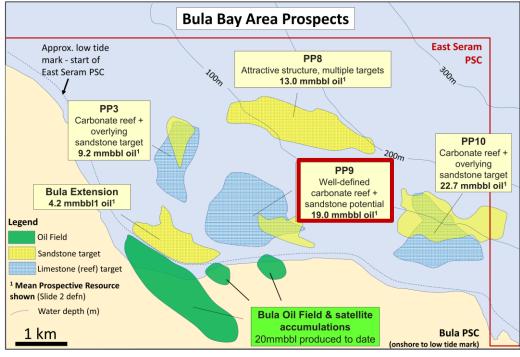
14 prospects & leads

Combined P90-P10 Prospective Resource: 89-498 mmboe, mean 254 mmboe



New seismic results have exceeded expectations!



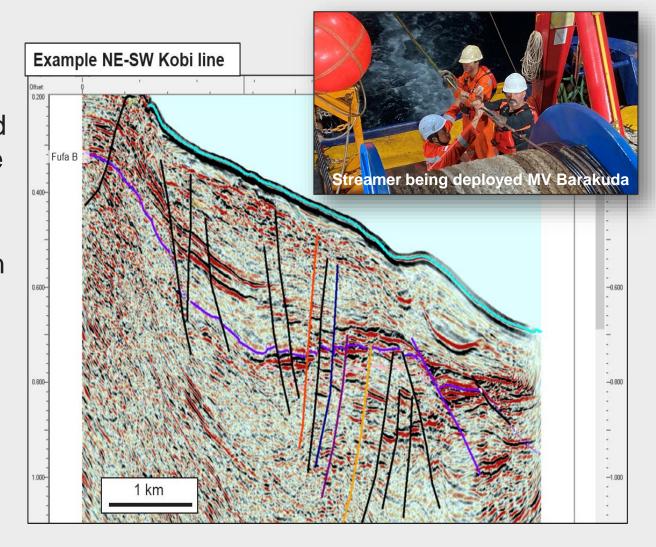


Conclusions



New marine 2D has significantly improved understanding of Plio-Pleistocene foreland basin

- ★ Overall complex structure with interaction of growth faults & ongoing movement on underlying thrust faults
- ★ Clear prograding sections with well defined topsets, reefal build-ups channelised slope deposit, turbidite complexes and mass transport bodies
- * Carbonate on paleo-highs offset from main sediment input
- * Abundant amplitudes, positive AVO responses clear evidence of HC charge
- Significantly upgraded portfolio with new shallow marine sandstone, reef build-ups & turbidite prospects





Thank you!

Please contact Kim Morrison - kmorrison@lionenergy.com.au if you are interested in more information on the East Seram PSC

Acknowledgments - special thanks to SKK Migas and our partner OPIC for approval to give this presentation

View from Manusela National Park lookout toward Sawai Bay