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Jakarta Scout Check

Spicing Up Exploration Potential along the Banda Arc

Insights from regional hydrocarbon charge and trap integrity studies in Timor Leste

Talk Outline

- **An Introduction to Timor Leste**
- Ascendience Charge and Trap Integrity Study
- Implications for Banda Arc Exploration
- Birdshead and West Papua Revisited
- Summary

Key Takeaway Messages

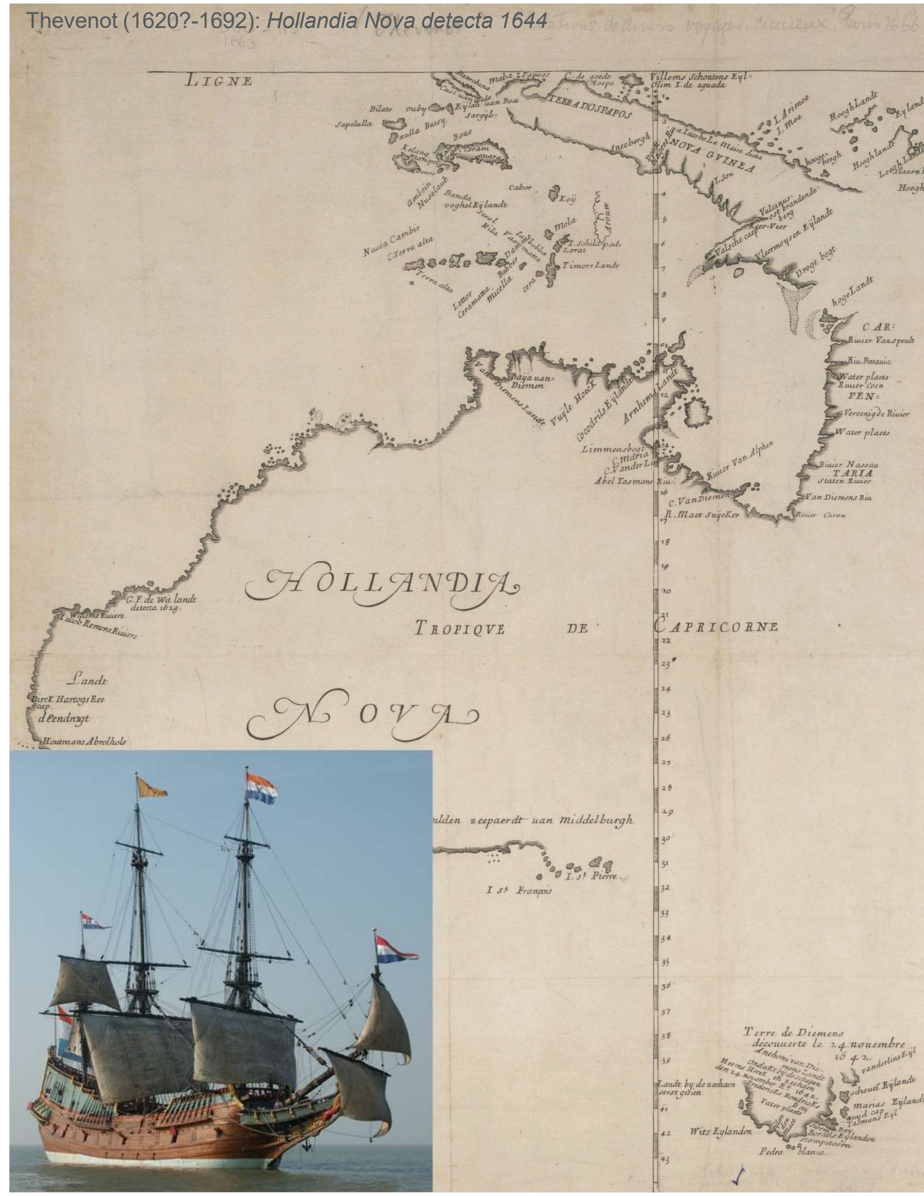
- Ideas find new plays, but technology helps
- Good regional studies work is the cornerstone of all new play opening discoveries
- White space represents unrecognised opportunity that shouldn't be ignored
- The Banda Arc has treasures yet to be found

Manhattan Transfer

- 358 years ago in 1667, an extraordinary deal was struck:
    - Two small Banda islands were exchanged for a swampy then Dutch colony, once known as New Amsterdam (now New York)
    - Banda Islands had a monopoly on nutmeg. It was the only place it grew, and the spice was worth more by weight than gold
- The Banda Arc has more treasures to be revealed…

Batavia or Bust

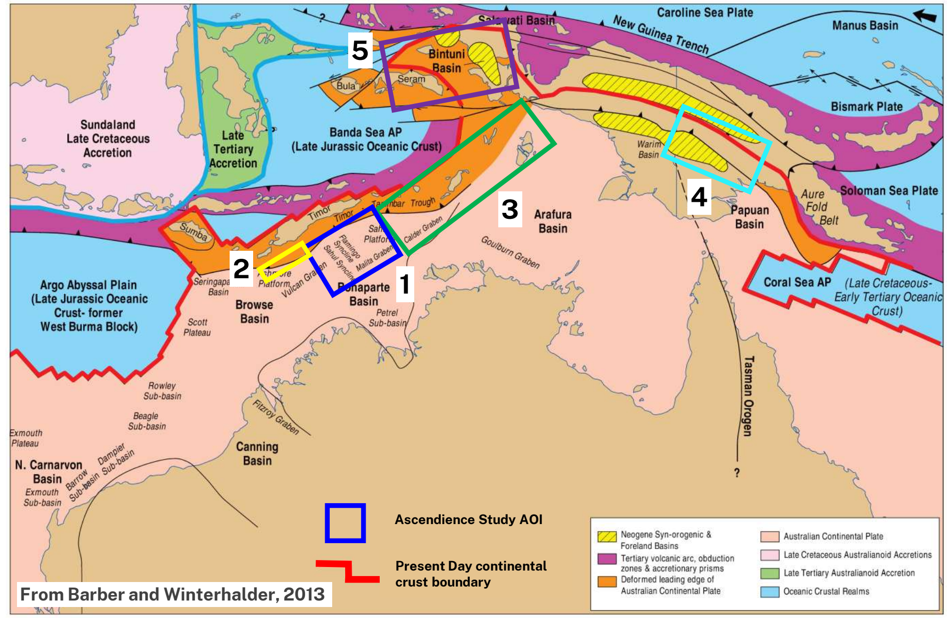
- The Dutch East India Company dominated the very lucrative Indian Ocean spice trade in the 17th century, especially around the islands of Indonesia.
- Company shareholders became immensely rich, while ambitious young men risked life and limb for the opportunity to make a fortune.
- In 1629, a VOC ship named the Batavia was wrecked on the Houtman Abrolhos, a chain of small islands off Western Australia, one of many failed journeys
- Risk and reward are always linked

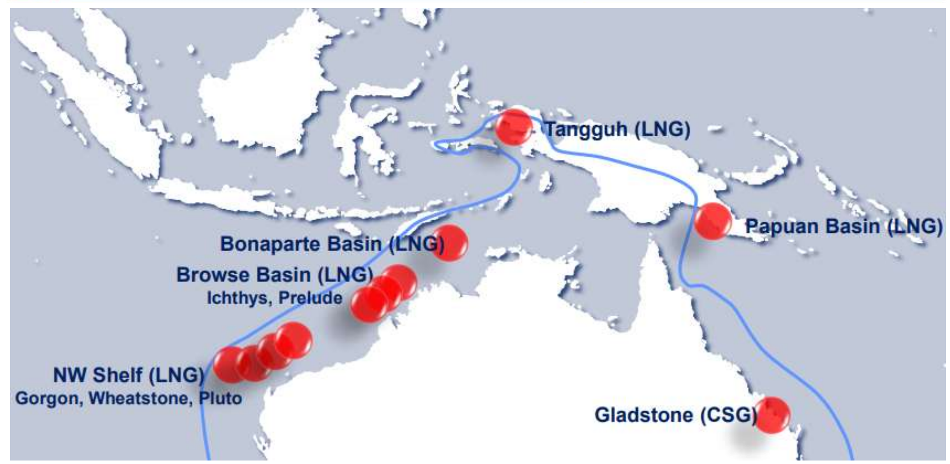


Thevenot (1620?-1692): *Hollandia Nova detecta 1644*

Study Location

- Designed to address Trap Integrity Risk for the ANPM 2020-21 Timor Leste Offshore Area (TLOA) licencing round the study covers the Northern Bonaparte Basin immediately to the south of the Timor trench
- The regions make up a regional super-basin encompassing Timor Leste, Australia, Indonesia and PNG that has delivered prolific hydrocarbon reserves, principally gas but with significant oil volumes
- Our learnings in Timor Leste can be exported across the entire margin to reduce risk and highlight opportunities for future success

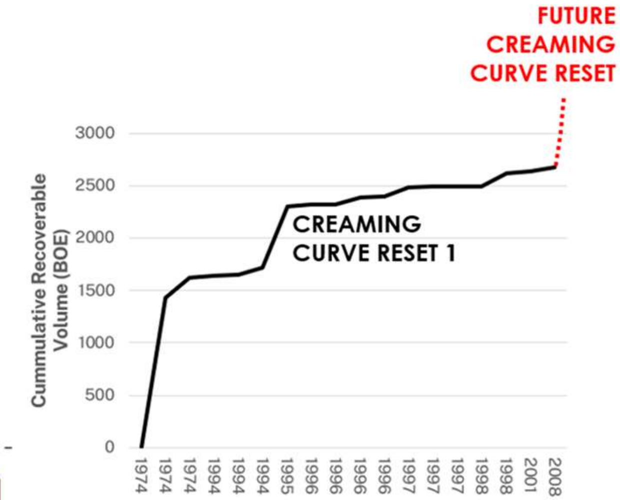


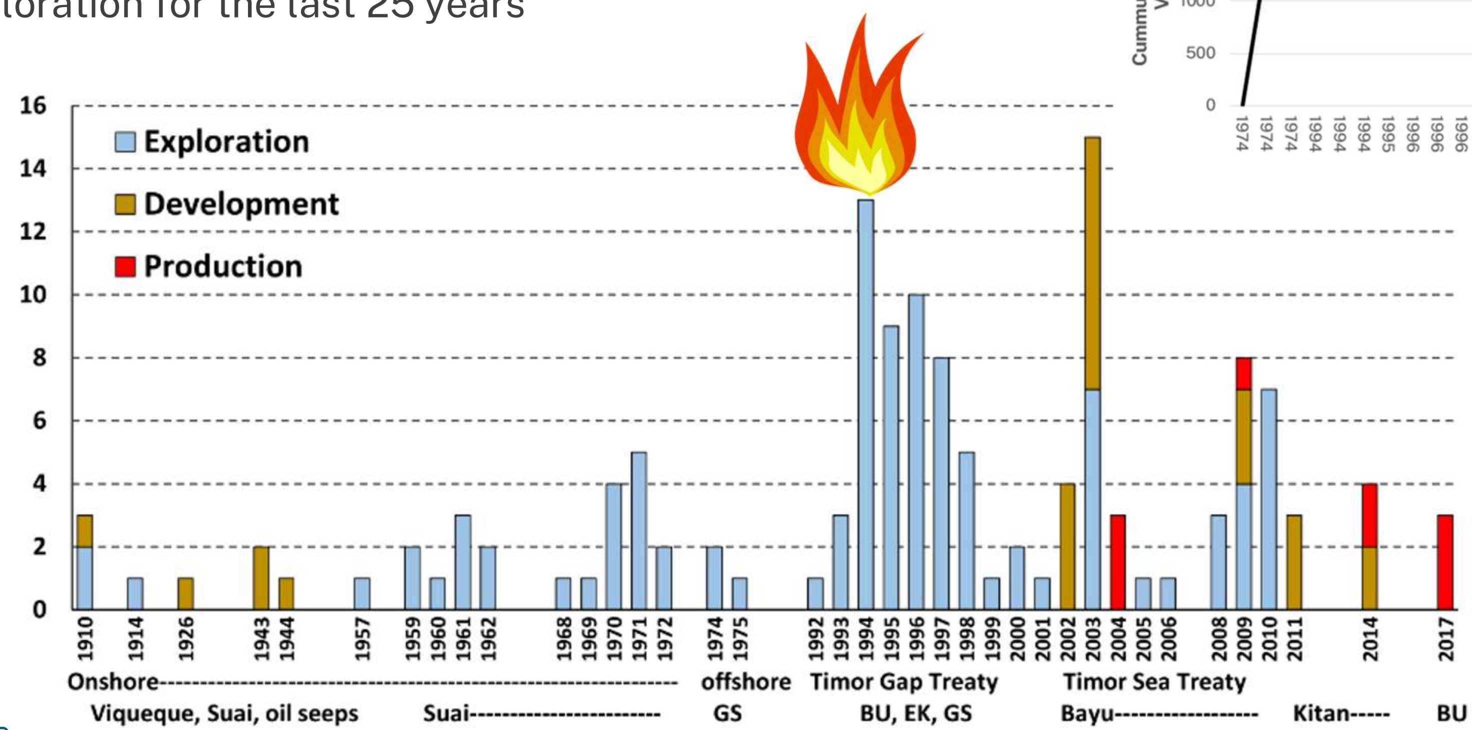


From Barber and Winterhalder, 2013

Northern Bonaparte Drilling History

- Over 130 wells have been drilled in 117 years of activity
- Post 2000 development and productions wells dominate
- Minimal exploration for the last 25 years





Graph by La'o Hamutuk based on historical data and ANPM Lafaek database, accessed June 2017

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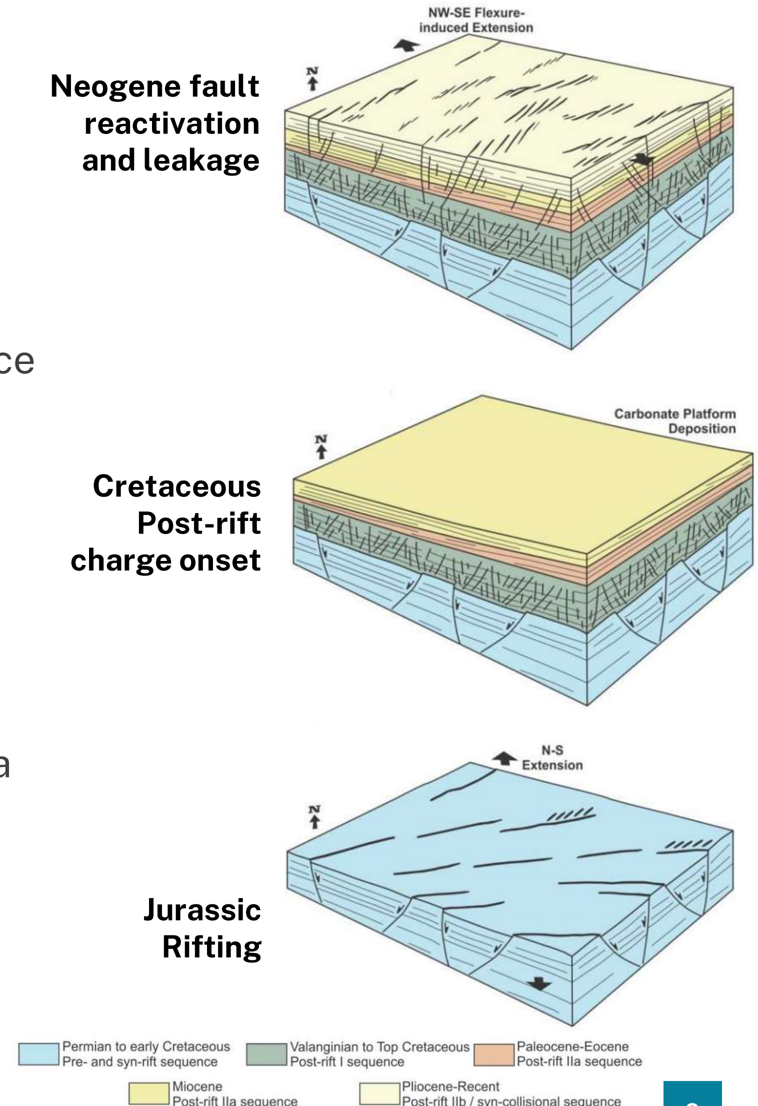
Key Phases

- Jurassic rifting produced pre- and syn-rift fault-bound traps
- Syn-rift mudstones deposited in anoxic, restricted circulation synclines produced localised high quality oil-prone marine source rocks with gas-prone source rocks predominant elsewhere
- Post-rift thermal sag resulted in widespread transgression and deposition of a thick regional seal in a passive margin setting
- Northwards Australian Continent drift coupled with opening of the Southern Ocean produced a shift from clastic to carbonates
- Collision of the northwards moving Australian Plate with Eurasia produced widespread Neogene fault reactivation trap breach
- Seepage rates diminished from initial collision, reflecting a change in the stress field to the current transtensional setting



From Saqab, 2012

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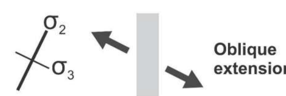
Tertiary Plate Collision

- Passive margin conditions ceased at 25Ma when Australian Crust collided with the Eurasian Plate near PNG
- Oceanic crust began to be subducted northwards beneath Eurasia creating the Banda volcanic arc
- Oceanic crust was consumed until the onset of Arc-Continent collision at about 3Ma
- Flexure of the Australian Margin resulted in widespread oblique extension with arrays of neo-formed shallow faults and reactivation of deeper Jurassic rift faults
- Jamming of the subduction zone resulted in south directed imbrication of Australian basement terranes and parts of the Banda forearc
- Compressive shortening led to the emergence of Timor Island and development of the Timor Trough

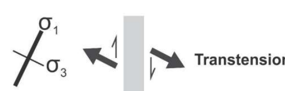
25Ma

Initial collision accommodated by subduction of Australian plate beneath Eurasian Plate producing the volcanic Banda Arc



3Ma

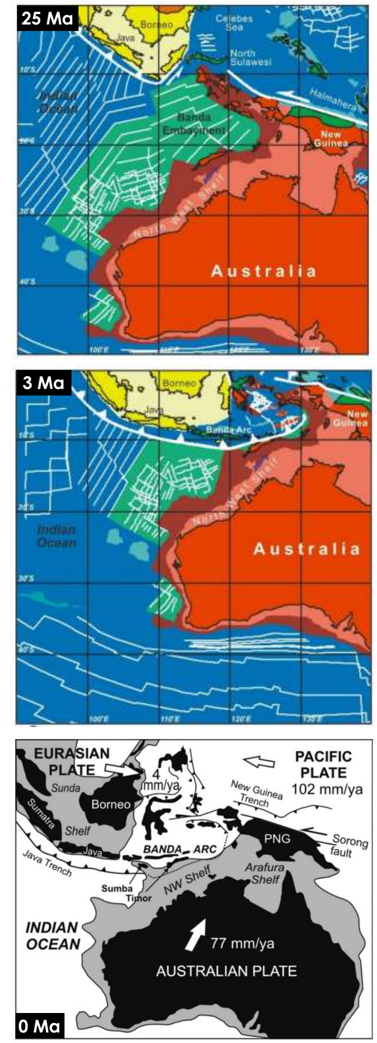
Full onset of Arc-continent collision as Australian continental crust reaches the subduction zone and jams the collision. South directed imbrication of the Aileu complex and parts of the Banda forearc



0Ma

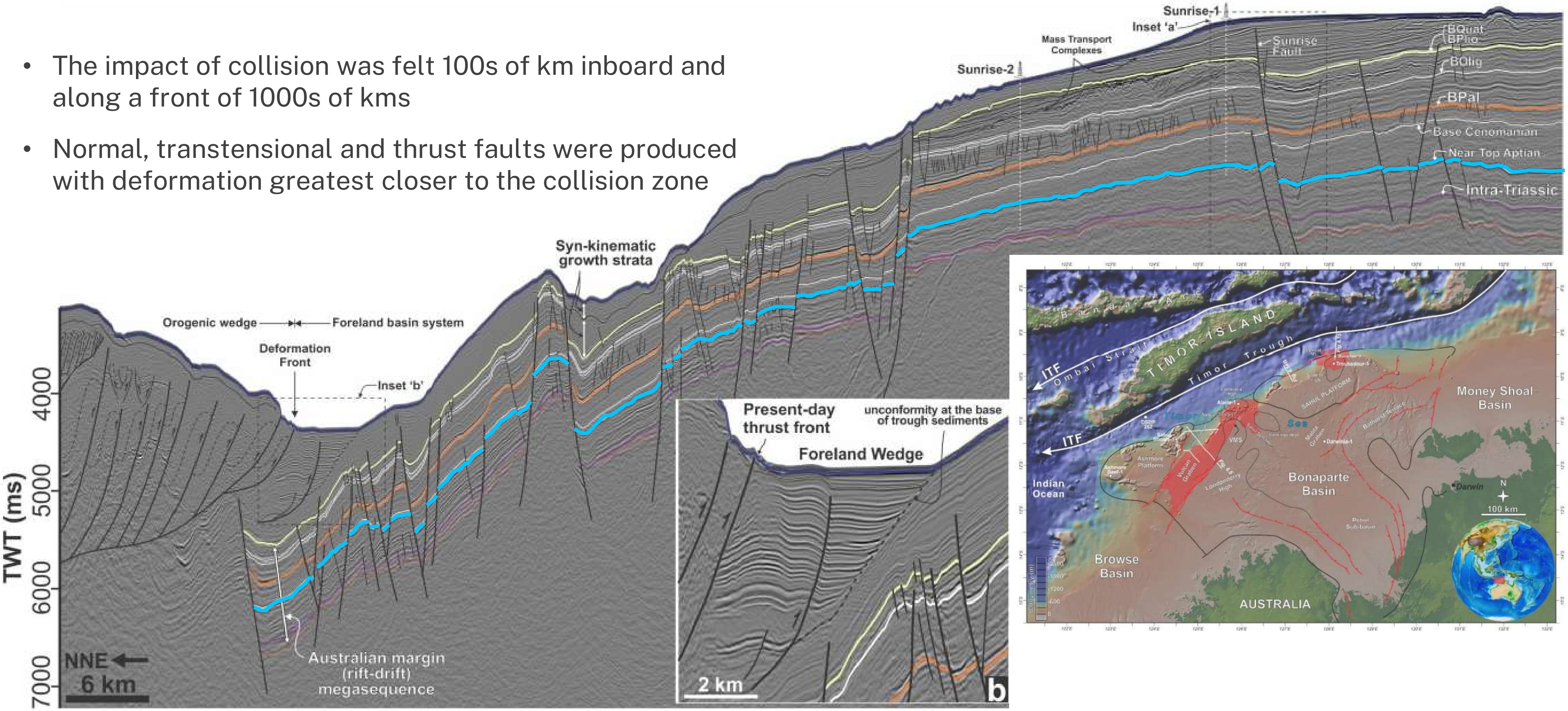
Ongoing collision accommodated by shortening with orogenesis on Timor Island and rapid deepening of the Timor Trough

From Hall, 2012



Slow Motion Train Wreck

- The impact of collision was felt 100s of km inboard and along a front of 1000s of kms
- Normal, transtensional and thrust faults were produced with deformation greatest closer to the collision zone

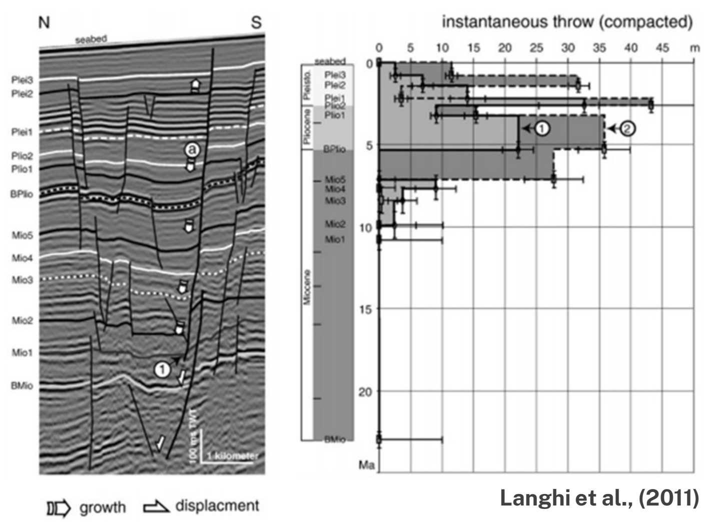


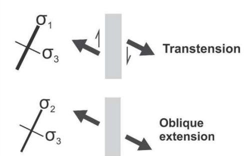
Saqab (2016)

Inboard Impact of Neogene Collision

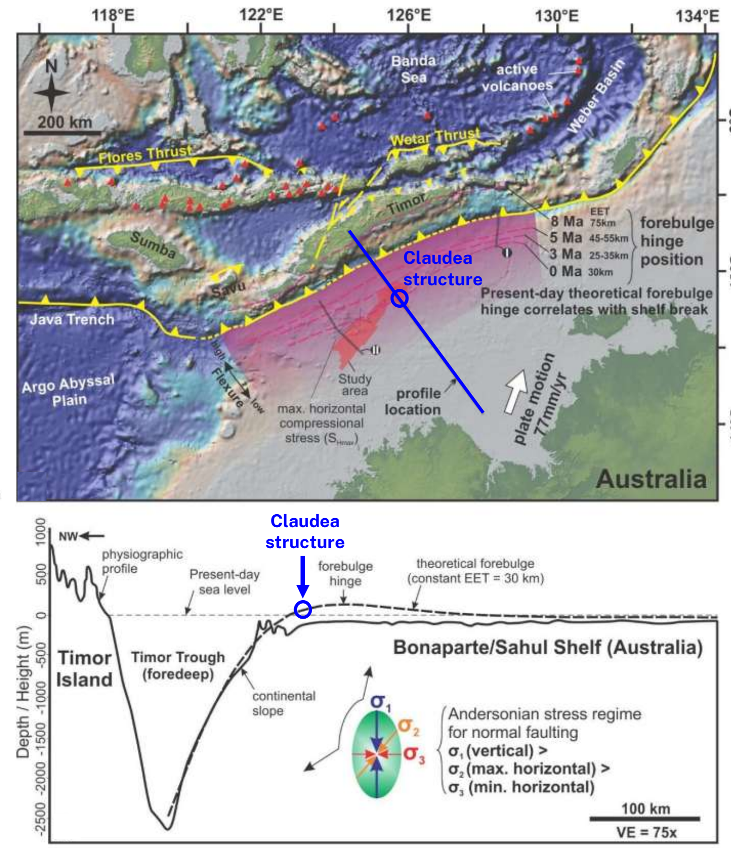
- How the impact of the Neogene collision impacts the prospective inboard structures was the focus of the 2021 multiclient study
- As collision proceeded the fore bulge hinge migrated southwards and produced widespread extensional failure through oblique extension creating arrays of neo-formed faults along the collisional margin
- Fault growth histories record a maxima in early Pliocene time before reducing as the stress field rotated to its current position where Sh_{max} has become the principal stress

Claudea structure fault growth history





Langhi et al., (2011)

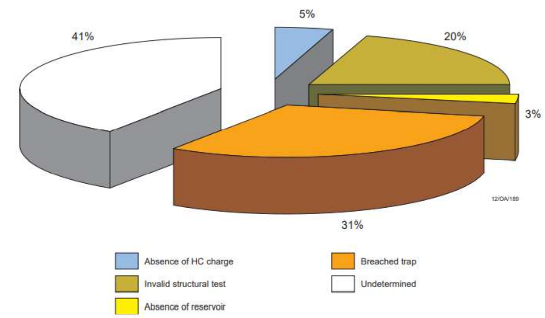


Saqab (2016)

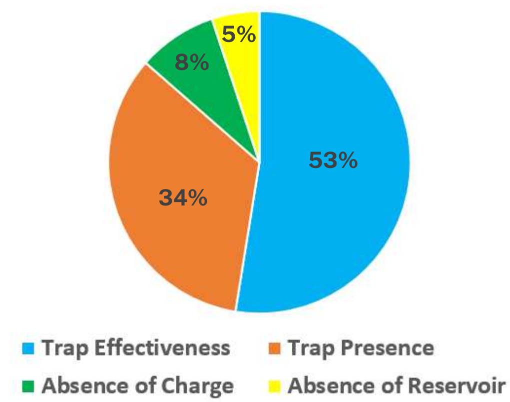
Barriers to Effective Trap Delineation

Trap remains the principal risk

- Seismic data quality improvements have helped to reduce trap presence risk, but accurate trap delineation remains challenging
- Inherent limitations introduced by shallow geology and stratigraphic units with laterally variable seismic velocities produced challenges imaging deep structures and hinder accurate depth conversion
- Most data is 1990's heritage 2D, more recent 3Ds point to opportunity for massive uplift to solve this issue
- Even with modern data the ability to image faults and determine the type of linkage between rift-related faults and younger Neogene fault arrays introduces challenges in arriving at effective predictions of trap integrity and it remains the key risk



Dry Hole Analysis, Northern Bonaparte Basin Cadman and Temple, 2003



Dry Hole Analysis excluding traps where failure risk was undetermined, Northern Bonaparte Basin, modified from Cadman and Temple, 2003

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Study Rationale

TRAP INTEGRITY is the key risk in this highly prospective region

The region has a successful exploration history and has delivered significant hydrocarbon success

Despite this success many dry holes have been drilled – **Trap integrity attributed as a common failure**

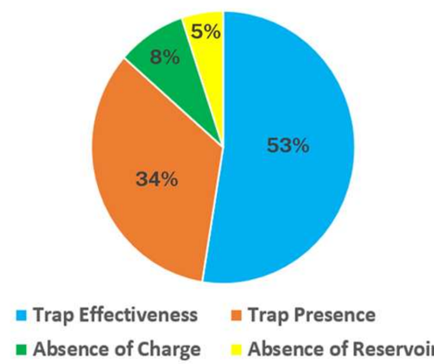
A better predictive method for trap integrity is the X factor needed to improve future success

The basin is **NOT** played out – economically significant hydrocarbons remain to be discovered

Turns the wounds of previous explorers into wisdom to power the next phase of successful exploration

Many traps with commercial volumes and low or moderate trap risk remain undrilled

Dry Hole Analysis, Northern Bonaparte Basin
Cadman and Temple, 2003



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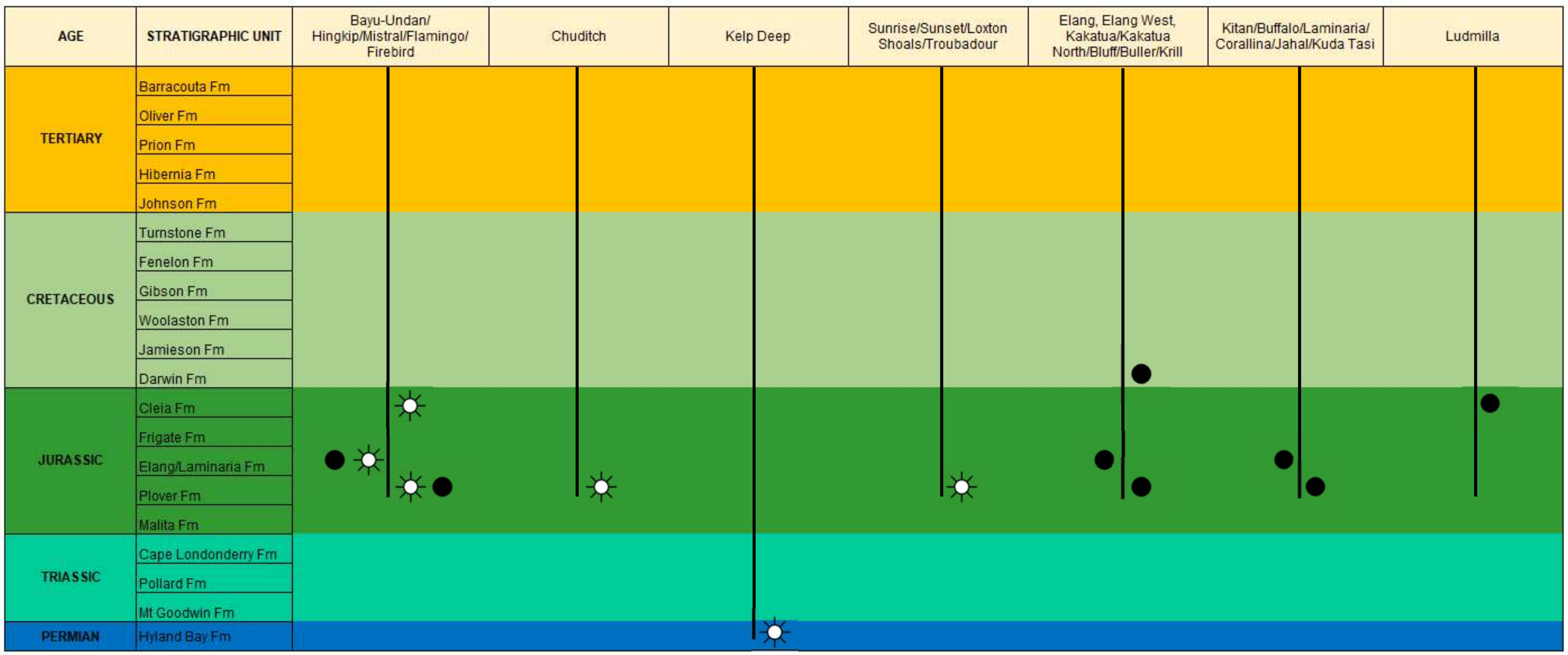
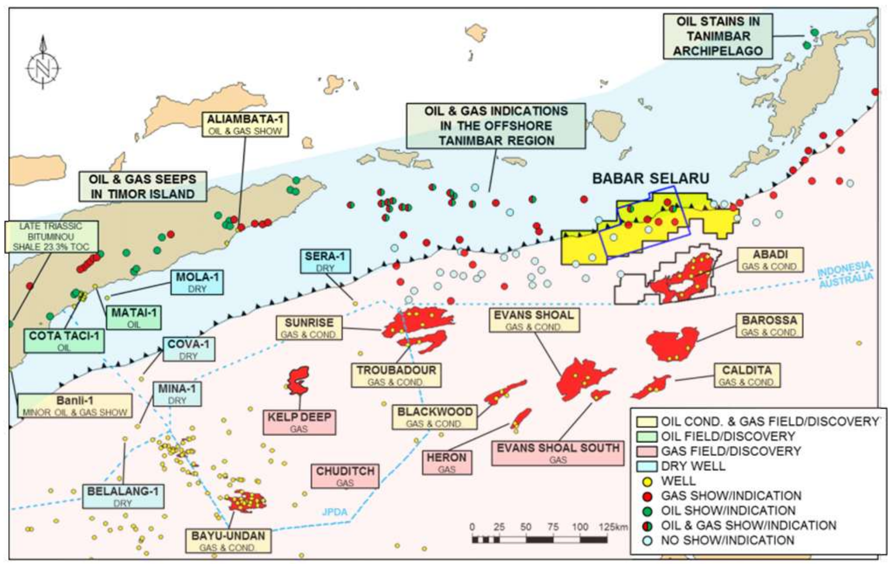
Discovered Hydrocarbons

- Reservoirs within the Jurassic Plover and Elang/Laminaria formations host most of the oil and gas
- Sour gas in the Kelp Deep discovery highlights potential for deeper reservoir-seal pairs
- Minor occurrences of oil are present within fractured Darwin Fm calcareous claystones

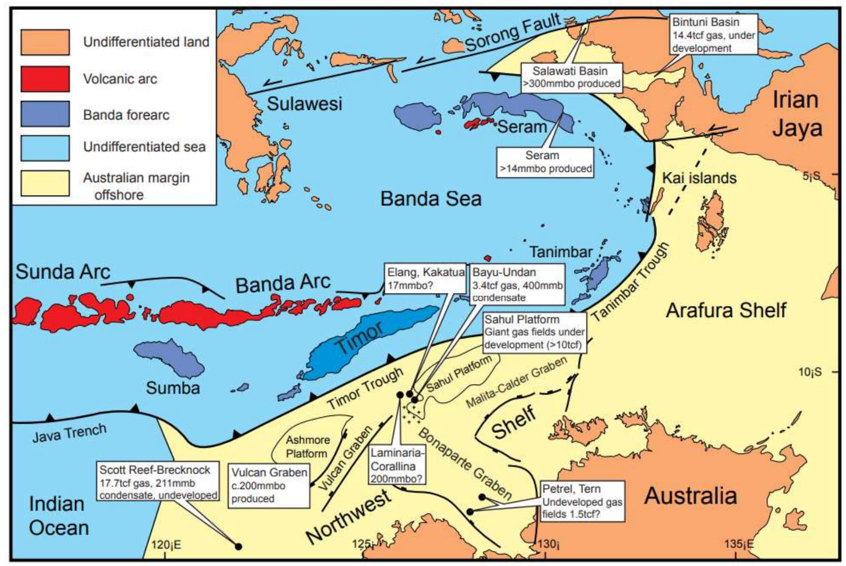


Distribution of Hydrocarbon Indications

- Commercial hydrocarbon fields are located almost entirely on the southern side of the current thrust front
- North of the thrust front widespread seeps and hydrocarbon indications point to active petroleum systems, but only on the island of Seram have material accumulations being identified
- Failure north of the thrust front reflects structural complexity as well as likely widespread trap breaching associated with reactivation and inversion



Ohara et al., 2014



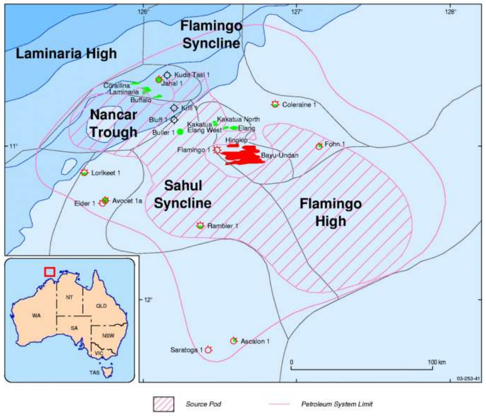
Charlton, 2002

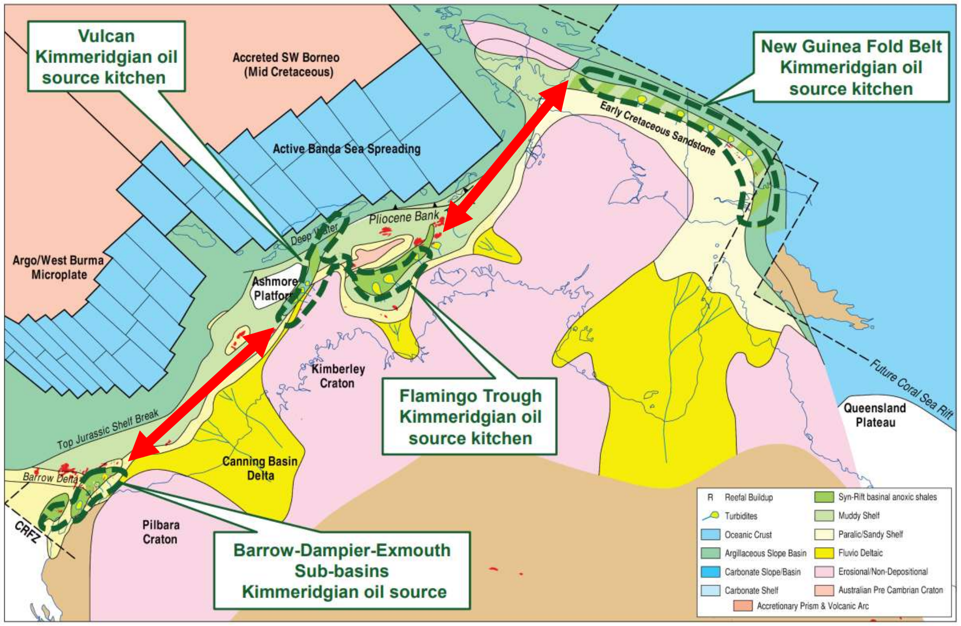
Critical Petroleum System Addressed

- Petroleum systems with access to oil-prone Upper Jurassic source rocks offer a compelling case for future success and economic return IF the key risk can be mitigated
- Small trap size segmented by high fault density with a significant reactivation overprint results in oil being the principal target to achieve acceptable EPOS
- The distribution of proven oil-prone source rocks comprising restricted marine Late Jurassic mudstones is key to understanding the oil potential
- We can learn from other basins along the margin
- Challenging long-held views essential to future success
- **MIND THE GAPS!**

Elang-Elang (!)

Earl, 2004





Barber and Winterhalder, 2013

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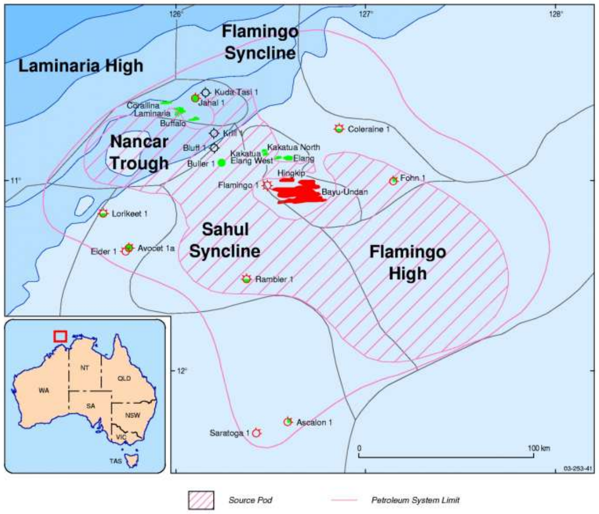
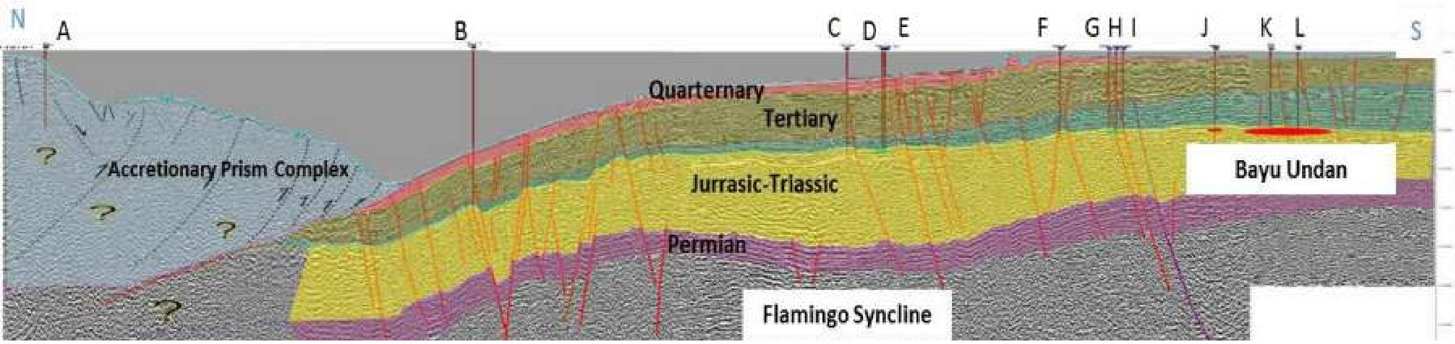
Controls on Source Rock Maturation

Elang-Elang-Plover (!) Petroleum System

- A pod of mature source rocks based on the current temperature distribution constrains the extent of an active charge cell for oil and gas
- The active (mature) source pod encapsulates all of the discoveries, with a wider migration halo capturing the wells with hydrocarbon shows
- Suggests charge is mostly derived from Upper Jurassic source rocks, with only limited contribution from the thicker underlying Plover Fm
- Northwards thinning of the Cretaceous and Tertiary section coupled with low surface temperature associated with deep water of the Timor Trough marks the northern limit to the Elang-Elang-Plover (!) Petroleum System

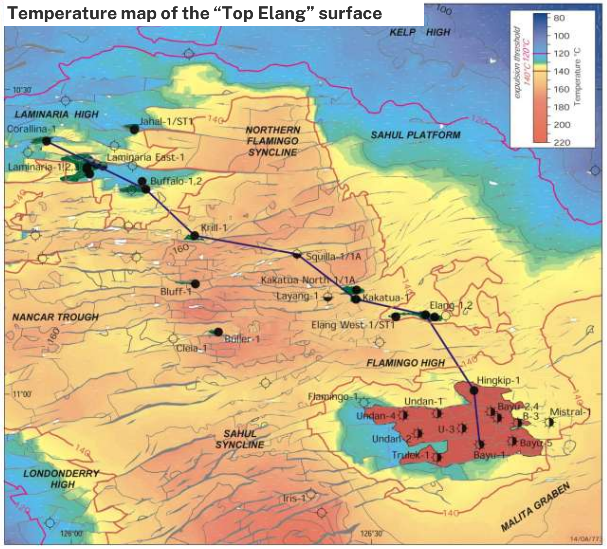
Earl, 2004 Elang-Elang (!)





ANPM, 2019, Timor Leste second licensing round 2019/2021

Temperature map of the "Top Elang" surface



Preston and Edwards, 2000

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Oil and Gas Seeps

Timor Island

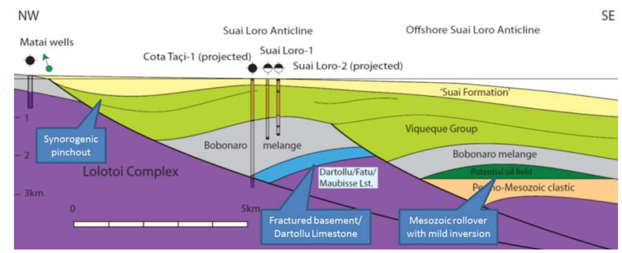
- Conventional oil and gas seeps are recorded onshore in Timor Leste
- Seeps have been typed to two source rock intervals (Baillie et al., 2019), one dominated by mixed marine-terrestrial organic matter (Wai Luli Fm?) and one a marine carbonate marl (Aitutu Fm)

Baillie et al., 2019

Matai natural oil seep from 2003

Matai surface oil seep from 2016

ANPM, Timor-Leste Second Licensing Round, 2019/2021

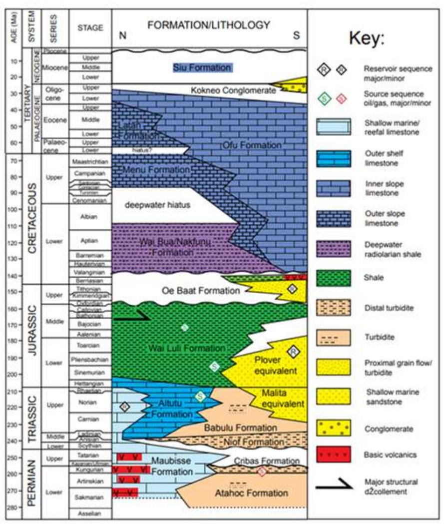


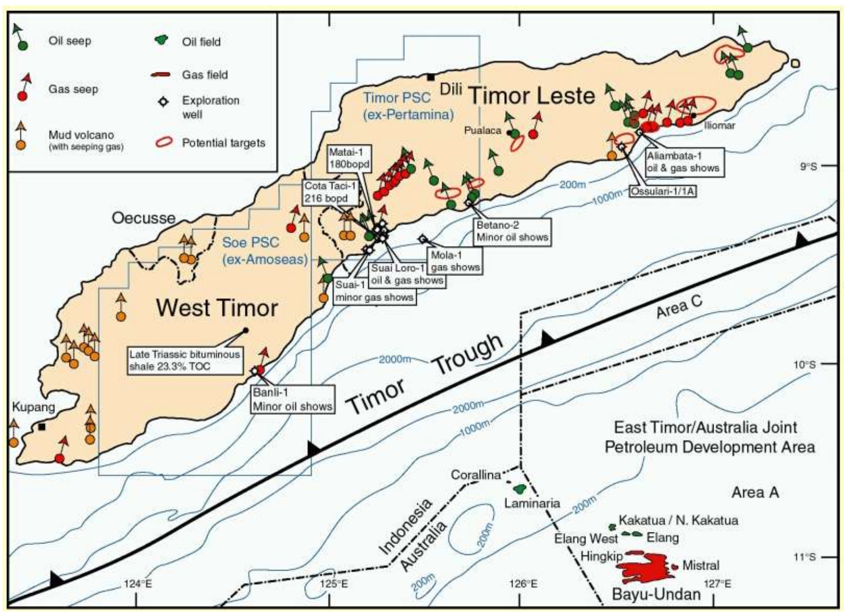
Charlton, 2018

ANPM, Timor-Leste Second Licensing Round, 2019/2021

Gas seep on the Bazol Anticline

Charlton, 2001





Charlton, 2002

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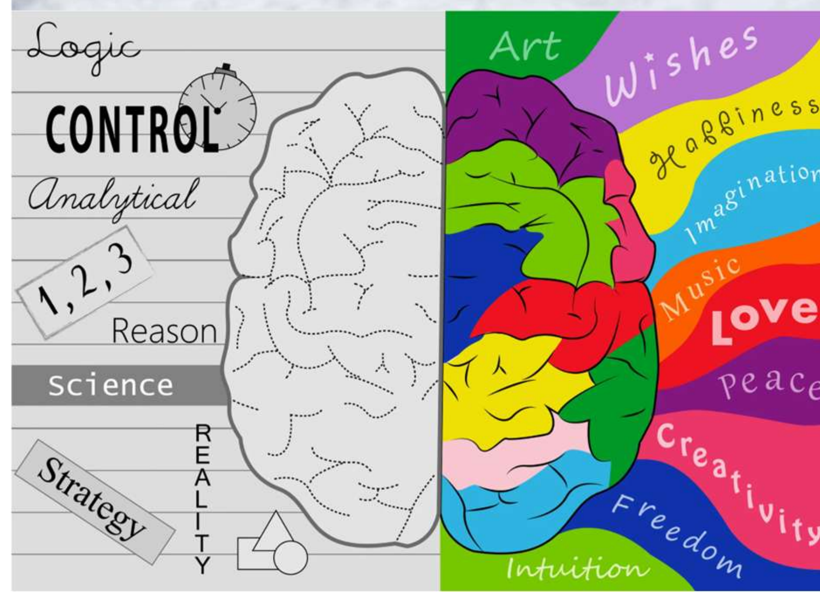
Avoid Colour by Numbers

- A standardised approach to portfolio analysis delivers more reliable assessment but does not deliver new ideas
- Application of creative thinking techniques improves cognitive performance
- More ideas and better technology find new plays and deliver creaming curve resets



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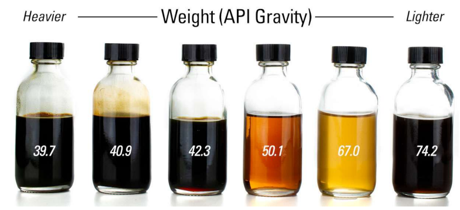
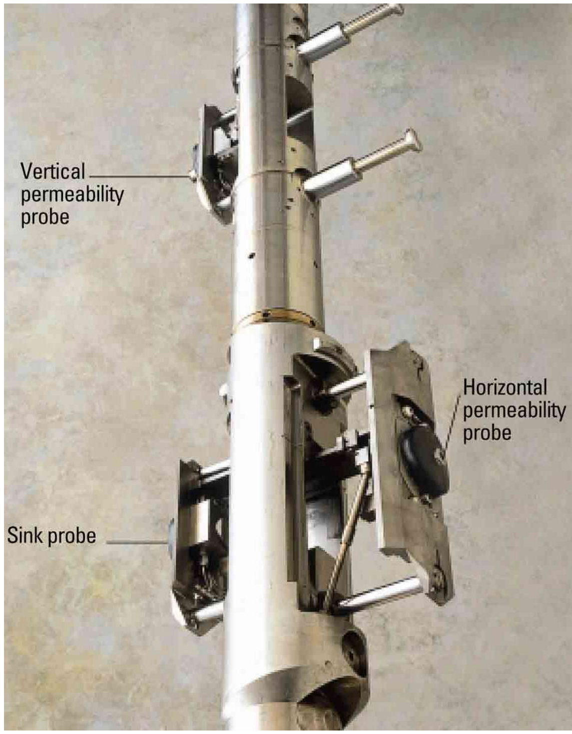


Kimray Inc., 2023

Fluid Inclusions – Nature's MDT Tool

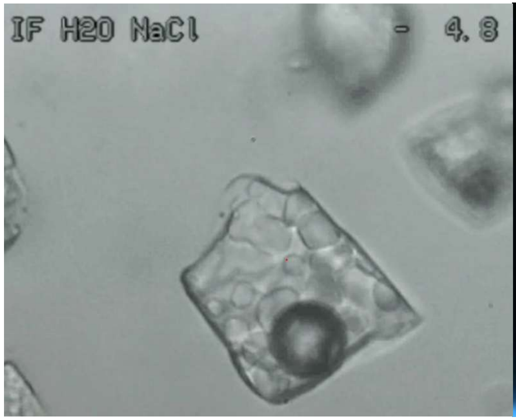
- Reservoir fluids trapped as fluid inclusions are isolated from the pore network and sealed away by authigenic cement at the time of charge
- Impervious to contamination and fully representative of the bulk fluid
- Permanently preserved in core, SWC and cuttings irrespective of mud-system used
- Delivering comparable (or better) information on reservoir pressure, temperature and fluid composition to that you would expect from an MDT tool

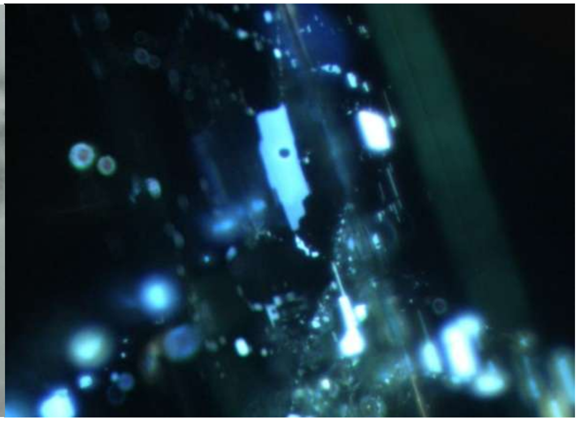


Schlumberger, 2002

PRESSURE TEMPERATURE COMPOSITION

PVTx



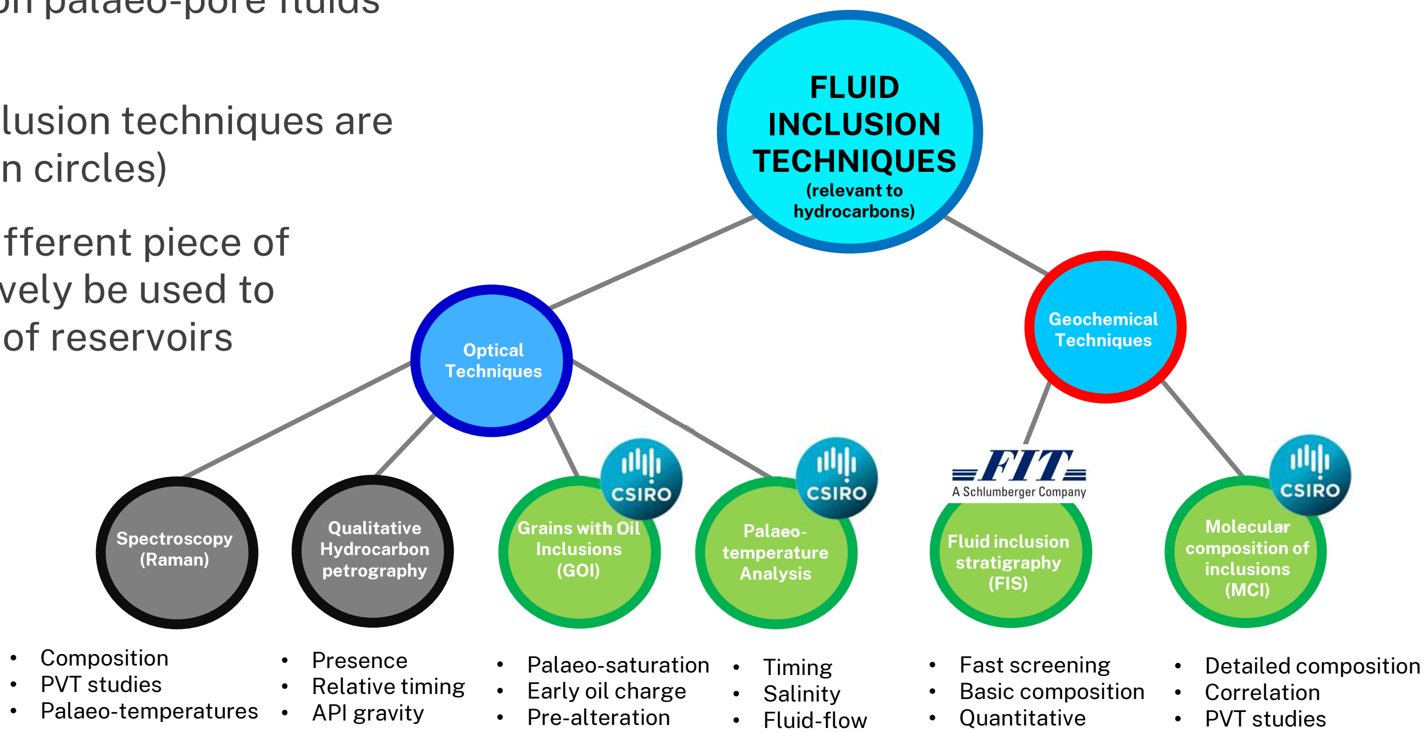


Université de Lille
https://fluid-inclusions.univ-lille.fr/co/004_ice_melting_H2O-NaCl_inclusion.html

Fluid Inclusion Analysis

Methods utilised in this study

- A plethora of techniques have been developed to yield important information on palaeo-pore fluids from fluid inclusions
- Data derived from 4 fluid inclusion techniques are discussed in this study (green circles)
- Each technique provides a different piece of information that can collectively be used to reconstruct the fluid history of reservoirs



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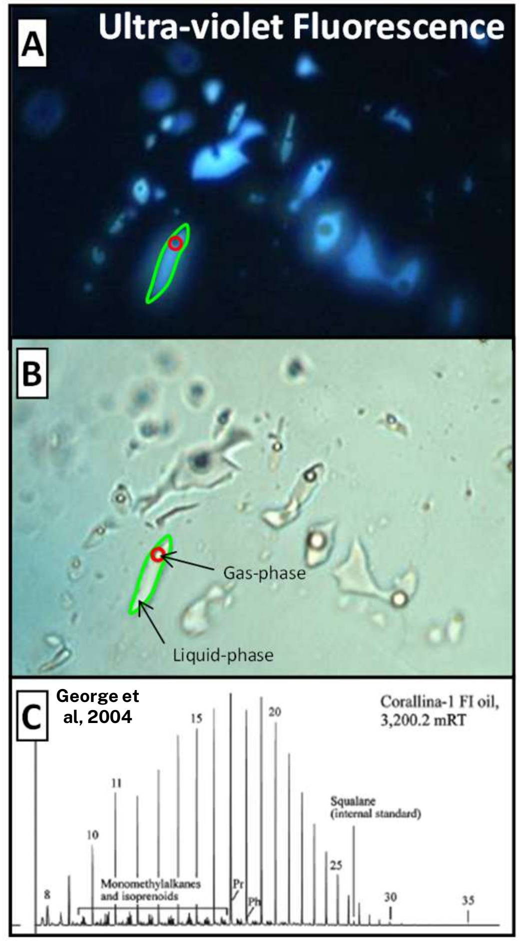
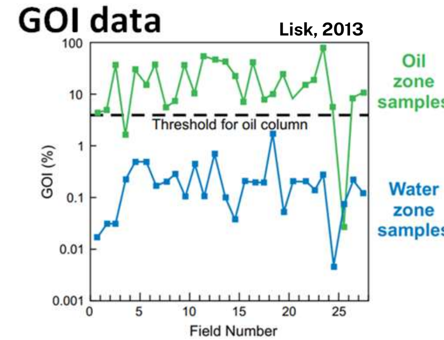
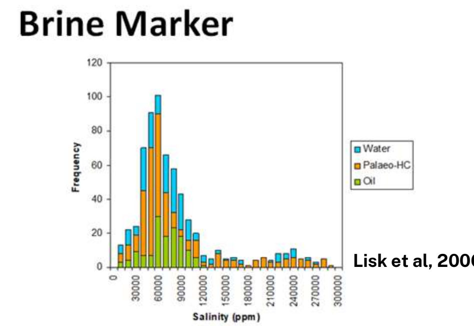
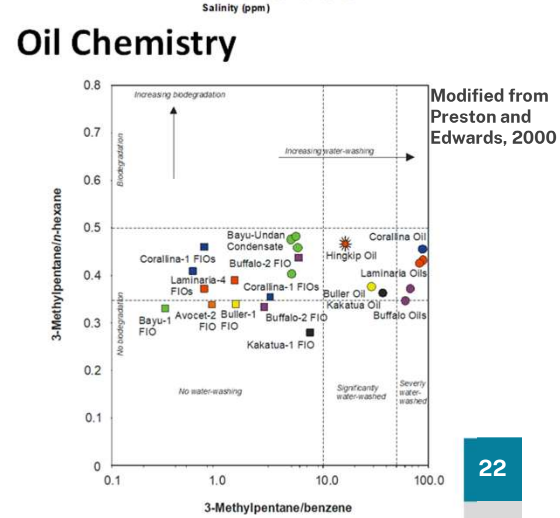
Fluid Inclusion Data Types in Timor

- An inventory of fluid inclusion techniques provides unique insights into the petroleum systems operating in the Timor Sea region
- These provide calibration of the charge system as well as unique insights into trap integrity prediction
- Low cost methods that can be applied to heritage wells and deliver unique insights that move the dial on value creation
- Methods applied to >1000 wells across Australia, Timor Leste and PNG







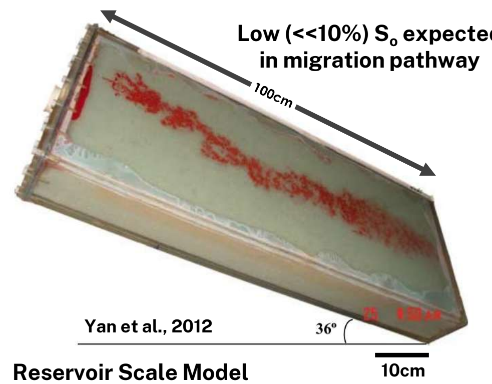


Grains with Oil Inclusions (GOI) Technique

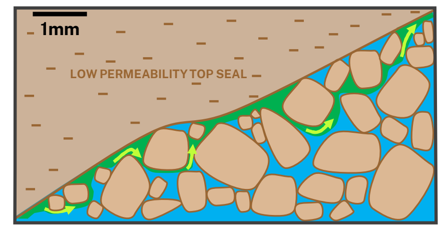
Tool to assess the maximum oil saturation attained

- Patented CSIRO technology that allows palaeo-oil accumulation to be reliably detected irrespective of the drilling mud used or storage time
- Relies on differentiating sandstones used as migration pathways, with low oil saturation (ca. <10%), from either current or palaeo-oil columns where confinement has allowed high oil saturation to develop (ca. >50%)
- Counting grains that contain oil inclusions rather than absolute abundance of inclusions provides a proxy for number of pore spaces exposed to oil and hence correlates with reservoir oil saturation

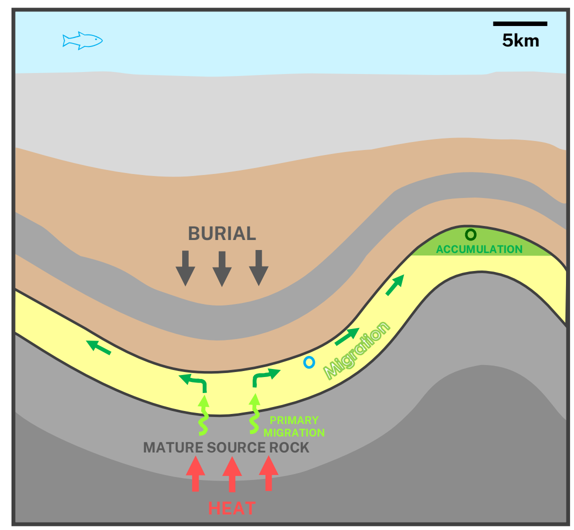
Scaled Physical Model



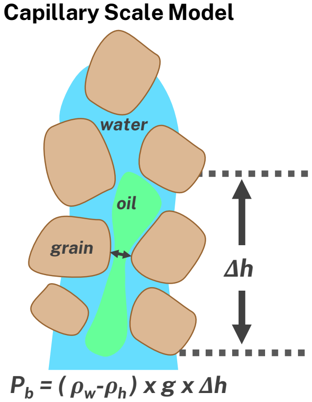
Reservoir Scale Model



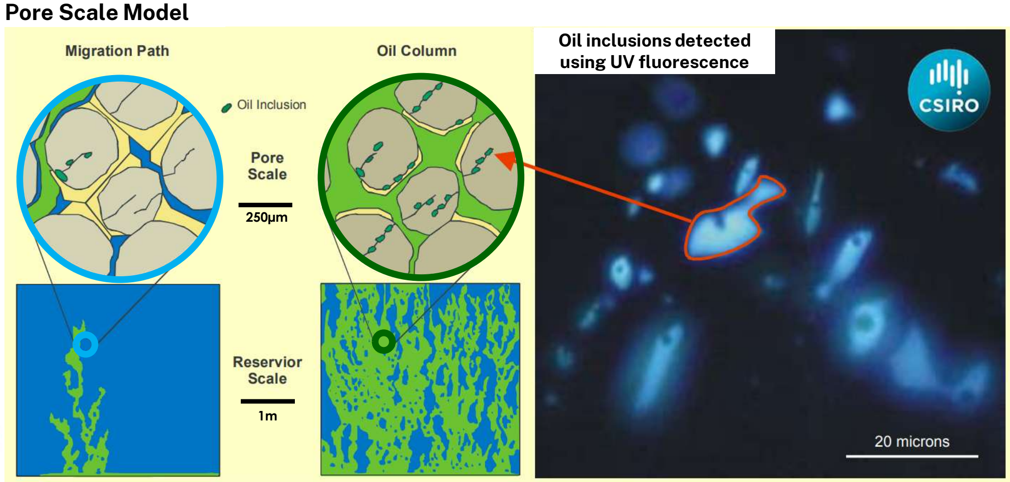
Basin Scale Model



Capillary Scale Model



Pore Scale Model



Lisk et al., 2006

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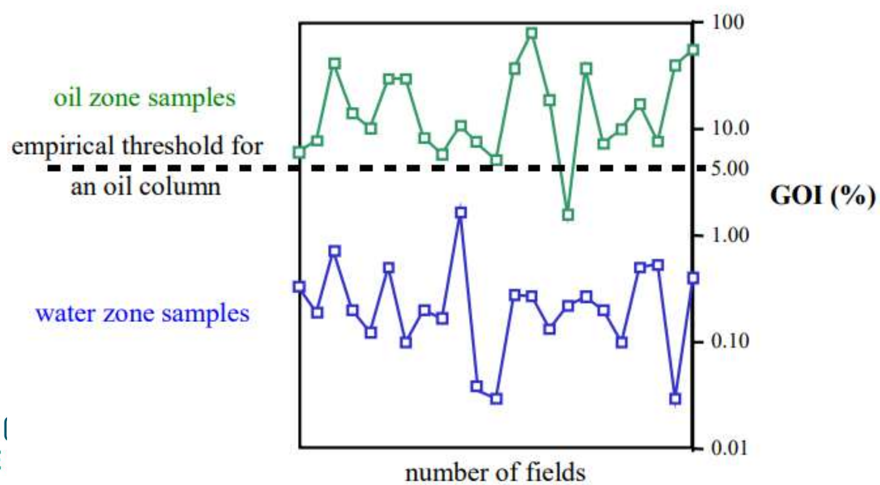
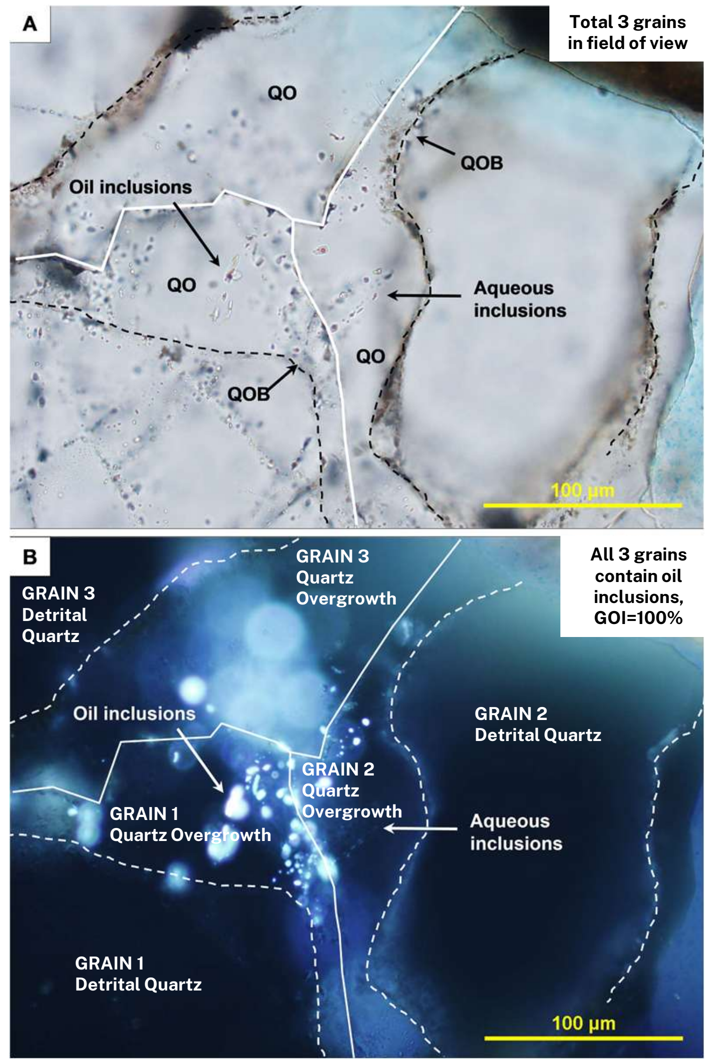
Application of the GOI Method

- Palaeo-oil saturation is assessed using the GOI technique by calibration against a database of GOI measurements recorded on samples from known oil fields
- In this database samples from the current oil-leg show GOI values that are typically one order of magnitude higher in the oil-leg than seen in samples from within the water-leg
- Fluid inclusions are retained where oil is lost due to leakage or gas-flushing to enable zones of high palaeo-oil saturation to be detected from the GOI data





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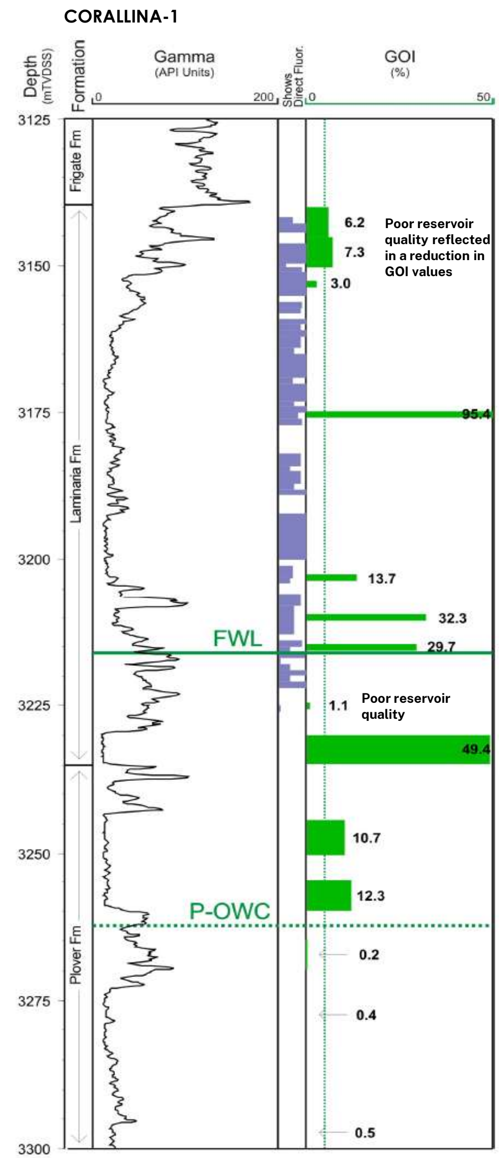
Typical GOI Results

Interpretation protocols

- GOI results obtained from the Corallina-1 well from the Corallina Oilfield demonstrate the utility of the GOI technique
- High GOI values above the empirical threshold derived from the oil-field calibration data set indicate attainment of high oil saturation
- The range in GOI values broadly reflects variations in oil saturation caused by changing reservoir properties (porosity and permeability) within the oil zone
- High GOI values extending below the current free water level are interpreted to reflect a initial high oil saturation below the current OWC at some point in the geological past
- A pronounced and sustained fall in the GOI values records the transition from high to low oil saturation and enable the position of palaeo-OWCs to be defined



From Langhi, et al., 2010

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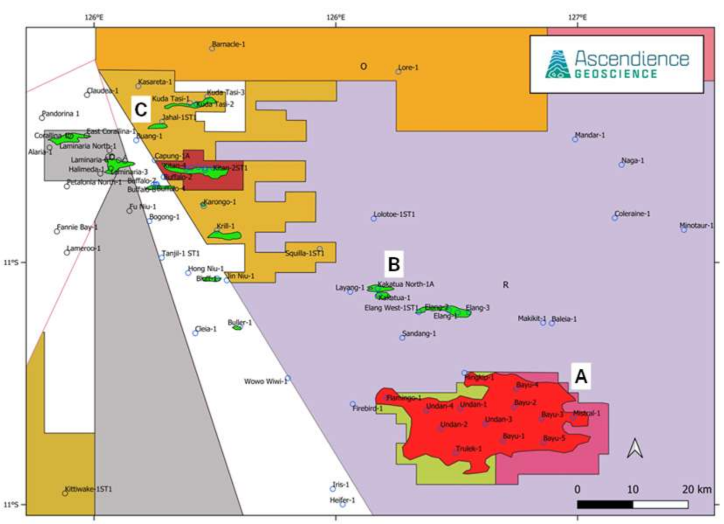
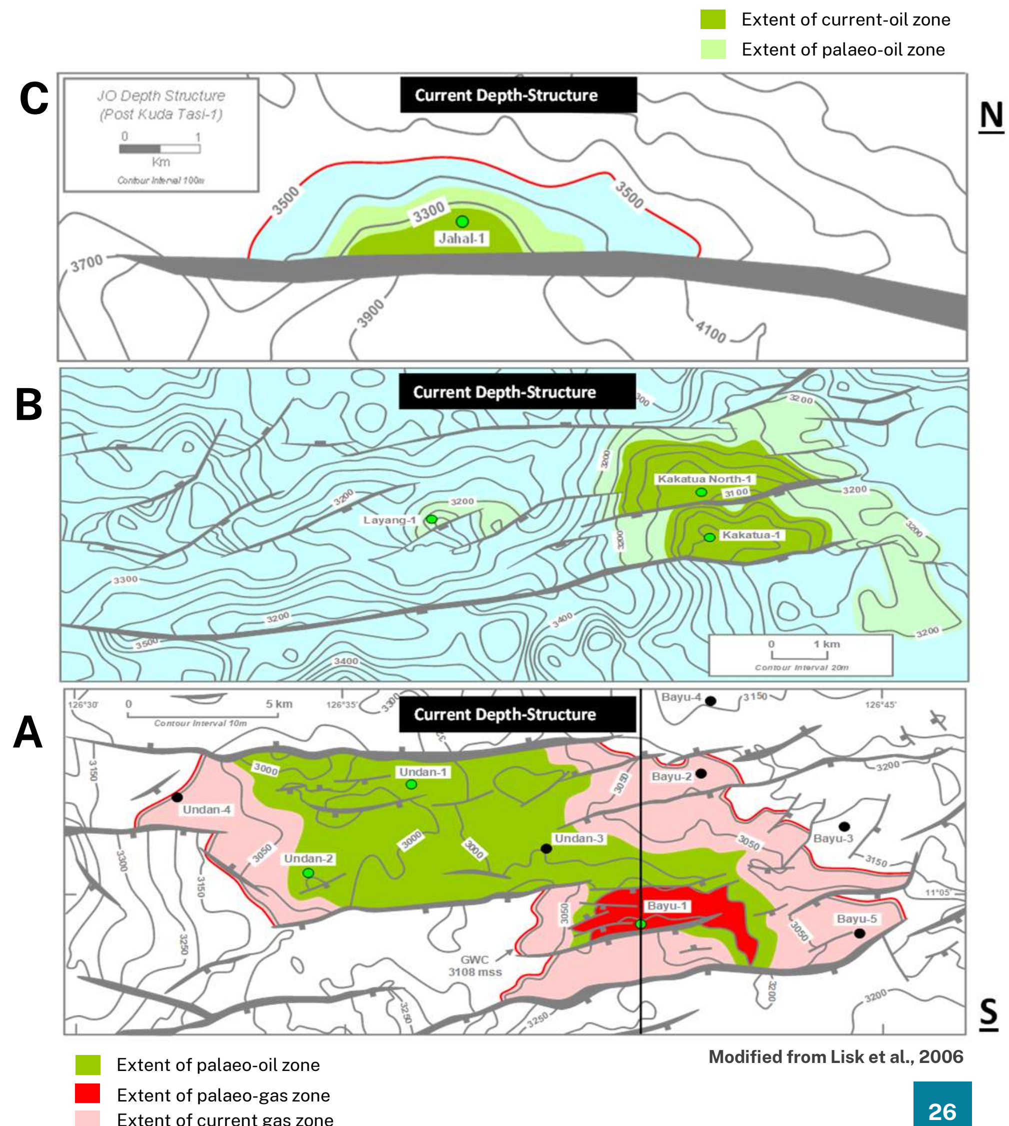
Application of GOI Data - I

Charge and preservation history in current fields

- Examples of GOI results from fields in the TLOA show:
  - A. Prior oil charge to the currently gas filled Bayu-Undan trap (gas-flushing implied)
  - B. Larger palaeo-column height indicating original fill to spill at Kakatua (trap breach implied)
  - C. Larger column height at Jahal but less than the maximum available structural closure (infers a degree of charge limitation as well as trap breach)



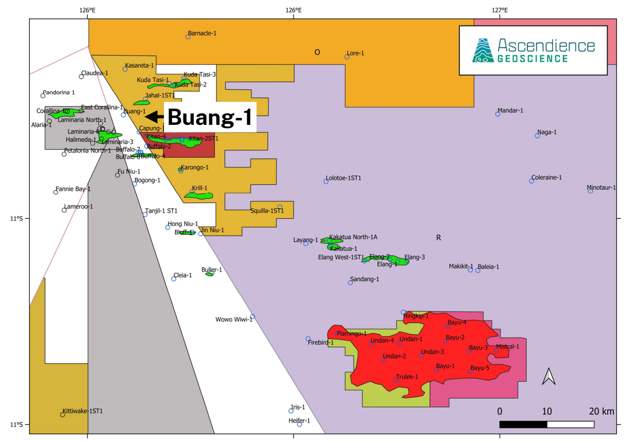


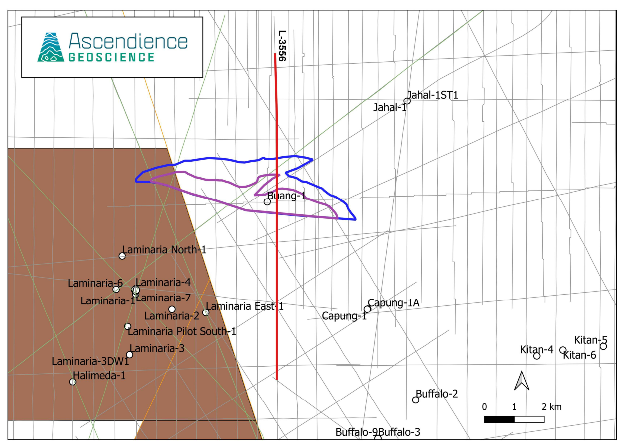
Modified from Lisk et al., 2006

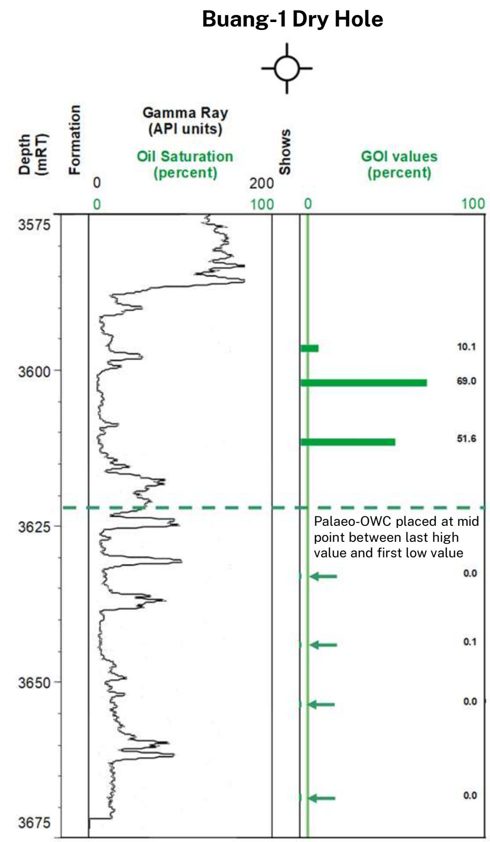
Application of GOI Data – II

Charge and preservation history in currently water-wet wells

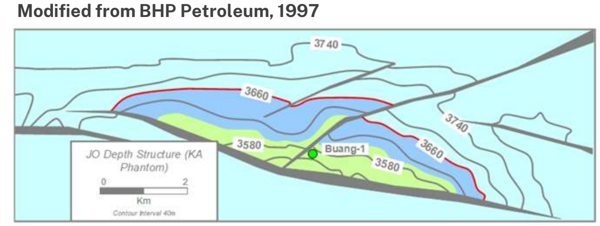
- Recognition of prior oil accumulation in dry holes extends the petroleum systems footprint beyond the known discoveries
- The position of palaeo-OWCs allows the degree of trap fill to be assessed relative to the existing structural spill point
- This may point to a degree of charge limitation or point to the presence of cross-fault passive leak points
- Observations made on multiple wells can contribute to better risking and more accurate volumetrics through improved column height expectations







Modified from BHP Petroleum, 1997



Extent of palaeo-oil leg

Extent of palaeo-water leg

Maximum Trap Extent

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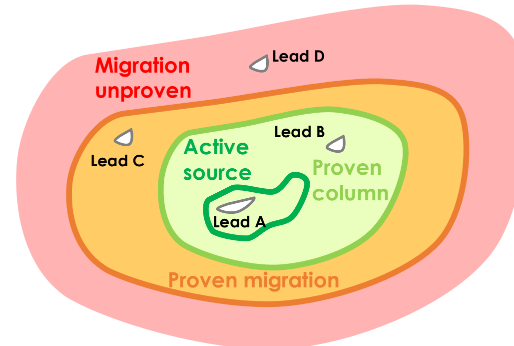
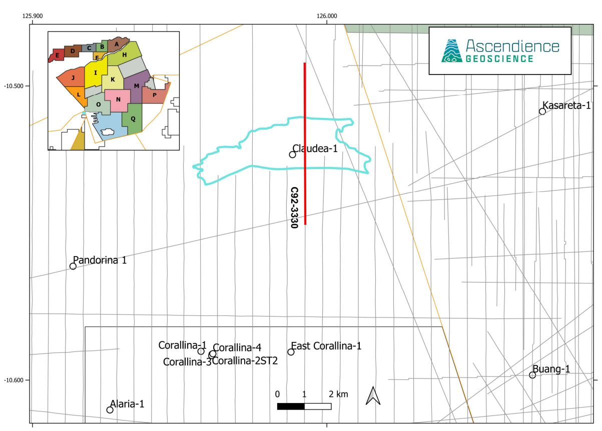
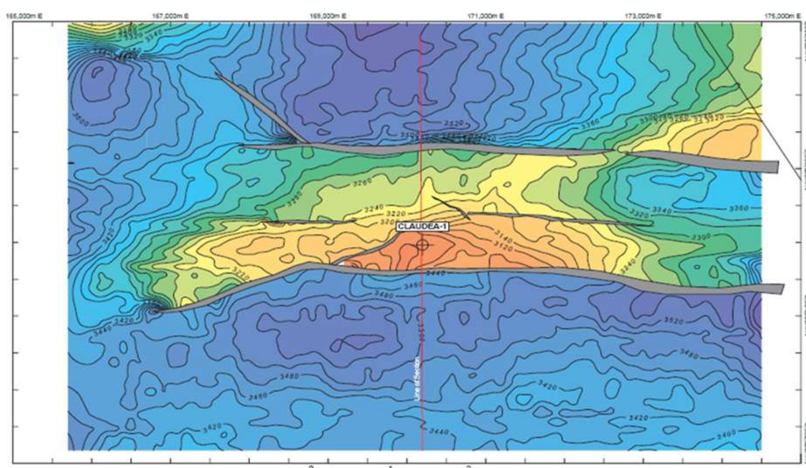
Application of GOI Data – III

Identifying oil migration in water-wet or gas-filled traps

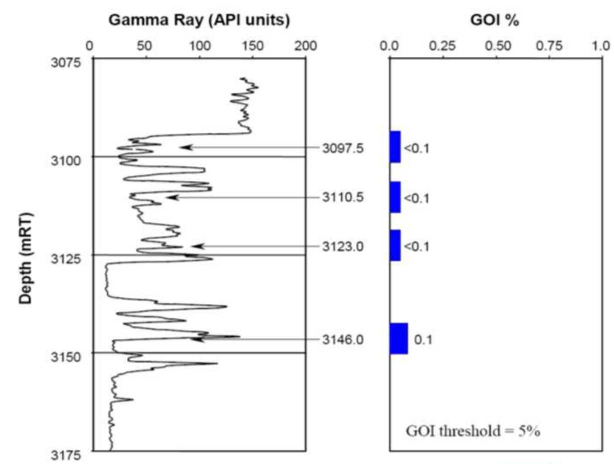
- Drilled structure lacking evidence of current or prior oil accumulation point to either an invalid structure or lack of charge access
- Robust traps that were never filled with oil point to restricted charge access allowing the effective migration halo to be better constrained
- Improved ranking of undrilled prospects will lead to better choices that help to polarise the value of the remaining exploration portfolio





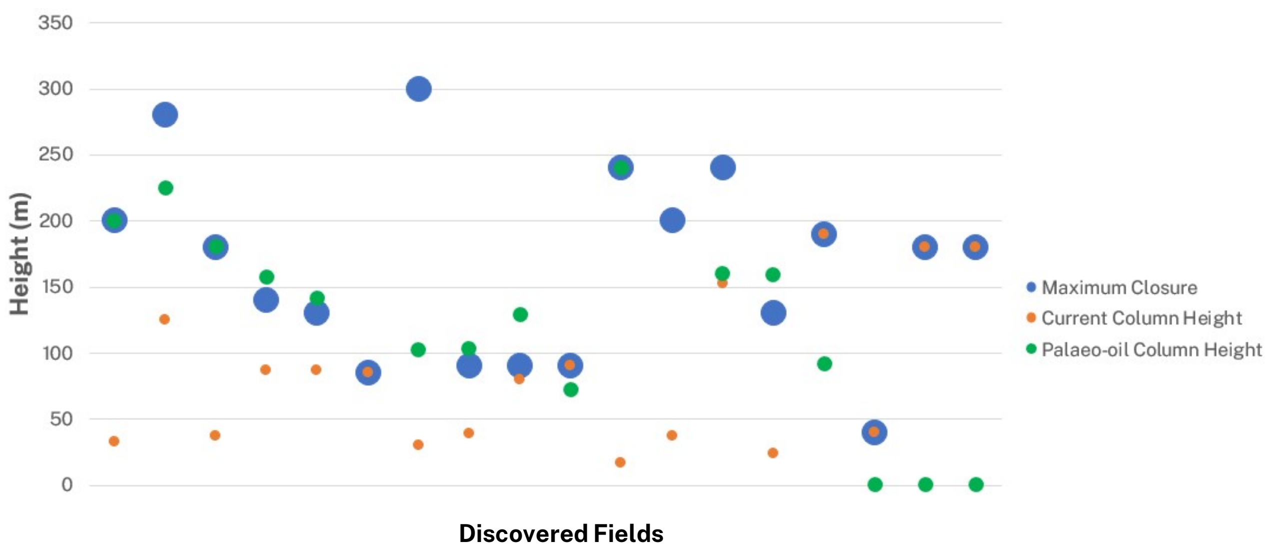


From Woodside Energy Limited, 1999a



Column Height Observations – Timor Leste

- Current columns are generally not filled to spill except where gas is the reservoired fluid
- Palaeo-oil column heights more regularly achieve a filled to spill outcome with some examples where palaeo-trap closure height may have been larger than seen today
- The distribution of traps where charge was unable to achieve fill to spill is informative wrt to potential charge limitation but could also reflect increases in trap size as a result of Neogene reactivation



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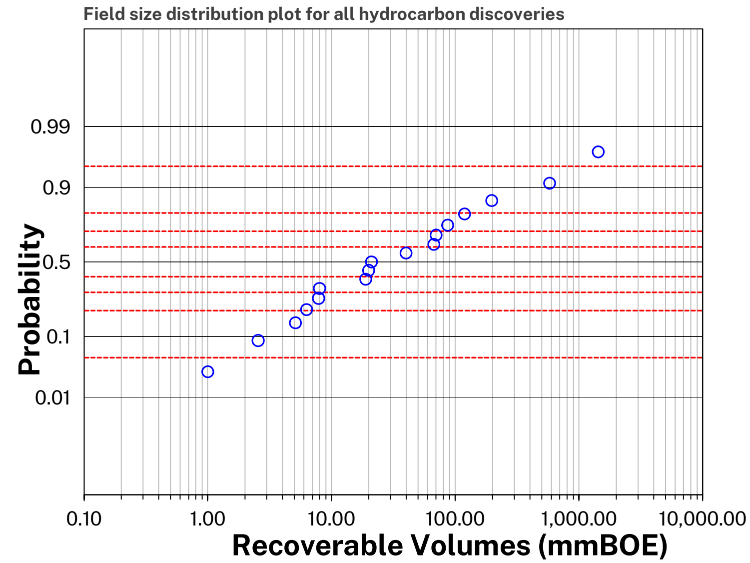
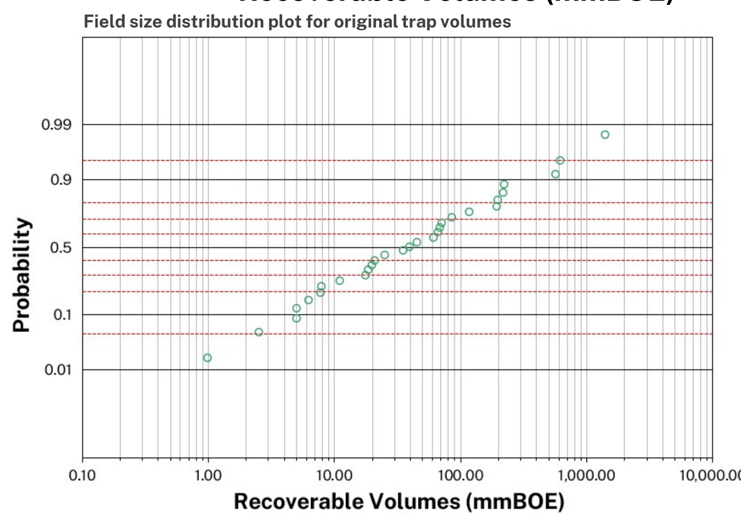
Estimate of Volumetric Losses

- Volumetric calculations utilising a simple area-yield relationship derived from oil fields with reported recoverable volumes converted to BOE allow the volumetric loss due to trap breach to be estimated
- Mapped maximum closure area and original column height from GOI derived palaeo-OWCs have been used to estimate original oil volumes and to reconstruct a field size distribution plot that existed prior to trap breach
- P50 volumes for the initial trap fill are double what exists today with total recoverable volume of nearly 900MMbbl for the study AOI





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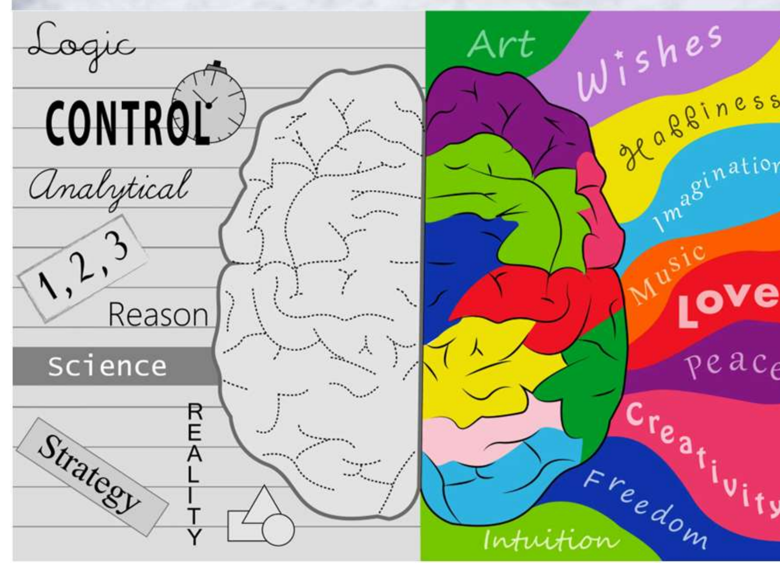
- Technology is the enabler, but ideas drive success
- Time for a new idea



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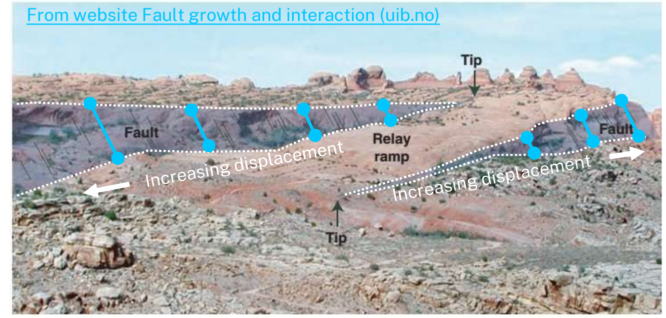
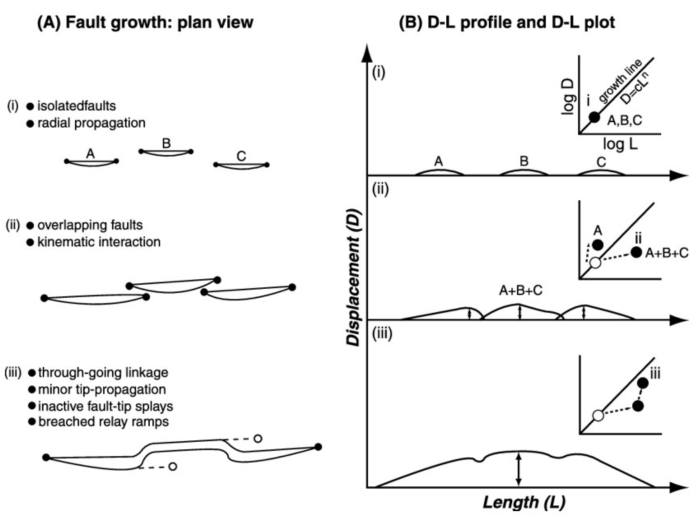
Strain Localisation Concept

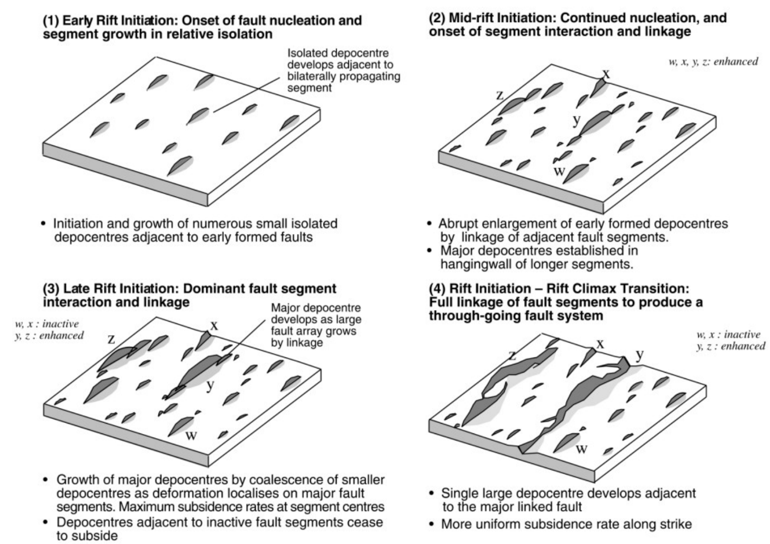
Generic Fault Growth Model

- Partitioning of strain onto fewer, better-connected faults represents efficient accommodation of fault related deformation
- As strain increases an initial fault population consisting of large numbers of small displacement normal faults evolves into a smaller number of longer larger displacement faults (Cowie et al., 2000)





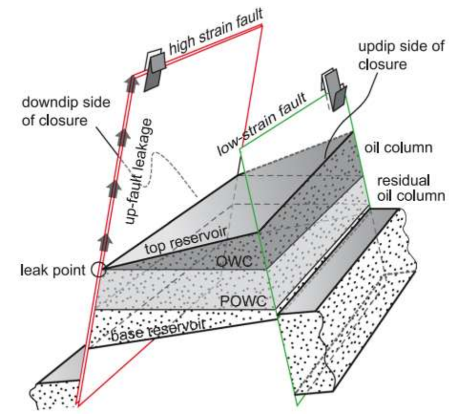
Jackson et al 2002



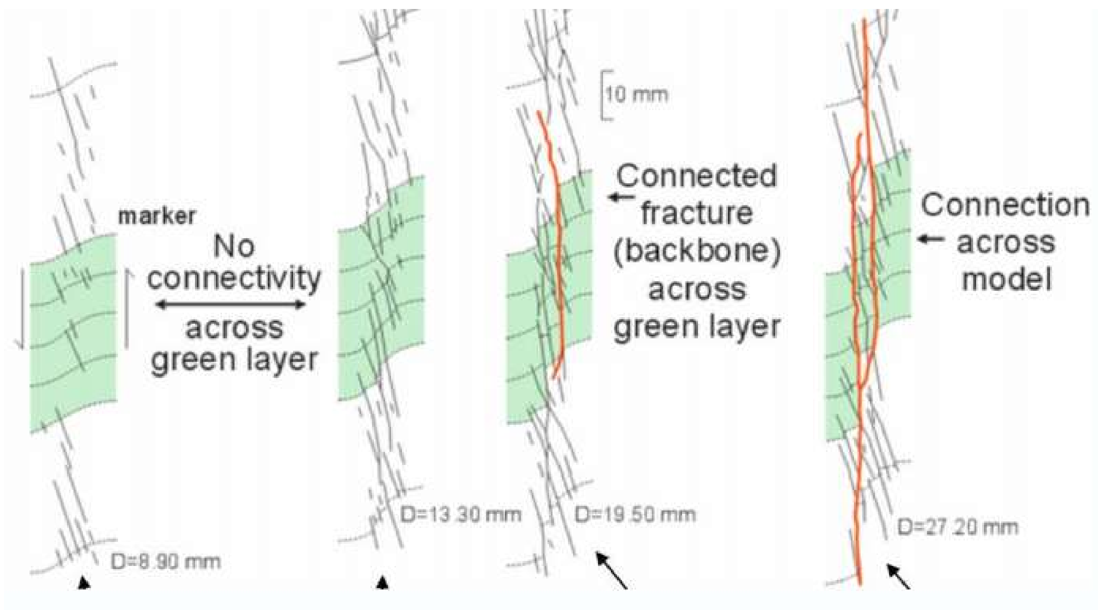
Gill, 2005 (after Cowie et al., 2000)

Fault Leakage Potential

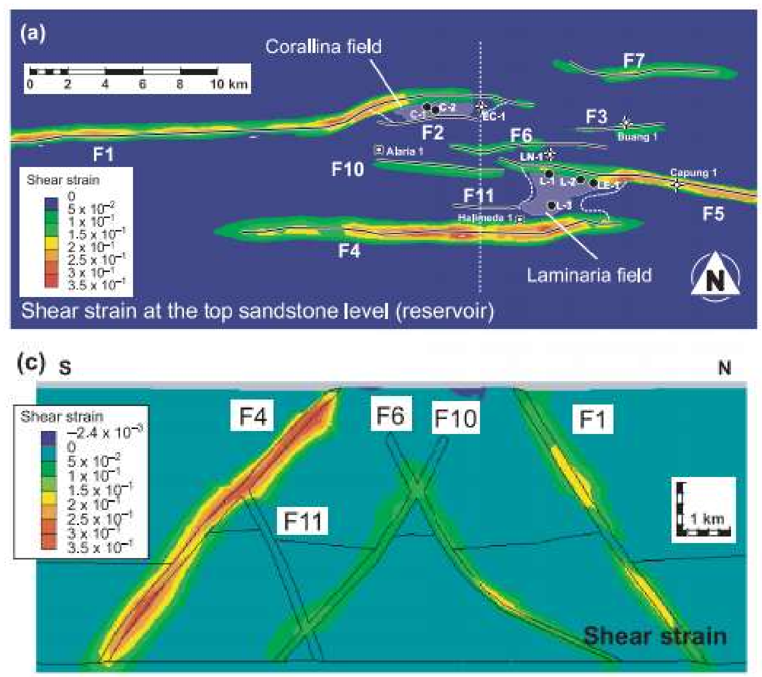
- Shear strain accumulation approximates the degree of structural permeability a fault displays
- High shear strains increase the probability that fault planes facilitate leakage

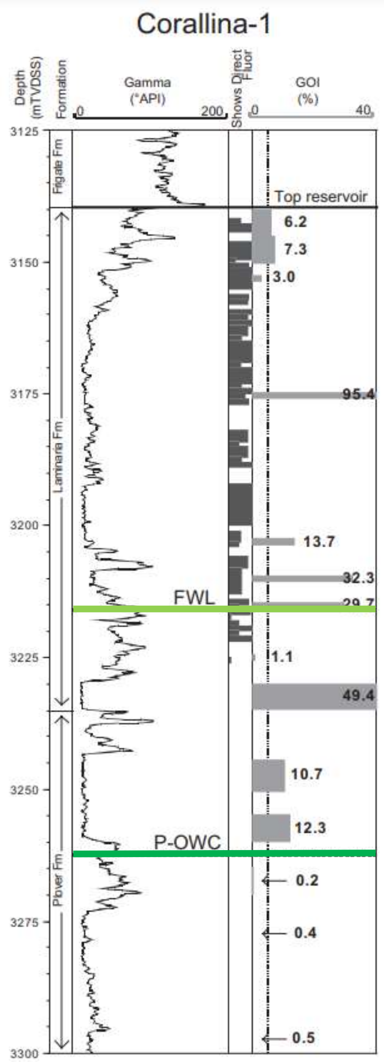


From Langhi, et al., 2010

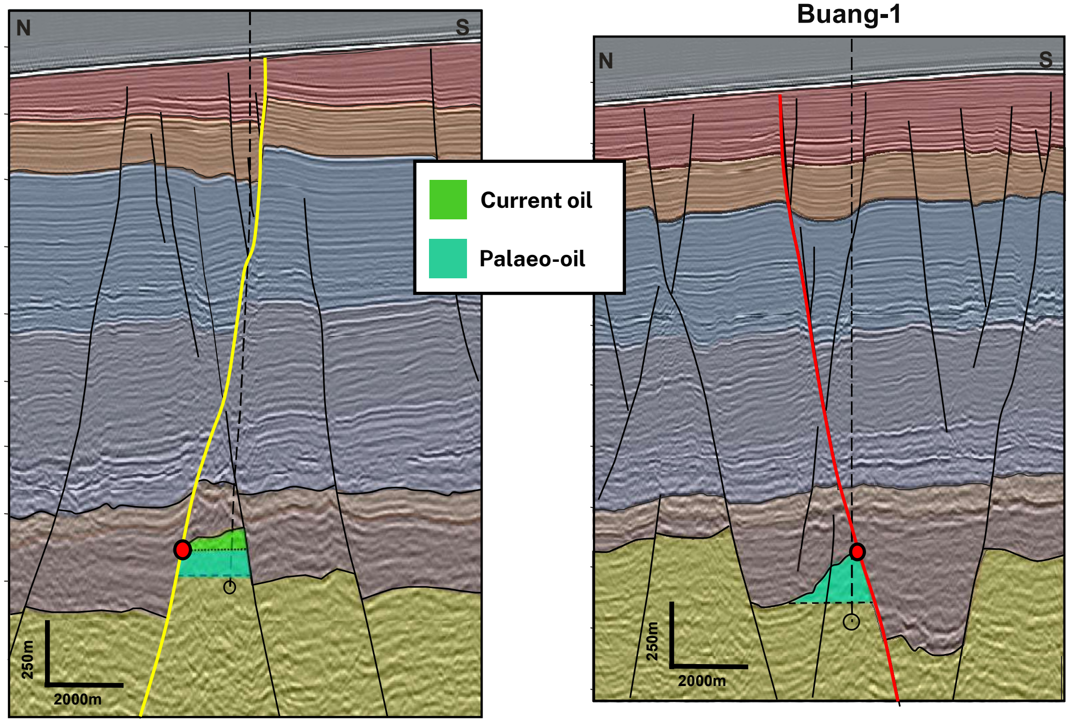


After Tchalenko, 1970

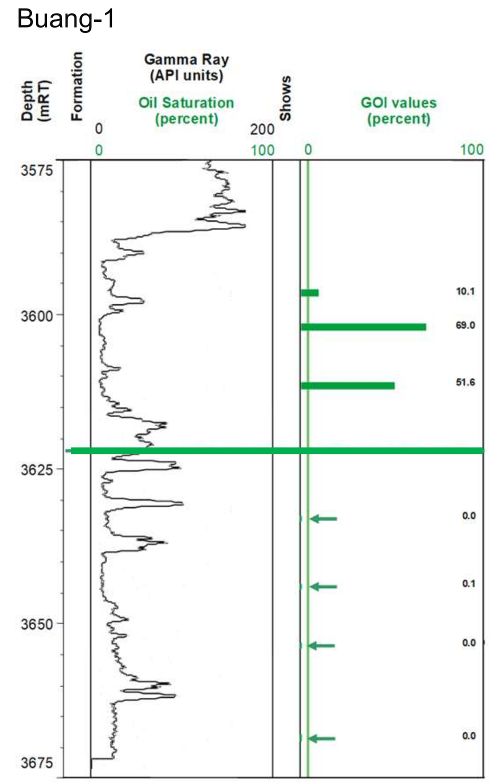




Model Calibration Examples



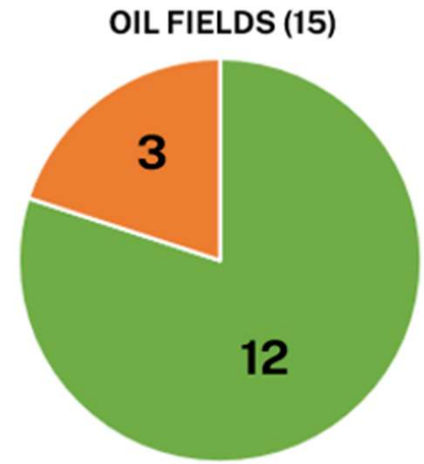
- Fault reactivation causes partial loss, but a commercial accumulation is retained
- Fault reactivation causes complete loss, with an expensive and unnecessary dry hole the result



Modified from Gartrell et al., 2006

Model Calibration

- The Strain Localisation Model provides a tool to assess trap breach risk based on the geometry of fault-bound traps and the degree of post-rift reactivation strain different faults experienced
- This simple observational model has been calibrated using drilled traps with different charge and retention histories
- Charge history is constrained from abundant fluid inclusion data using techniques widely applied across the basin, but not previously integrated into a regional model
- Drilled traps with different charge and retention histories were evaluated to assess their adherence to the proposed strain localisation model using a consistent methodology



Prediction History Match
80-100%

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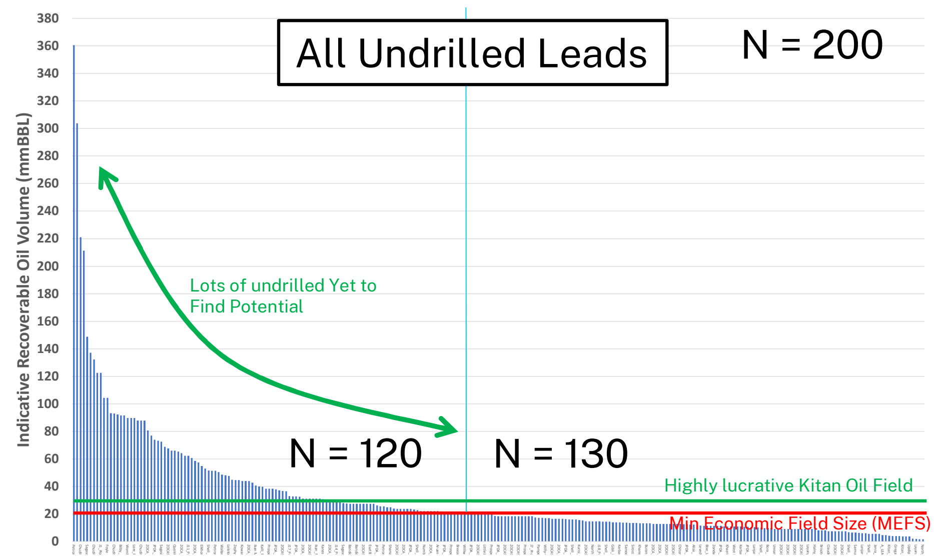
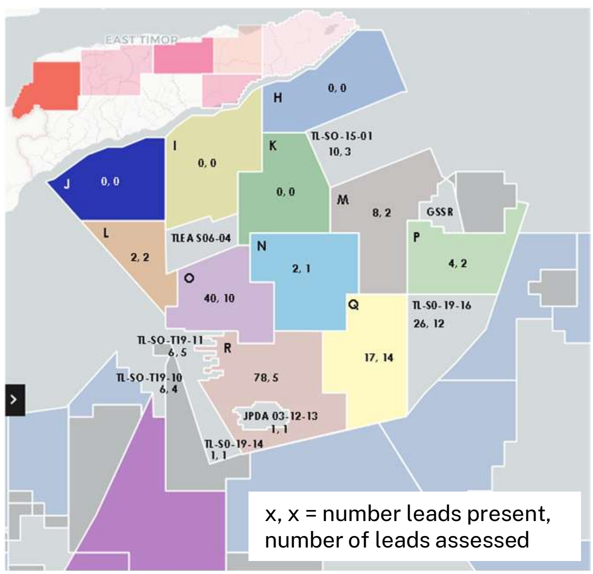
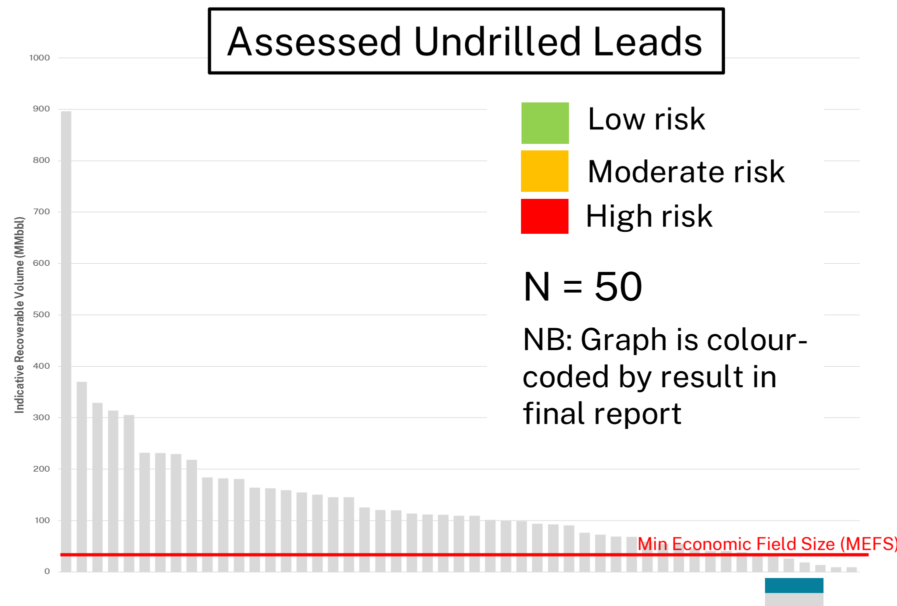
Leads and Prospects

Prediction phase

- Seriatim of 200 previously identified leads and prospects drawn from public domain sources
- Simple area-yield (bbl/km2), calibrated to local oil fields, used to complete indicative screening volumes
- Smallest commercial field used as cut-off for viable opportunities to screen out small traps
- Calibrated trap Integrity Assessment completed for 50 undrilled leads (see map for distribution)
- Calibration based on all discoveries, all palaeo and residual columns and a selection of valid dry holes







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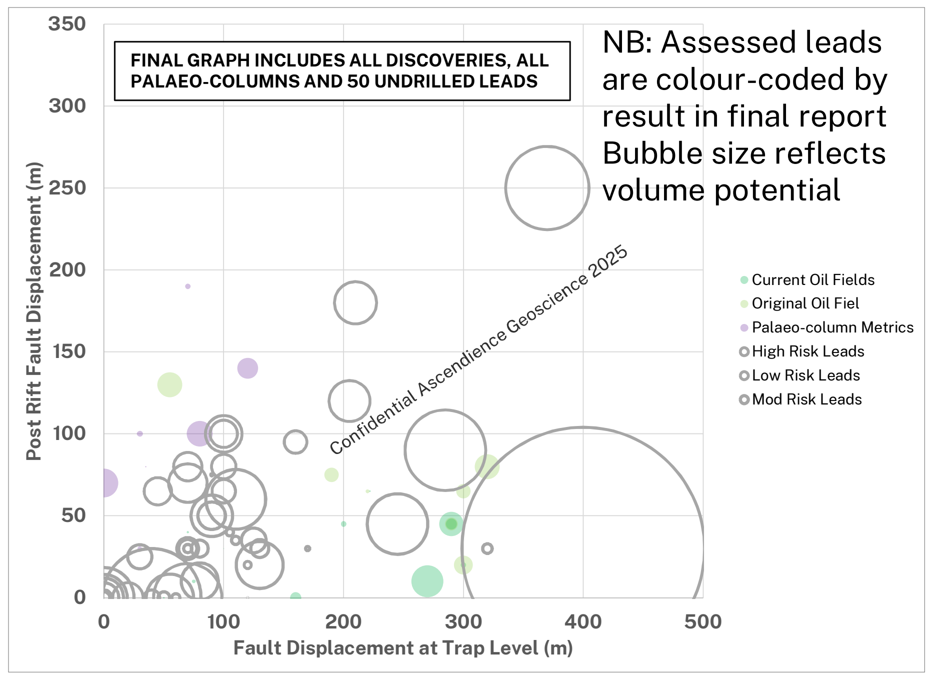
Applying Calibration to Undrilled Leads

- Results from undrilled leads are calibrated against data from the drilled traps for intact, breached or never charged features
- Level of post-rift displacement a key measure but integration with other observations such as fault geometry also critical
- Assessment against other standard petroleum systems elements also required to high-grade the best opportunities for future drilling

Current Oil field – Calibration point
Partially Breached Oil field – Calibration point
Fully Breached Oil field – Calibration point
Undrilled Lead – Low Risk
Undrilled Lead – Moderate Risk
Undrilled Lead – High Risk



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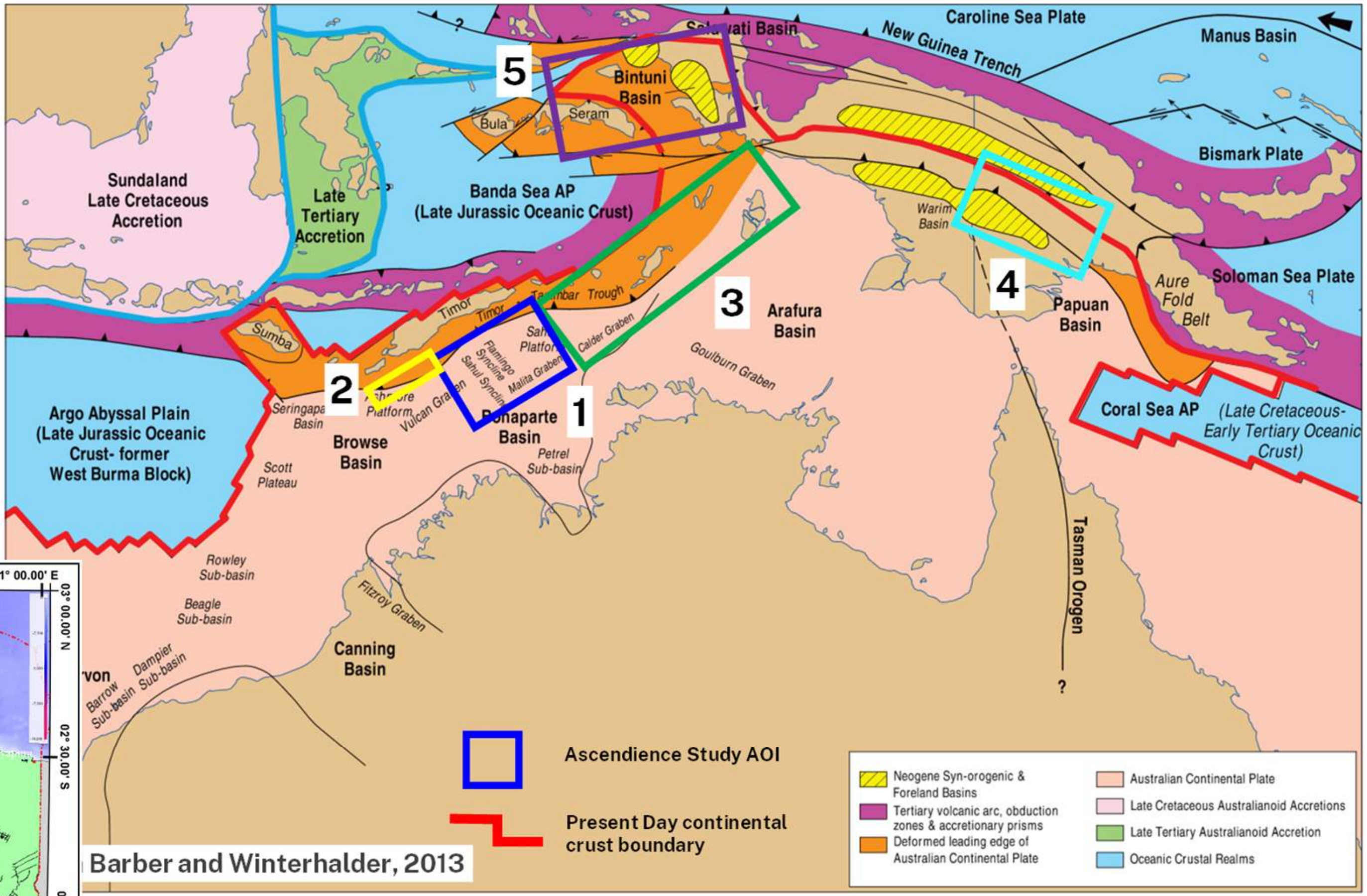
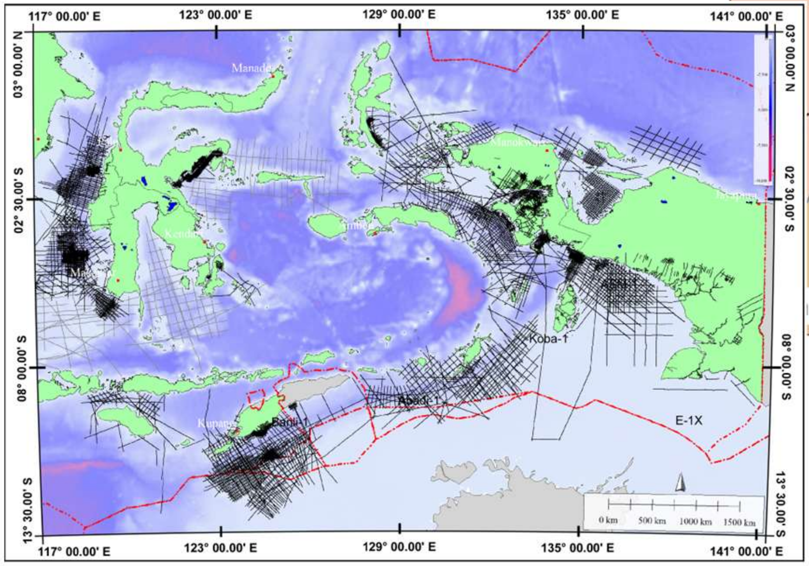
2. West Timor



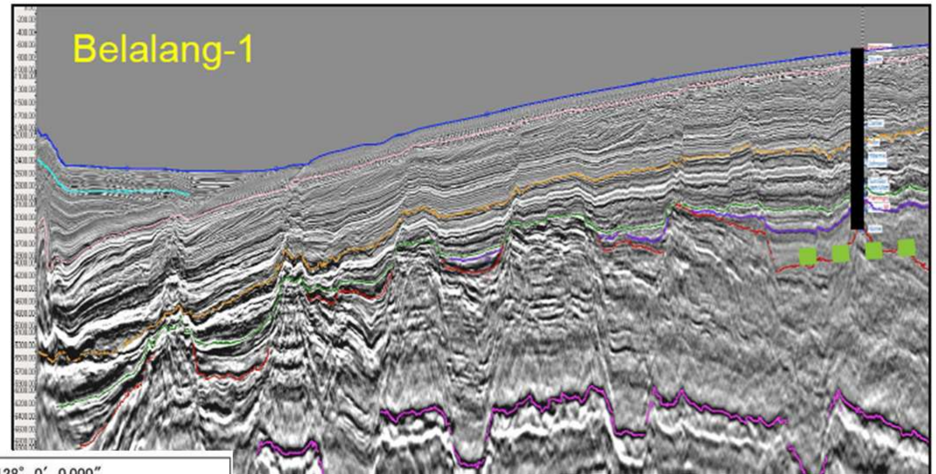
Sapiie, 2023

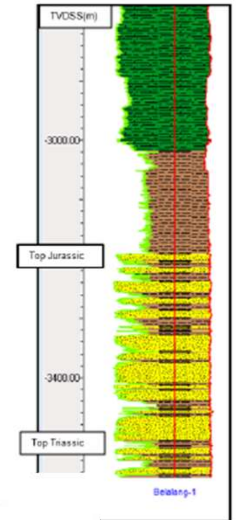


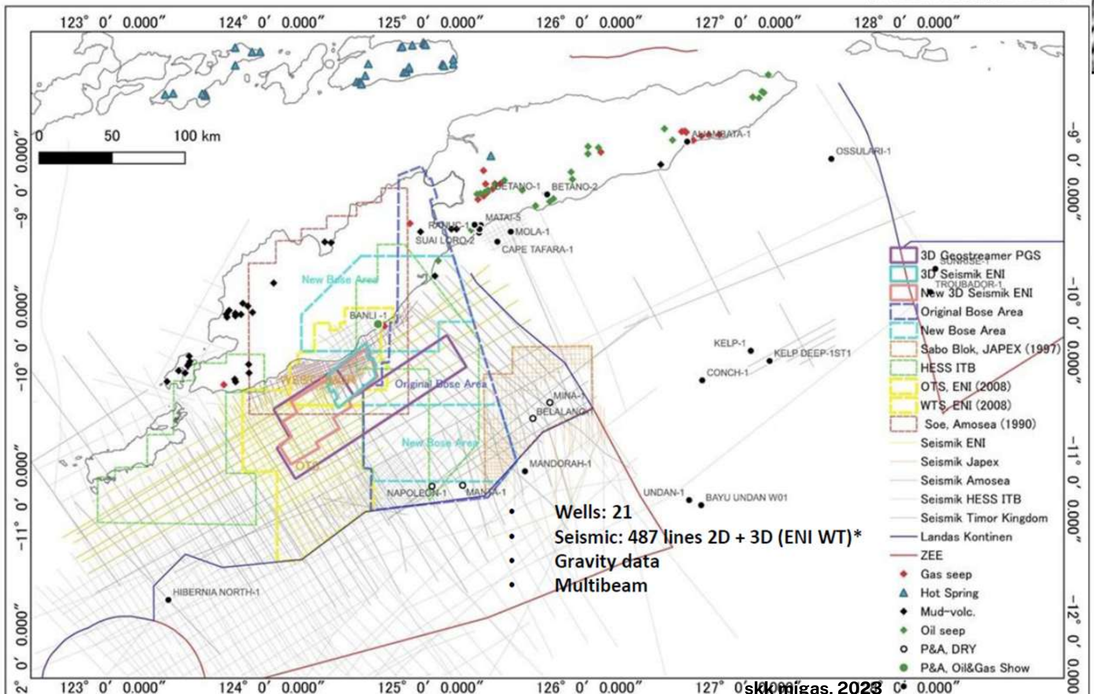
West Timor

- Wells drilled in West Timor remain confidential but hold a very interesting story that can leverage learnings from Timor Leste to reduce risk

Baillie et al., 2019

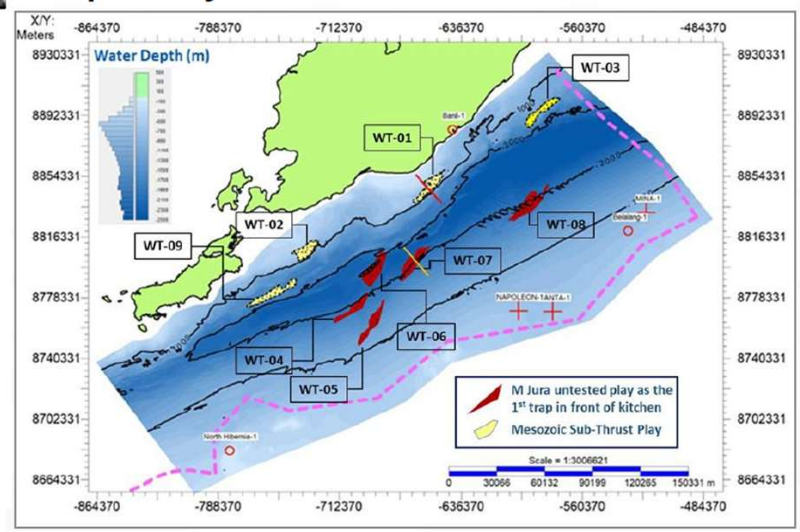






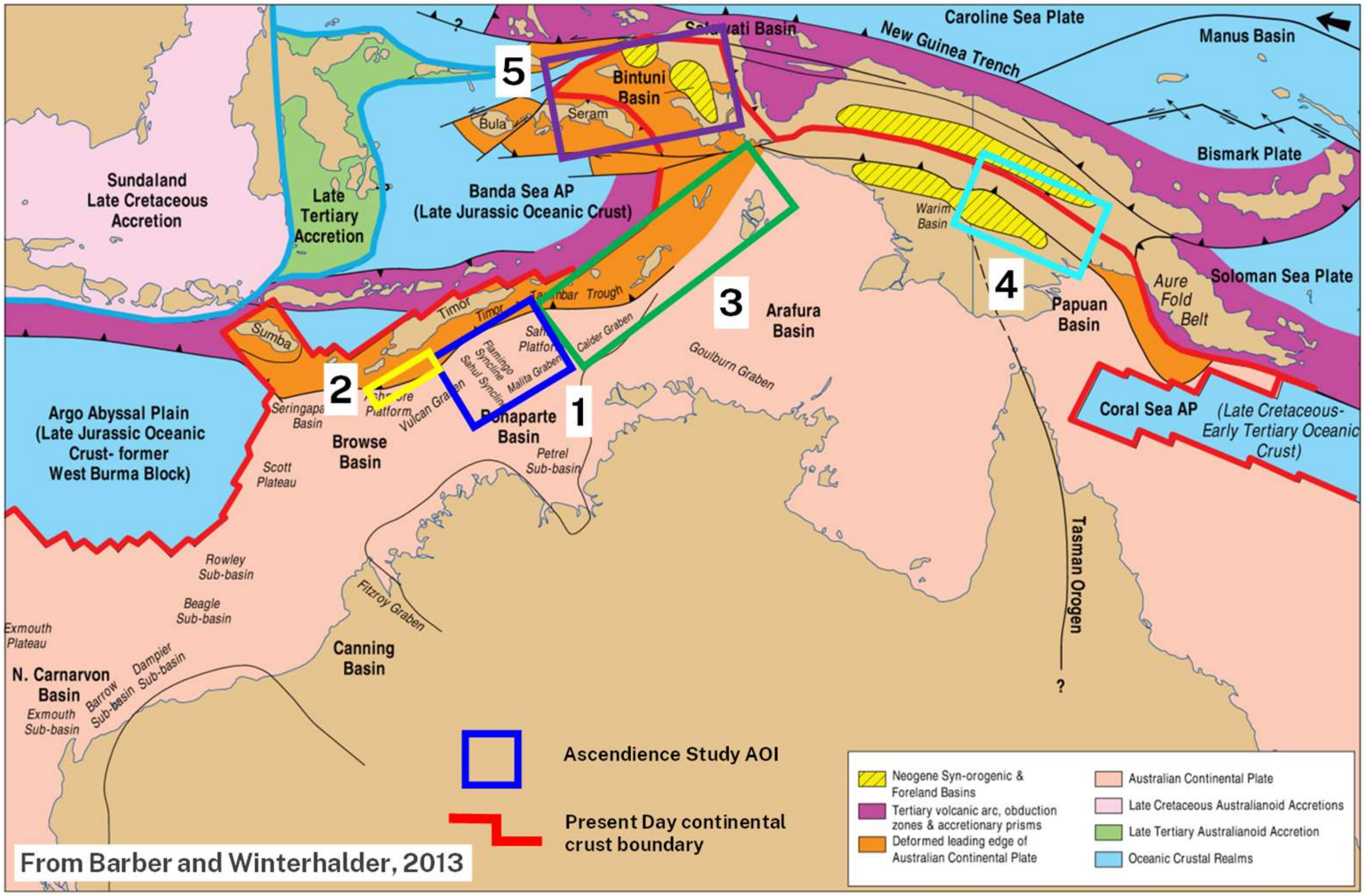
skk migas, 2023

Prospectivity



skk migas, 2023

3. Tanimbar

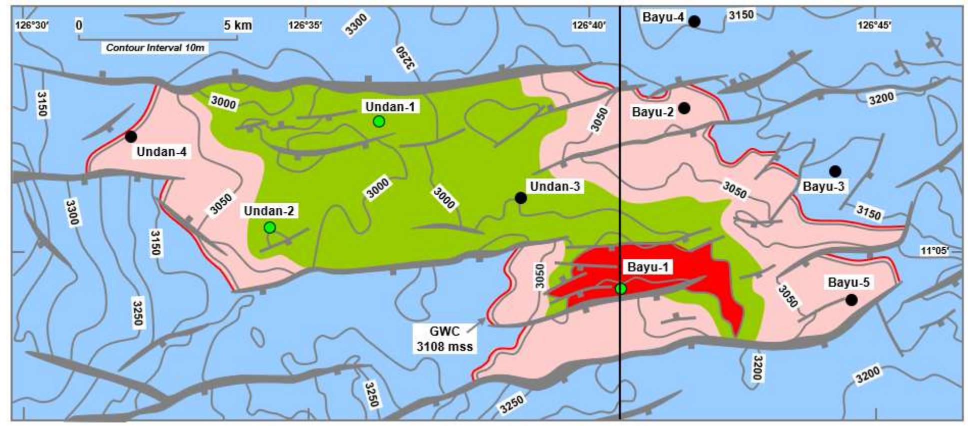


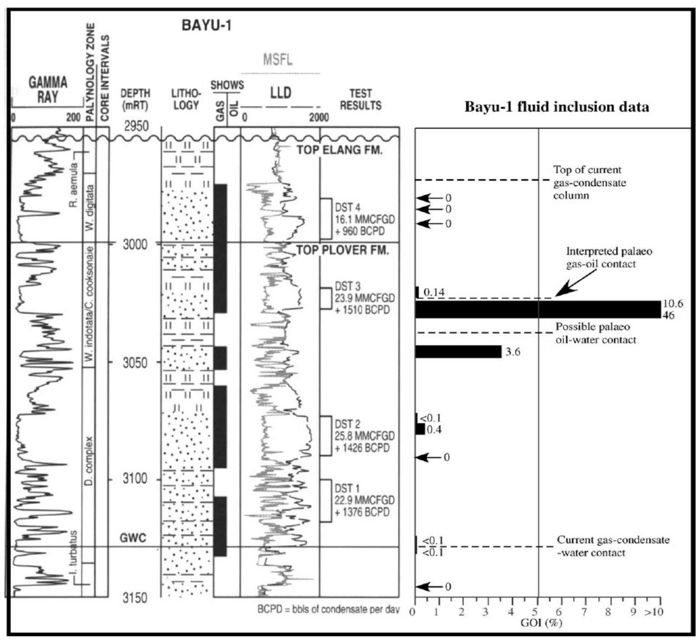
From Barber and Winterhalder, 2013

Bayu Undan Gas Field

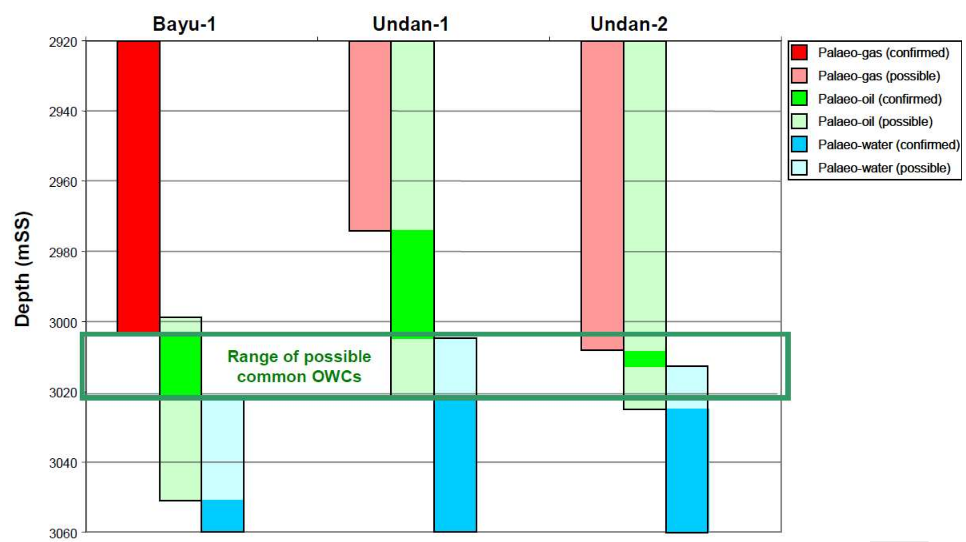
- GOI data across multiple wells on the field support original charge being gas over an oil rim
- Significant palaeo-oil zone recognised within the currently gas-charged Jurassic reservoir
- NFE opportunities for flushed oil

Lisk et al., 2006





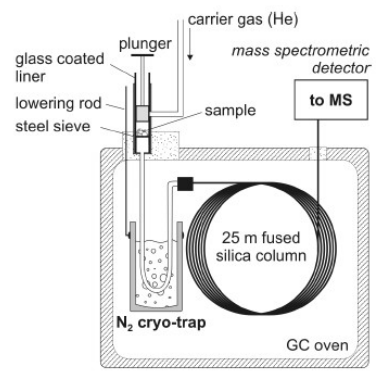
George et al., 1998



Molecular Composition of Inclusions (MCI)

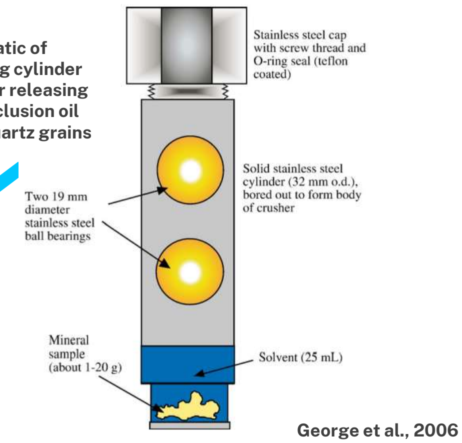
Analytical methodology

- Samples are thoroughly cleaned to remove any surface contamination using strong solvents
- Typically, analysis involves two discrete steps
    1. Large sample fraction is crushed to release oil into solvent that is analysed using GC-MS
    2. Smaller sub-set sample fraction crushed and contents swept directly onto the GC
- Step 1 samples the heavy molecular weight compounds (Offline analysis)
- Step 2 samples the low molecular weight compounds (Online analysis)
- Very detailed results similar to that attained by conventional oil analyses is achievable



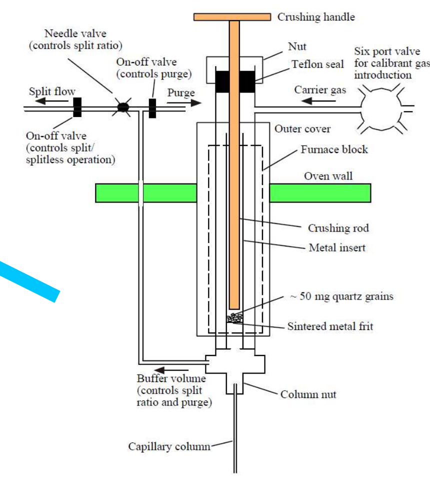
OFFLINE

Schematic of crushing cylinder used for releasing fluid inclusion oil from quartz grains



George et al., 2006

ONLINE

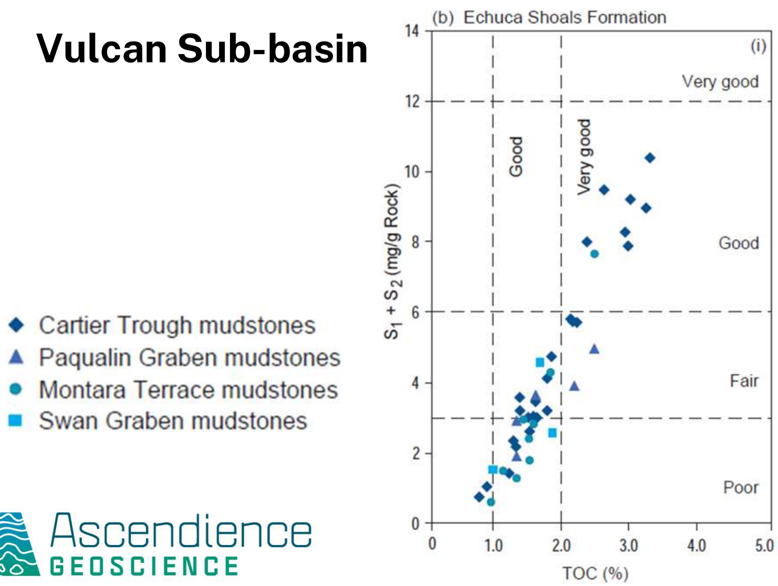


Schematic of Quantum MSSV-1 Thermal Analysis System used for releasing fluid inclusion oil from quartz grains by online method

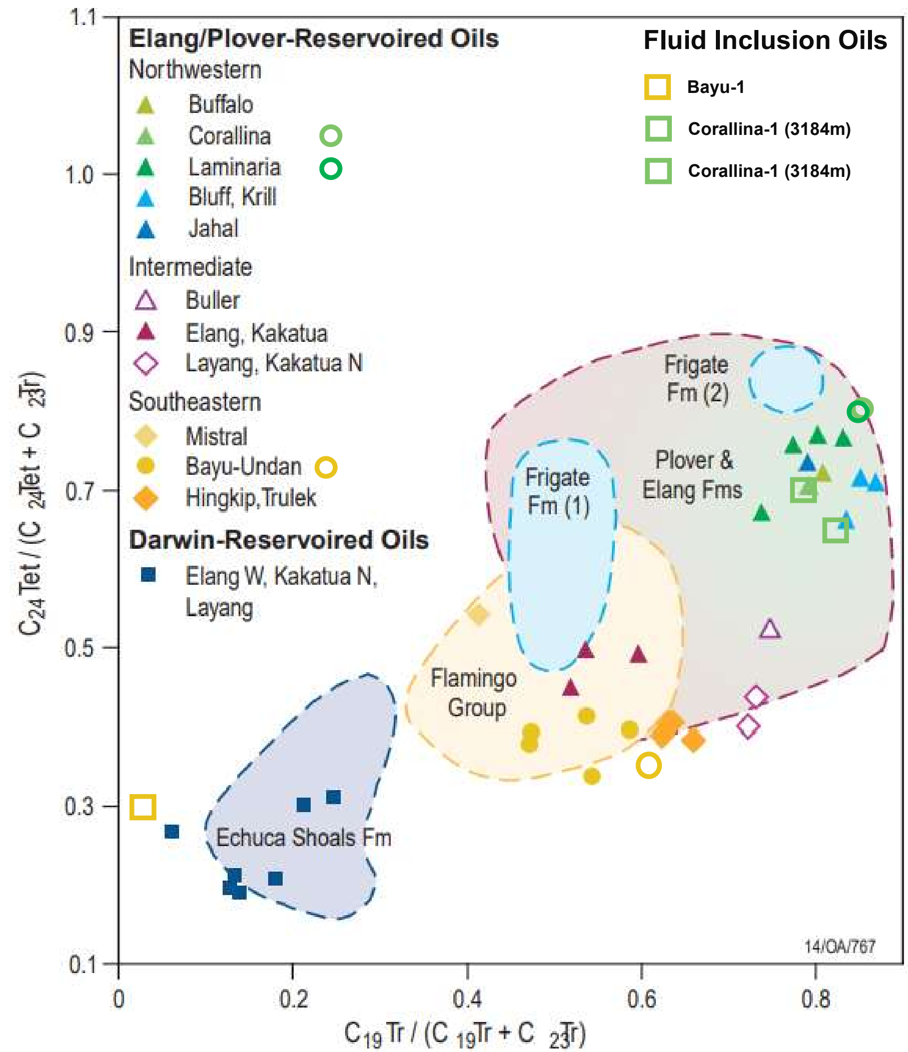
Source Matching Summary

- Fluid inclusion oil from Bayu-1 is geochemically distinct from the condensate reservoired in the field
- Differences imply derivation from a more marine source rock facies with a greater calcareous input typical of the Cretaceous Echuca Shoals Fm

Vulcan Sub-basin



From Edwards et al., 2004



Modified from Preston and Edwards, 2000

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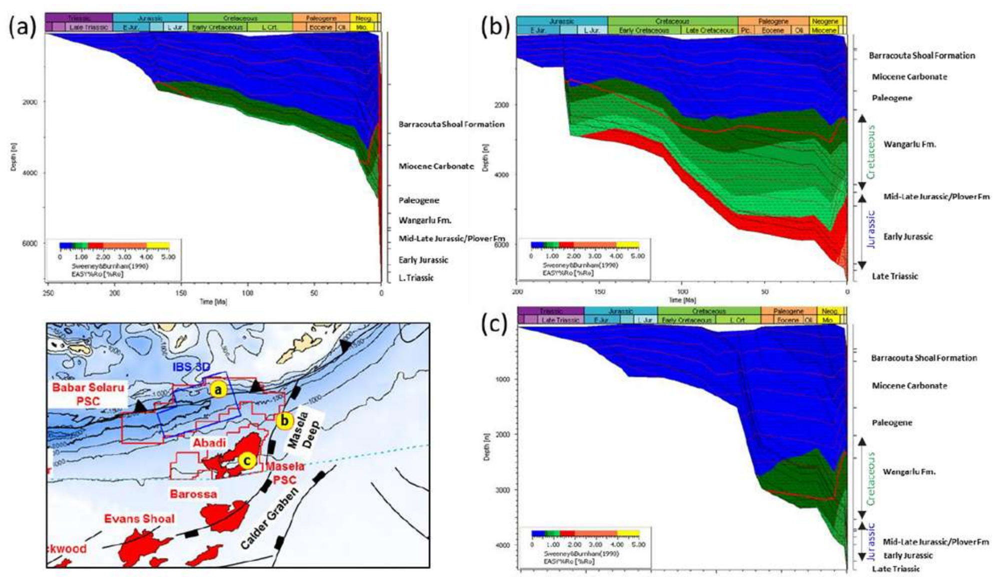
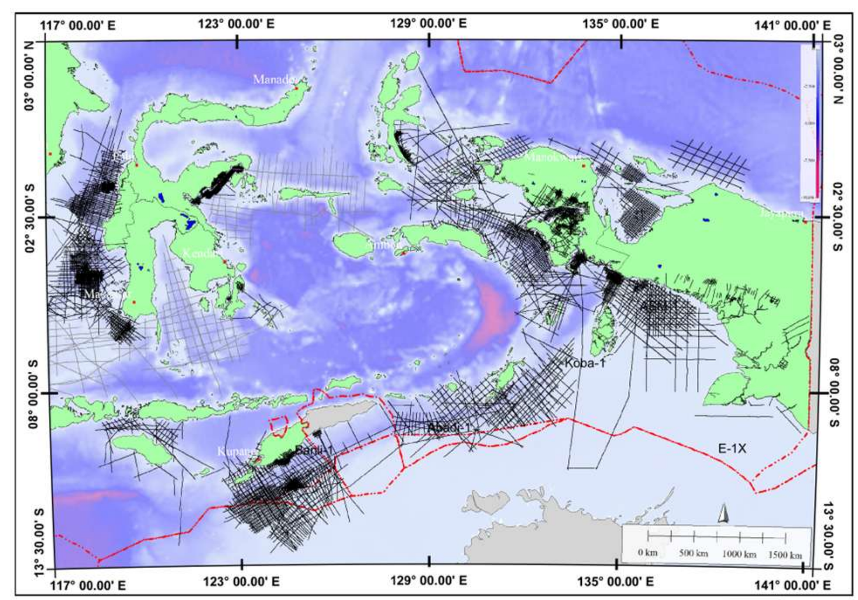
Abadi Near Field Oil Play?

- Published basin modelling results suggest potential exists for equivalent facies to Cretaceous oil prone source rocks in the Vulcan Sub-basin to be oil-mature in the Masela deep
- Use of fluid inclusion data to confirm an early oil charge to the Abadi gas field could re-rate near field exploration potential in the area and define a new play in the area



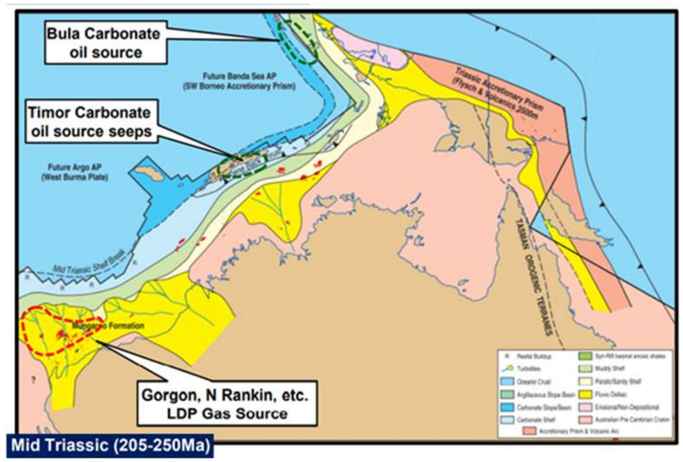
From Saputra and Ohara, 2016

From Sapiie, 2017

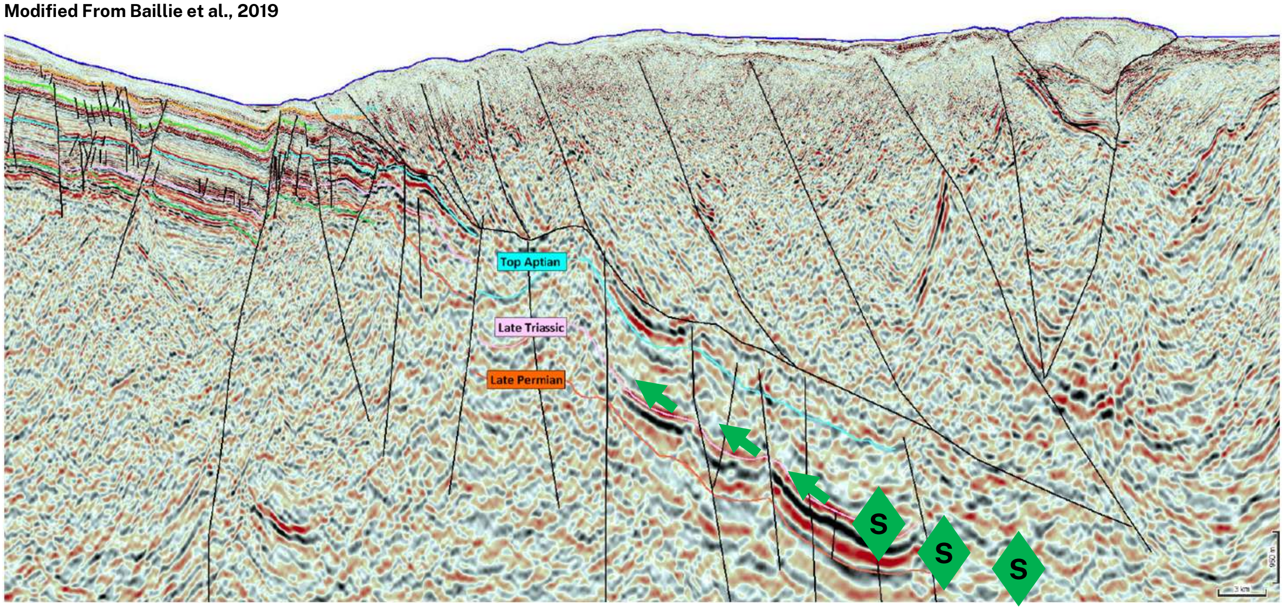


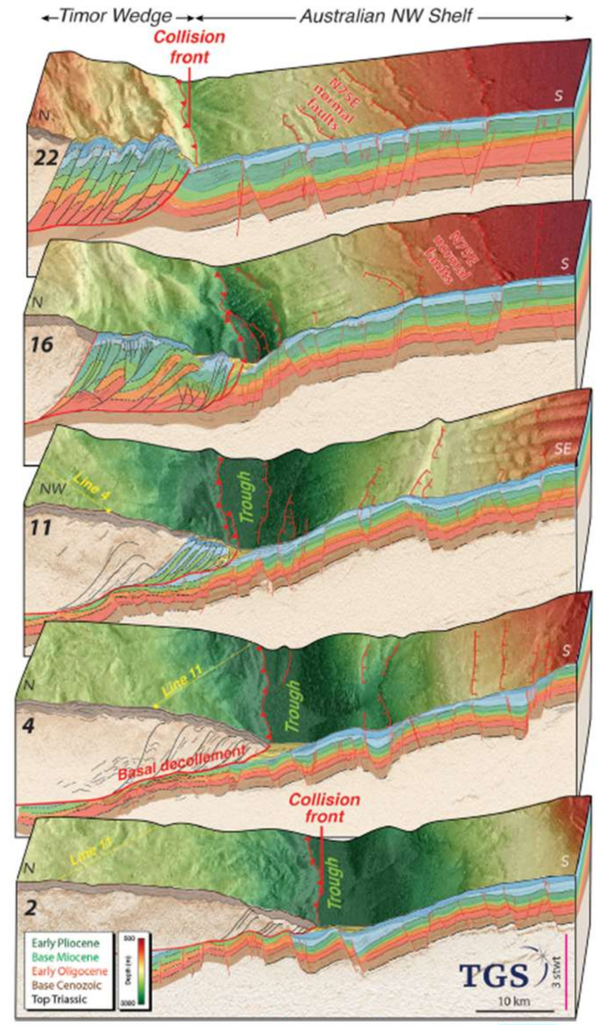
What Lies Beneath

- Sub thrust imaging is improving through use of better technology
- Illuminating new opportunities for game changing plays
- Can Triassic oil-prone source rocks get mature below the imbricate zone?



Modified From Baillie et al., 2019



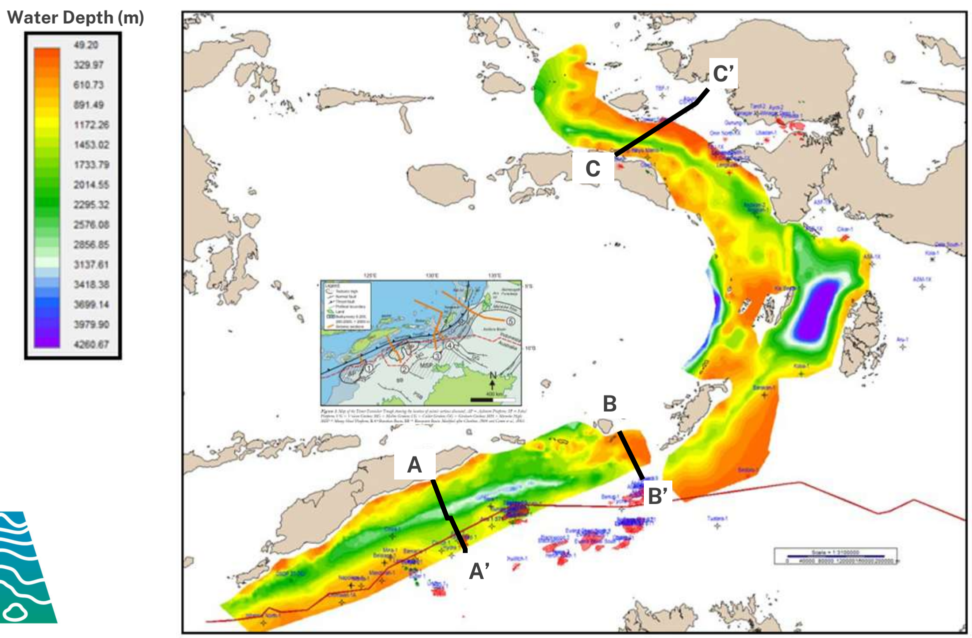


From Coudurier-Curveur et al., 2021

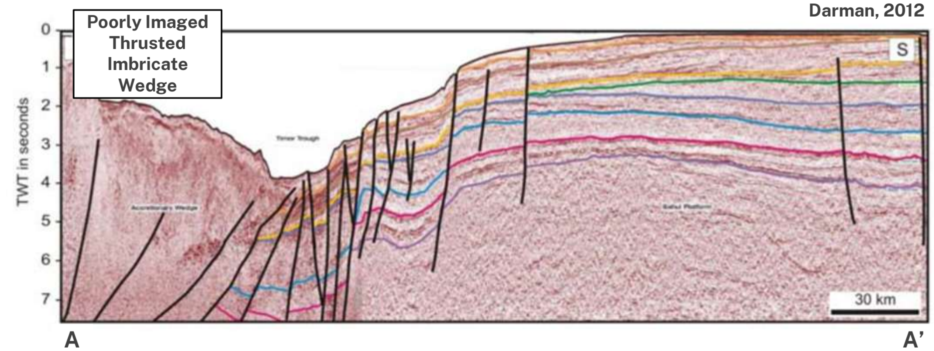
Challenged Imaging

- Historically imaging challenges have hampered mapping below the imbricate wedge
- 1990s legacy data not up to the task in defining the potential below this zone of poor illumination

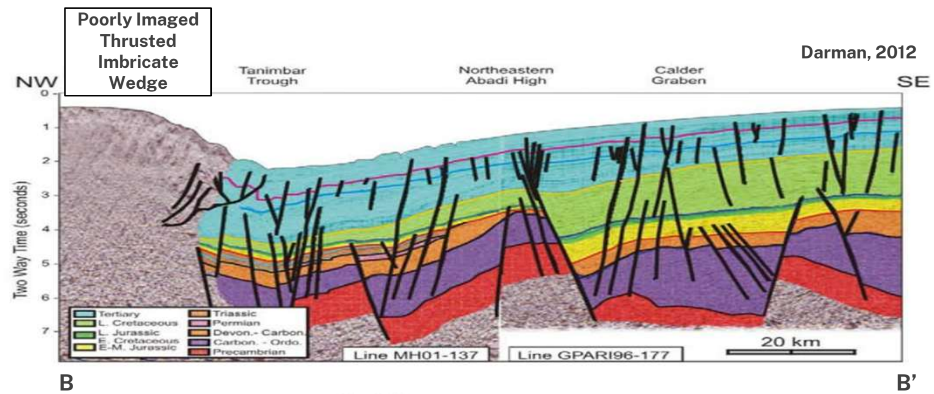
Baillie et al., 2019

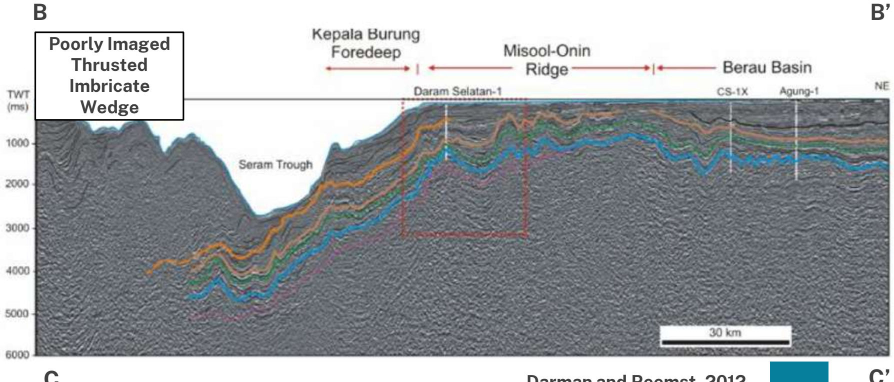


Darman, 2012



Darman, 2012

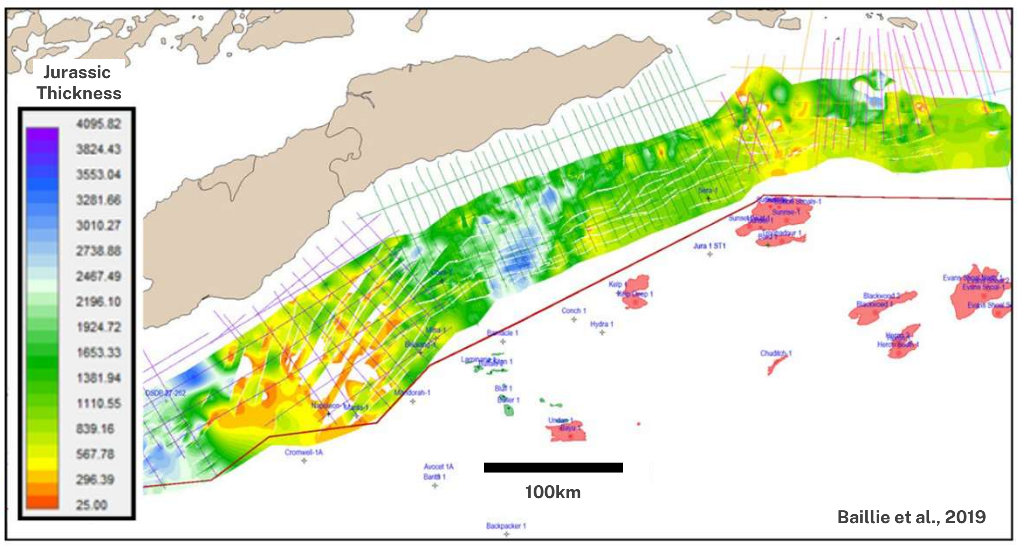


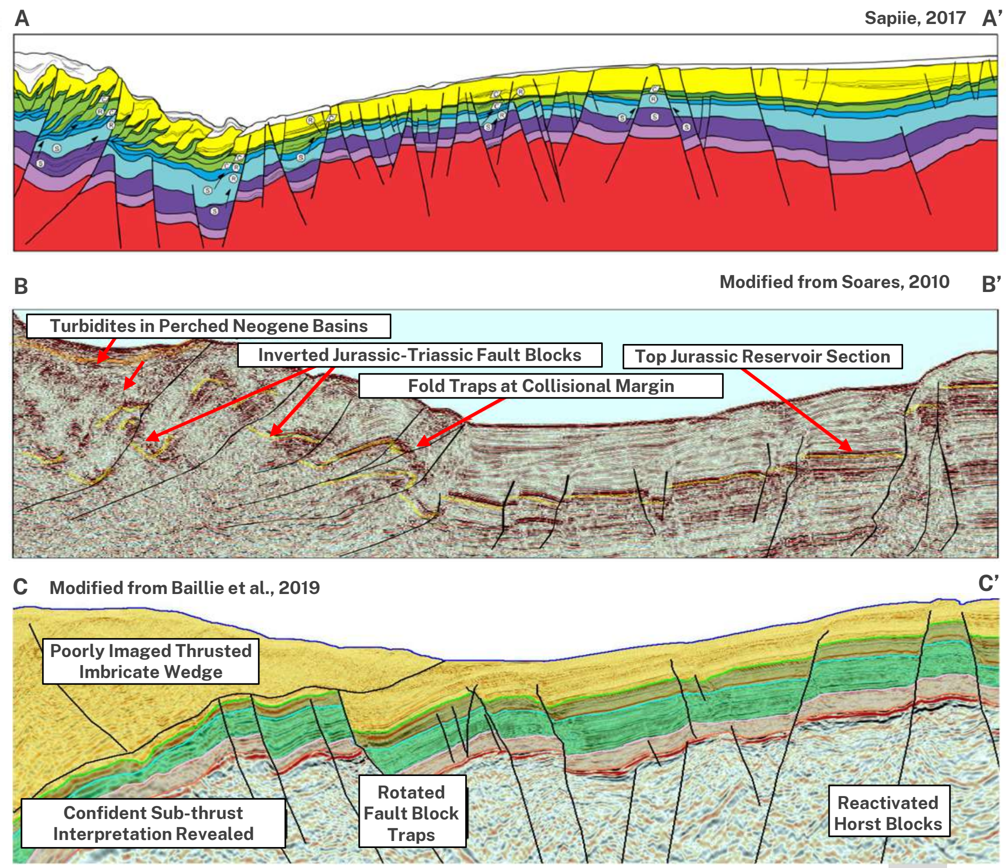


Darman and Reemst, 2012

Step-change in Imaging Improvements

- Acquisition of modern data or uplift from repro of legacy data starting to lift the veil and illuminate new sub-thrust opportunities
- Changes in structural style shows that the types of opportunity vary along the margin
- Better mapping certainty highlights depocentres that may offer charge potential





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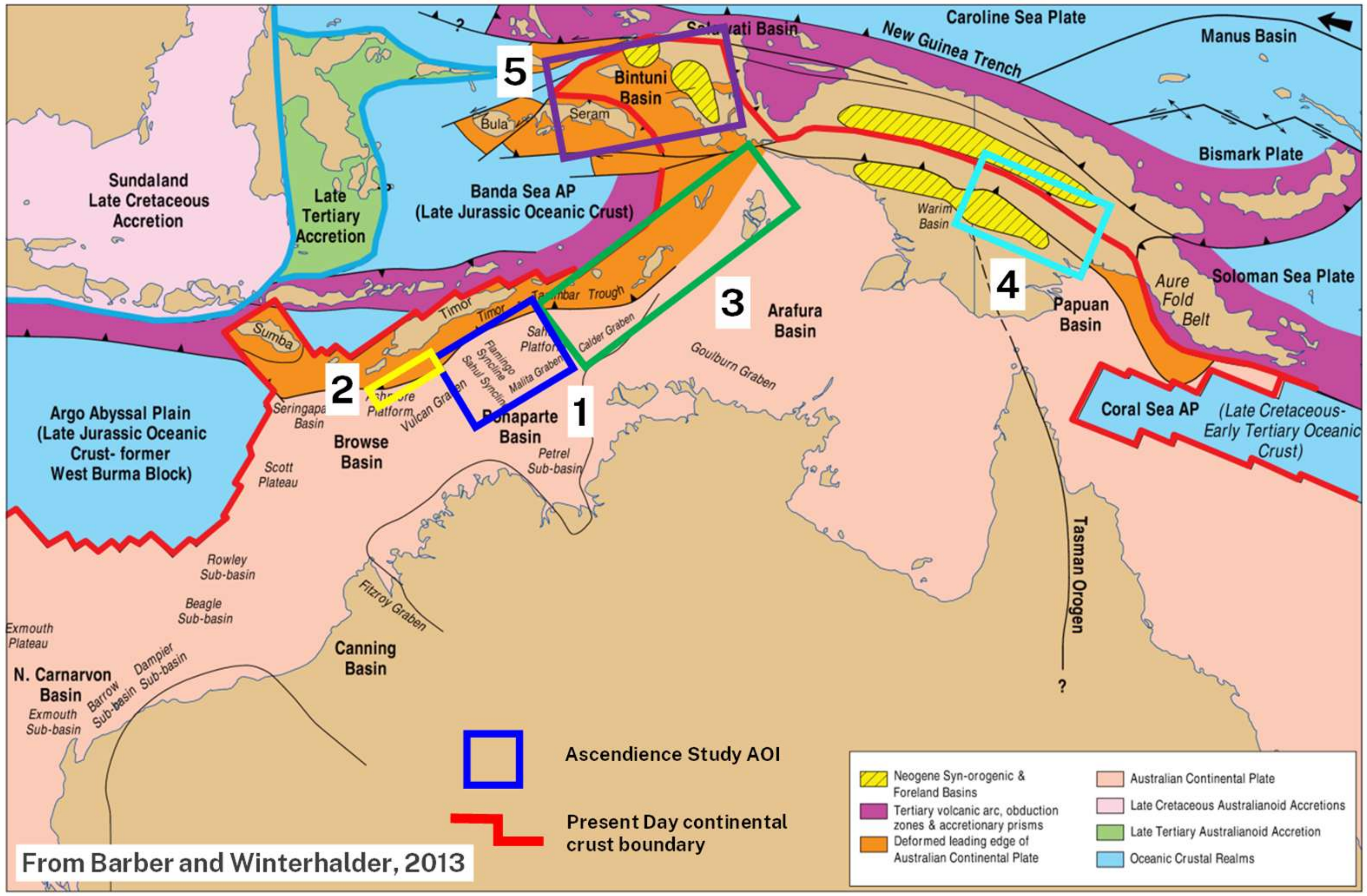
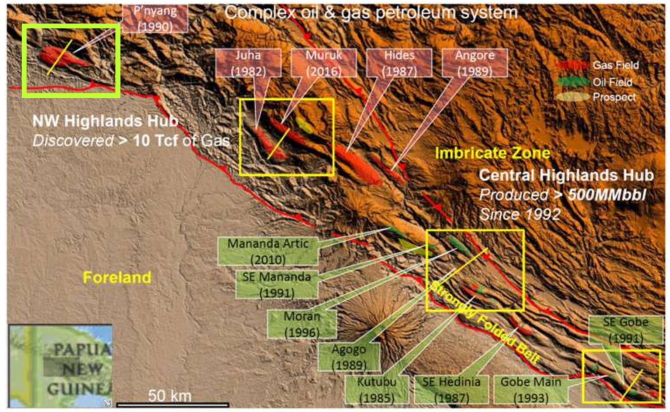


Modified from Barber and Winterhalder, 2013

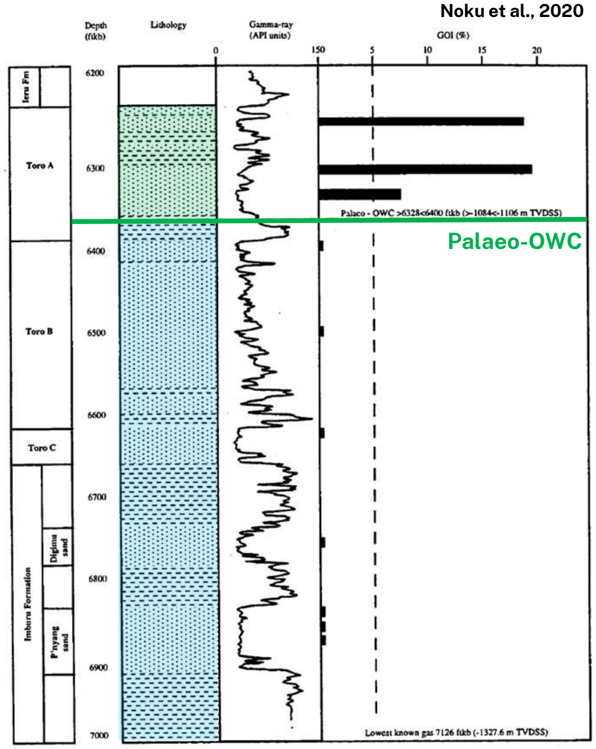
Prior Oil Charge

Pnyang Gas Field Example

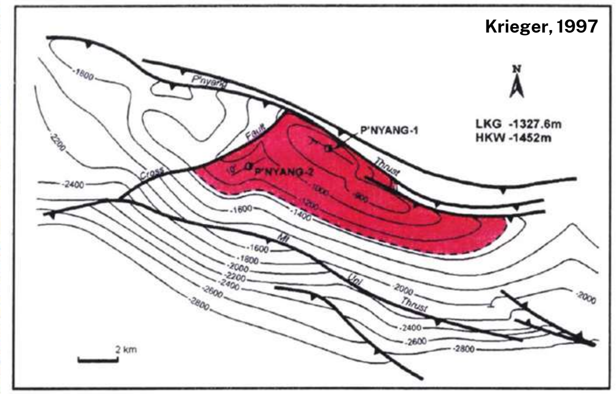
- GOI data define a clear palaeo-oil zone in Pnyang-1 suggesting early oil charge to this giant gas field
- Volumetric estimates using depth-structure maps in 1997 indicated 280MMbbl OOIP (Krieger, 1997)
- Revisions to the size of the Pnyang structure suggests palaeo-oil volumes could be much bigger
- Important to consider PVT conditions when considering the likelihood of a down-dip oil-leg

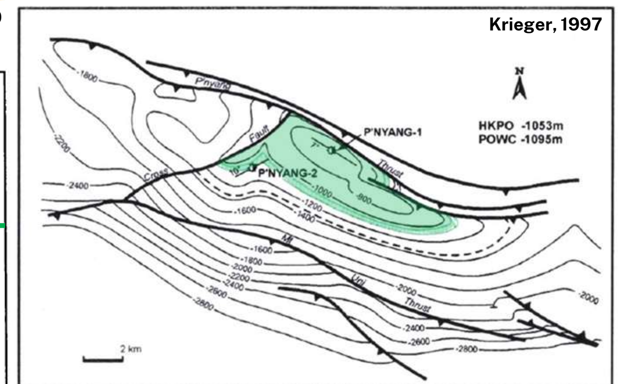


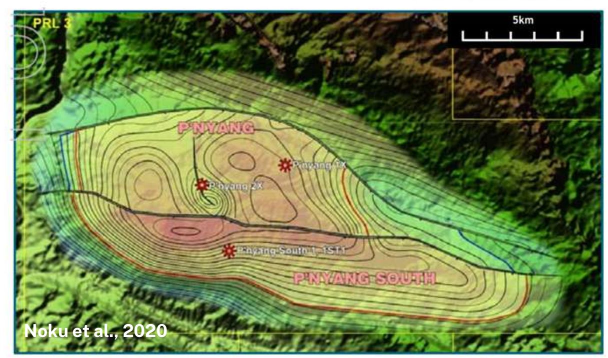
Noku et al., 2020



Krieger, 1997

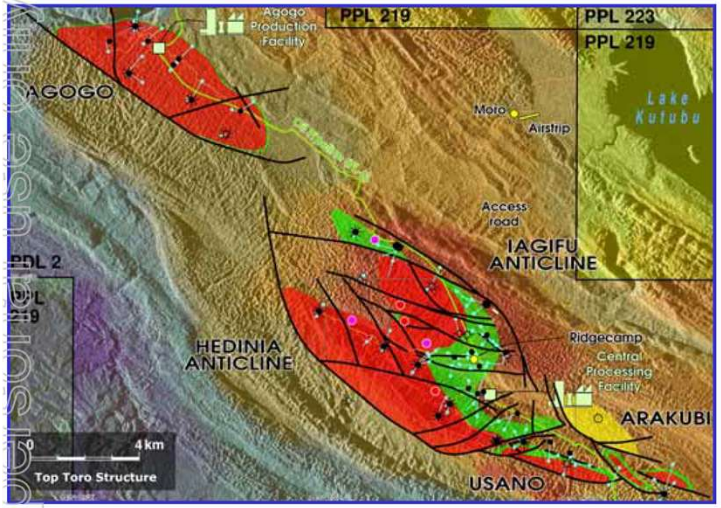






Oil-Leg Potential in the Foldbelt

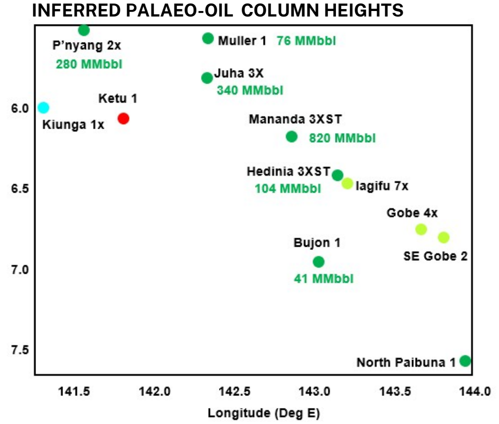
- Gas fields examined along the fold belt all contain evidence of prior oil charge with substantial volumes originally in place
- Constraint on the position of the GWC is permissible of significant oil zones below the recognised gas columns
- Current understanding combined with targeted new GOI analyses would constrain the potential



KUTABU OIL FIELD

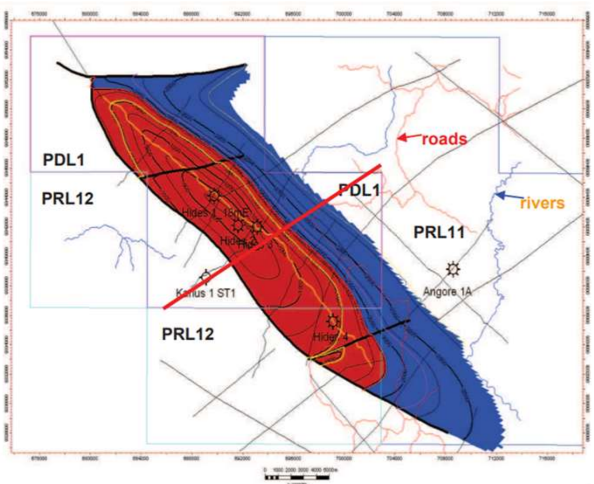
Oil Search, 2010

PAPUAN BASIN FLUID INCLUSION
INFERRED PALAEO-OIL COLUMN HEIGHTS



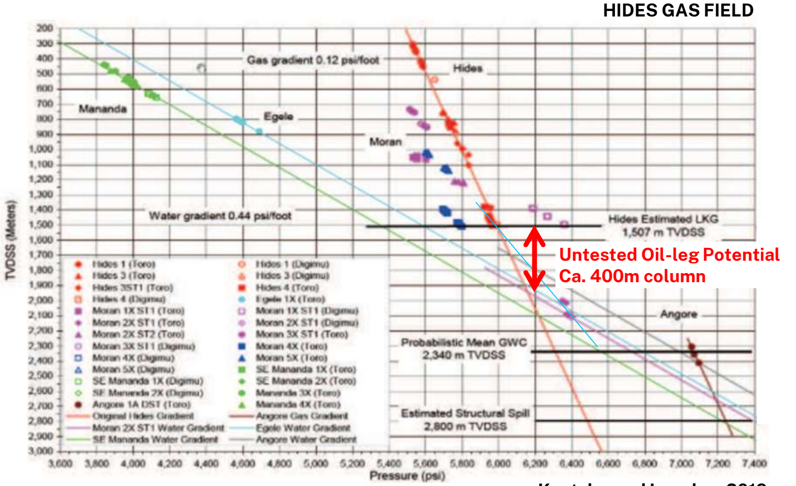
Modified from Krieger, 1997

HIDES GAS FIELD



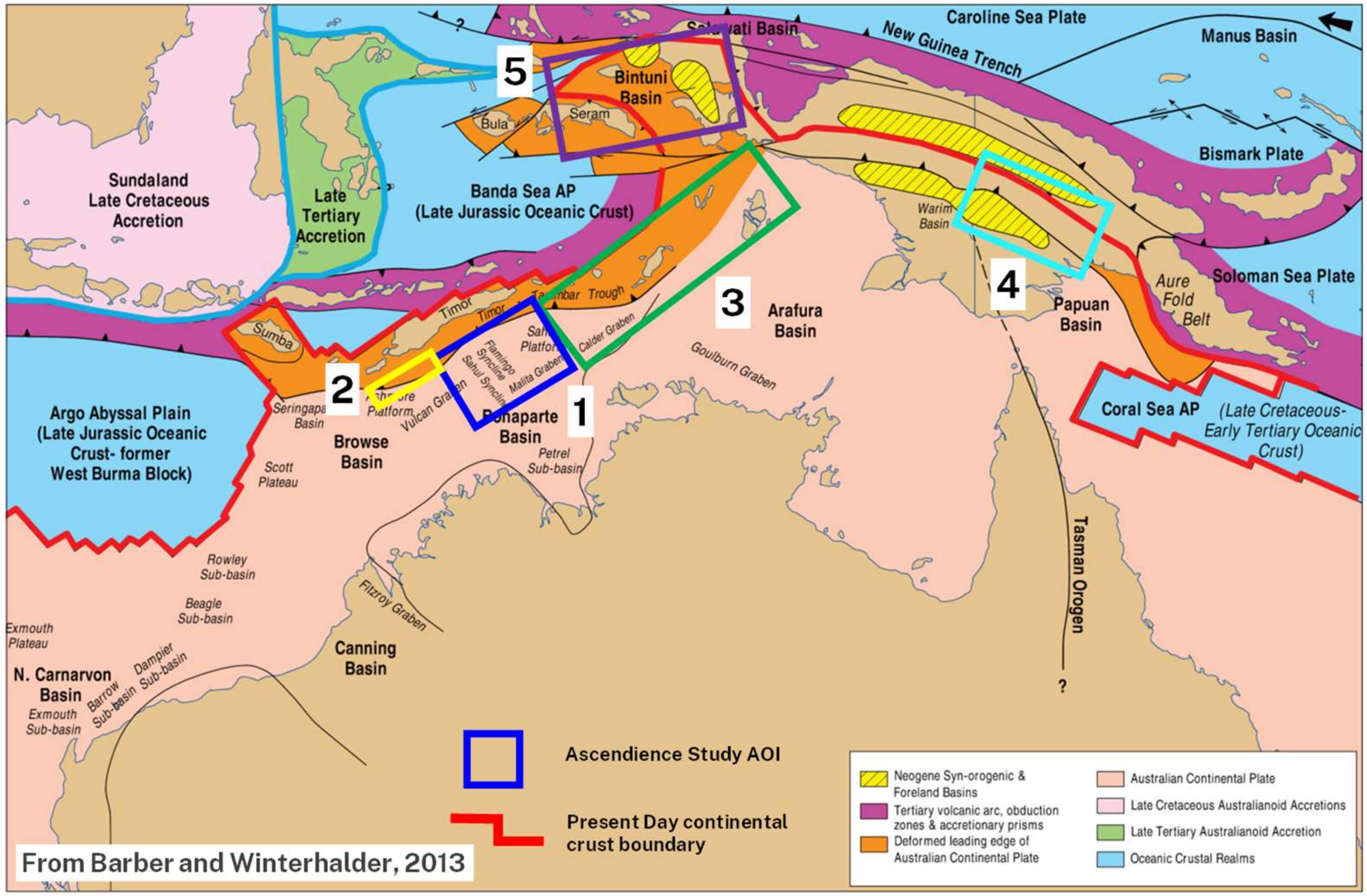
Kantsler and Longley, 2019

HIDES GAS FIELD



Kantsler and Longley, 2019

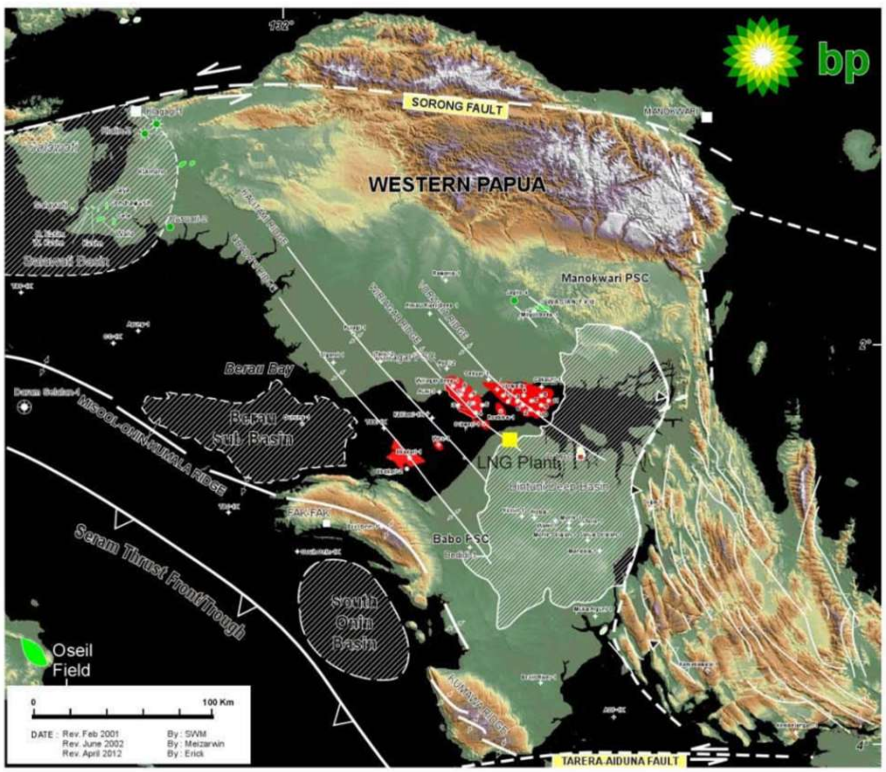
5. Birdshead



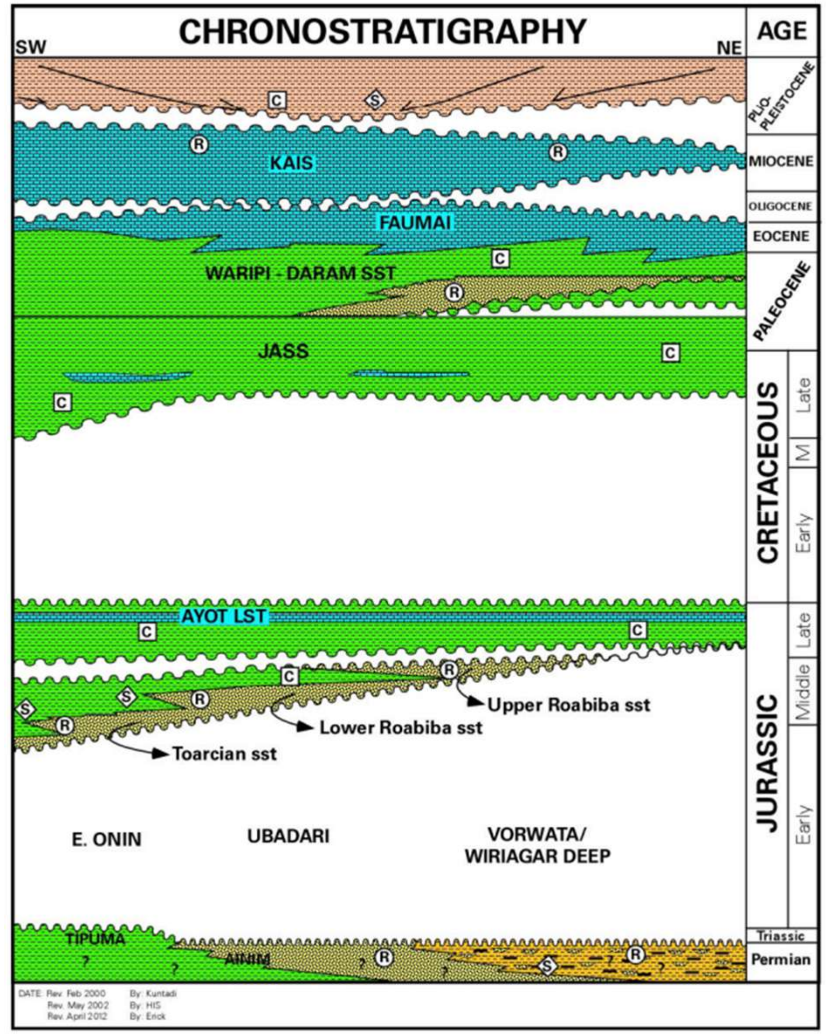
From Barber and Winterhalder, 2013

Tangguh Area

- Same Geology, same tools will work to highlight opportunity
- Currently no similar data fluid inclusion data has been acquired



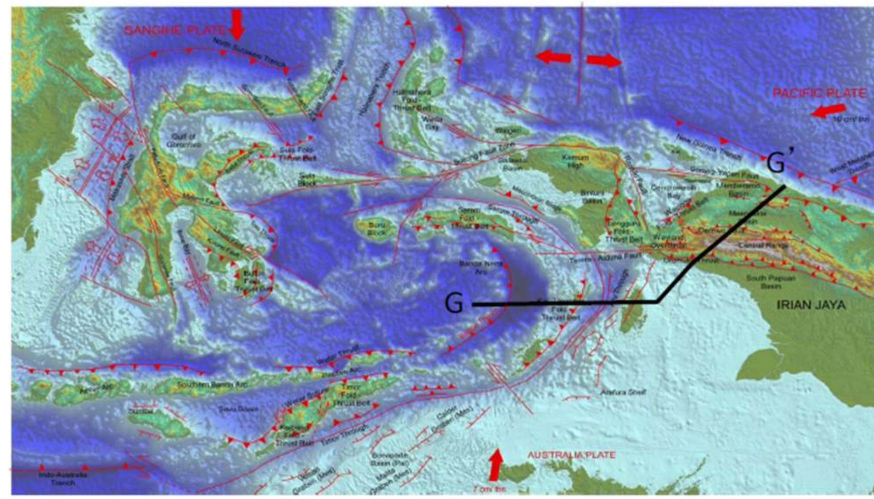
Yudhanto and Pasaribu, 2012



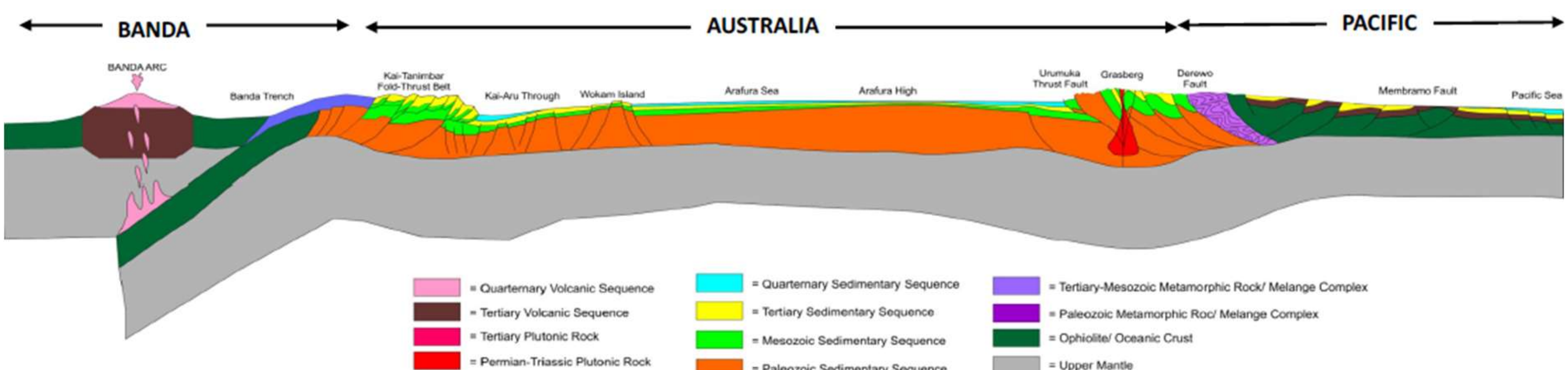
Yudhanto and Pasaribu, 2012

Australian Crust in Indonesia

- Spanning over 4000km from the Carnarvon Basin to the Papuan Basin the Jurassic “Australasian” super basin offers similar stratigraphy
- Learnings from knowledge from one basin is fully transferrable to other basins along this margin
- Relying only on “local” information is like exploring with a blindfold on



Regional X-section: Banda Sea – Papua Central Range



From Sapiie, 2017

Key Takeaway Messages

- Ideas find new plays, but technology helps
- Significant opportunities remain in Offshore Timor Leste for modest sized, but highly valuable new fields
- The learnings from Timor Leste and PNG and the technology used have considerable potential to supercharge new plays along the Banda Arc from West Timor to the West Papua.
- Good regional studies work is the cornerstone of all new play opening discoveries: White Space = Opportunity
- The Banda Arc has more treasures yet to be found...

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