



ORAL PRESENTATION

Day 1: 7th March 2023

Session 3: NORTHERN AUSTRALIA AND TIMOR-LESTE

Co-Chair: Stephen Molyneux, Advisor Geoscience to Pivotree-Harvester

Co-Chair: Peter Baillie, Consultant

13:40	Australasia Petroleum Exploration: Year in Review 2022	Adam Craig	RISC
14:05	The Petrel Gas Field, Bonaparte Basin Australia, Development Plan and Potential Upside Resource Following Recent Broad Band 3D Seismic Survey Acquisition and Interpretation	Janet Hann	Neptune Energy
14:30	Chuditch Field, Offshore Timor-Leste: Application of PSDM and FWI to Unveil a Substantial Gas Field	Colin Murray	SundaGas
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Australasia Petroleum Exploration: Year in Review 2022

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The abundance of material natural gas resources associated with low geopolitical risks continue to favour Australasia on the international scene and help transforming it into a significant world energy player. Investment supporting new exploration activities remains strong and now further extends to cover carbon sequestration and non-hydrocarbon gas. The review will present a summary of the petroleum exploration activities Australia, Timor-Leste, PNG and NZ for the 2022 calendar year, both for conventional and unconventional resources. We will provide an overview of exploration licensing rounds, bids and awards across all onshore and offshore jurisdictions. Analysis of exploration acreage awards will discuss trends in work program, seismic acquisition and drilling. In addition, activity in the equities market for petroleum exploration companies will be summarised and presented. The discussion will also include carbon sequestration acreage licensing and the activities related to non-traditional petroleum such as helium and hydrogen exploration. Summaries of key exploration wells drilled in the year, and their results, will be presented.

SPEAKER BIOGRAPHY

Adam Craig is a highly experienced geoscientist with over 30 years' experience working with WMC Resources, Woodside, Cooper Energy and KUFPEC prior to joining RISC in 2020. Adam has significant global experience in exploration, appraisal, development and production activities. He is a member of PESA (2021-23 WA branch President), a certified petroleum geologist of the AAPG and a Fellow of the Geological Society.



ORAL PRESENTATION

The Petrel Gas Field, Bonaparte Basin Australia, Development Plan and Potential Upside Resource Following Recent Broad Band 3D Seismic Survey Acquisition and Interpretation

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The Petrel Gas Field is a large and currently undeveloped gas field located 200km offshore north-western Australia. The main reservoir comprises tidal sandstones within the late Permian age Cape Hay Formation and has significant variations in reservoir quality. Key subsurface uncertainties are reservoir distribution, structural closure and GWCs.

An extensive review of the well drill stem tests and on the 17-month Petrel-1 well blowout provided the best indicators of reservoir performance on a macro scale, and emphasis has been placed on dynamic data for the current model calibration and production forecasting.

In 2019/20, a long offset, broadband, triple-source 3D seismic survey was acquired to better image the reservoir, structure and other exploration targets.

The new seismic was supported by numerous geological studies including a major overhaul of the petrophysics, further SCAL analysis, fluid inclusion studies, regional seismic mapping and revision of the petroleum system and basin modelling.

The 3D seismic has been incorporated into the geological model and assisted in locating the future well targets for the potential development. In addition, the 3D seismic also highlighted exciting new exploration prospects both off structure in the proven Cape Hay Formation reservoir and a deeper prospect, where a significantly larger early Permian Keyling Formation anticline is mapped and where there is currently no well penetration.

The deeper Keyling prospect is analogous to the recent onshore deep Permian discoveries of the Perth Basin, Australia, where production tests have exceeded 100 mmscfd. The Perth Basin gas discoveries are in equivalent aged reservoirs at similar depths to the Permian Keyling Formation in the related Petrel Sub-basin.

The off-structure Cape Hay prospects and the deeper Keyling prospectivity are both supported by seismic amplitudes and could represent a major upside in the overall Petrel field gas resource.

SPEAKER BIOGRAPHY

As a three-decade veteran of the industry Janet Hann has been leading project teams to deliver challenging and sometimes marginal oil and gas developments in WA, Victoria, Queensland and NT.

Janet joined BP in Aberdeen in the early 1980s as a graduate from Heriot Watt University and trained as a Petroleum Engineer with the company during the height of the North Sea's boom period, immigrating to Australia in 1989.

Currently as the Managing Director of Neptune Energy Bonaparte, she leads a team which aims to find a development solution to produce natural gas from the Petrel field in the Bonaparte basin.



ORAL PRESENTATION

The Chuditch Field, Offshore Timor-Leste: Application of PSDM and FWI to Unveil a Substantial Gas Field

Colin Murray¹, Rob Herries¹, Dino Gandara¹, Belazario Gusmao¹, Andy Butler¹

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Seismic imaging in the Timor Sea region has historically proven highly challenging, particularly on the margins of the Sahul Platform in the northern Bonaparte Basin, offshore Timor-Leste and Australia Northern Territories. A shallow patchwork of reef and platform carbonates, along with a variable seabed created by drowned incised topography, has led to severe degradation of seismic quality. This complex bathymetry and shallow geology overlie an otherwise approximately layer-cake stratigraphic section through Tertiary and Mesozoic sequences down to the Middle Jurassic Plover Formation, primary reservoir to the Bayu Undan, Greater Sunrise, Evans Shoal, Barossa and Abadi gas fields along the prolific Timor Sea fairway.

SundaGas Banda Unipessoal Lda ("SundaGas") operates the offshore TL-SO-19-16 Production Sharing Contract (PSC), offshore Timor-Leste, which contains the Chuditch-1 gas discovery, drilled by Shell in 1998 on 2D seismic. The Chuditch-1 well encountered a 29m gas column at the top of a good quality Plover Formation reservoir section, under the regional Lower Cretaceous Echuca Shoals and Wangarlu Formation sealing shales. The gas was interpreted to be trapped in a three-way fault-bound structure, with the well located in a downdip position. Shell exited the area in 2001, likely due to lack of commercialisation options for gas at that time, and no further drilling has taken place although a 3D seismic survey was acquired in 2012. SundaGas signed the PSC in 2019 and on initial evaluation of the legacy 2D and 3D PSTM seismic data, Chuditch was estimated to hold about 700 Bcf of recoverable gas resource. Adjacent faulted and low relief four-way dip closed traps were also identified but were observed to be partially coincident with bathymetric highs even after depth conversion. Imaging of the near top reservoir Darwin seismic event was also extremely poor close to fault zones, particularly in the area between the Chuditch discovery well and the crestal bounding fault, the position of which itself was uncertain.

To address these issues, 1,270 km² of vintage 3D seismic data has been reprocessed to PSDM during 2021-2022, including the application of Full Wavefield Inversion. Significant effort was put into velocity model building, to resolve the issues created in large part by the shallow section. This project was carried out by TGS Imaging UK and resulted in a significant uplift in data quality, such that the Chuditch field can be clearly imaged for the first time (Figures 1 and 2).

A number of observations are emerging from ongoing interpretation of these data:

- The Chuditch discovery appears substantially larger than previously assessed, with P50 estimate of recoverable gas resources of approximately 1.1 Tcf, significantly greater than resource estimates from earlier mapping.
- Adjacent prospects have either been enhanced, modified or removed on the new 3D PSDM mapping compared to earlier vintages. These additional features are anticipated to hold further mid-case prospective gas resources of approximately 2.1 Tcf in total.
- Subsurface risks associated with these resources have been significantly reduced on the improved new seismic dataset.
- The Wangarlu Fm. shales appear to behave in a ductile fashion, with faults in the underlying Permian to Lower Cretaceous being dislocated from the Upper Cretaceous and Tertiary, explaining structural differences and the regionally effective nature of the seal.

The uplift achieved through seismic reprocessing, and the resulting realisation that the Chuditch field appears to be materially largely than previously thought, means less appraisal drilling is likely to be required to achieve commerciality on the field. The effective 'concentration' of resources into the field that had previously been thought to sit in outlying prospects and leads simplifies the expected development concept, with fewer development wells required. These results add material value to the Chuditch project.

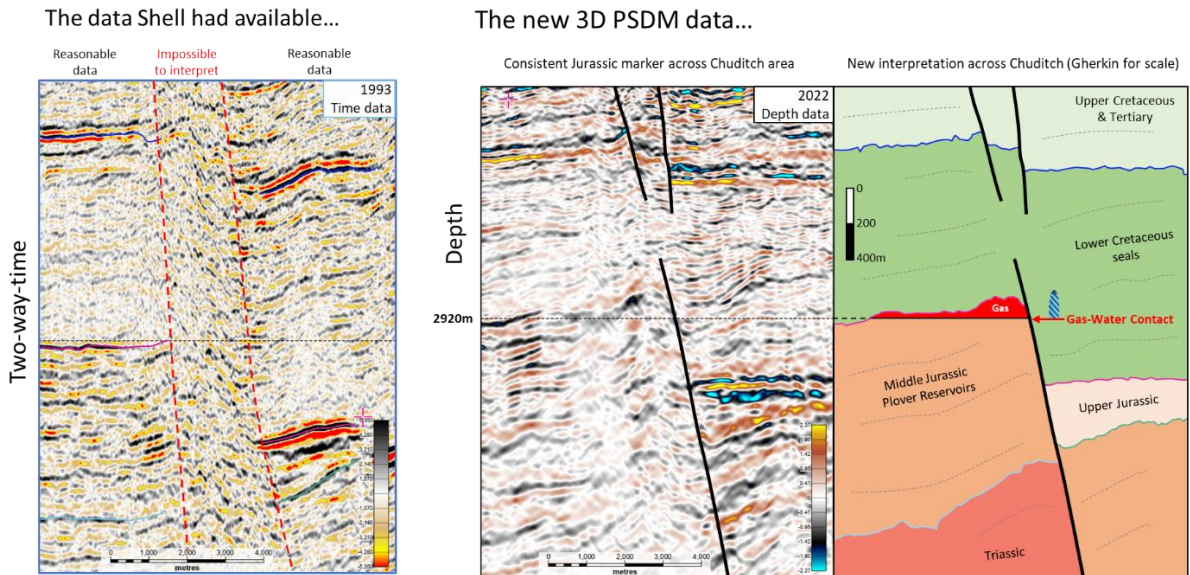


Figure 1: Comparison of vintage and new seismic data across the Chuditch field. Note separate faults above and below the Lower Cretaceous sealing shales.

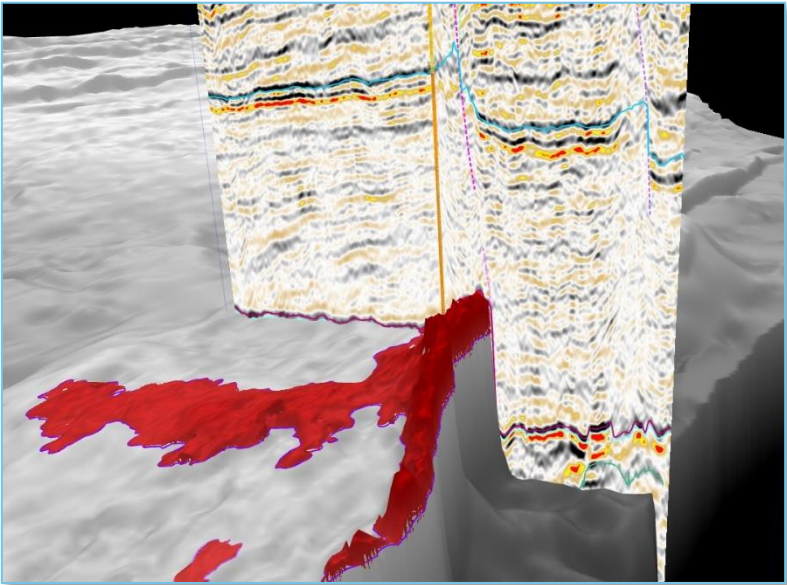


Figure 2: Illustration of new seismic data and mapping across the Chuditch field.

3D seismic data images are shown courtesy of TGS

SPEAKER BIOGRAPHY

Colin is VP Technical of SundaGas.

A geology graduate of Imperial College, London, Colin has over 40 years' industry experience in a range of technical and managerial roles, primarily in the UK and Far East, working on projects from frontier new ventures, through exploration and appraisal to developments.

His geographic area of focus in recent years has been Asia-Pacific, including China, Malaysia, Indonesia, Thailand, Philippines, Vietnam, Timor-Leste, Australia and New Zealand.

Prior to returning to UK in 2021, Colin was based in Kuala Lumpur Malaysia for over 17 years, including five years with Hess and Carigali-Hess and eight years as Exploration Manager for Mitra Energy, before joining SundaGas in 2018. Earlier in his career he worked with a number of companies including RTZ, Elf, Sun International, Kerr-McGee and Harrods Energy and was a founder director of Eclipse Energy initiating what became one of the UK's first offshore wind farms.



ORAL PRESENTATION

Onshore Oil and Gas Exploration Resumes in Timor-Leste after a Half-century Hiatus

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The island comprising of Timor-Leste (East Timor) and Timor Barat (West Timor) is the result of a complex continental-arc collision between the Australian continent and SE Asian Banda Arc. Whilst there is plentiful evidence of an active hydrocarbon system from surface oil and gas seeps, small scale production of shallow oil, and deeper oil and gas recoveries in the older wells, there has been no substantial commercial discovery north of the Timor Trough in either the onshore or offshore.

Timor Resources was awarded operatorship of two onshore Production Sharing Contracts on the south-western coast of independent Timor-Leste in mid-2017. Prior to this the last onshore drilling was concluded in 1972 by Timor Oil Company under Portuguese jurisdiction.

Timor Resources embarked on an accelerated exploration programme of geological survey followed by 2D seismic reprocessing and acquisition which led to a drilling campaign commencing in late 2021.

The drilling locations in the recent campaign were chosen to maximise investigation of the seven independent or partially dependent play types that were identified during the preceding years of study.

The rationale for the drilling locations is discussed with reference to seismic line interpretations. The preliminary results from the drilling indicate that commercial hydrocarbon accumulations are likely to occur in the onshore region of Timor-Leste and these are demonstrated by the interpreted well logs and various analyses.

SPEAKER BIOGRAPHY

Jan Hulse started his Oil and Gas exploration career in the late 1980's, working on BP, MIMPEX and Santos assets in PNG. During this time, he led several field geological surveys in the PNG Highlands and, when back in the office, contributing to the technical interpretation, mostly in a structural analysis role.

In 2003 he moved into the consultancy world and spent the next 14 years providing geological evaluations of predominantly the Australian region, and wellsite geologist work.

He joined Timor Resources in 2017, initially as Chief Geologist and then Exploration Manager. He has led the small staff geological team, including Jacinto Soares the Timorese Senior Geologist, in collaboration with several experienced consultants and academic groups.