



ORAL PRESENTATION

Day 2: 4th April 2019

Session 5: Australia NW Shelf

Chairs: Peter Baillie - CGG, Mike Whibley - KrisEnergy

8:30	New Triassic Tectonostratigraphic Observations over the Central North West Shelf, Australia	Steve Abbott	Geoscience Australia
8:55	Dorado: An Overview of the Largest Oil Discovery on the North West Shelf of Australia in the Last 30 years	Ian Cockerill	RISC Advisory
9:20	Exploring the Triassic oil potential on the North West Shelf, Australia	Claudia Valenti	Carnarvon Petroleum
9:45	Exmouth Sub-Basin: New Data, New Insights	Alex Karvelas	WesternGeco, Schlumberger



ORAL PRESENTATION

New Triassic tectonostratigraphic observations across the central North West Shelf, Australia

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Ellen Gunning¹

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The Triassic succession in the Roebuck Basin and parts of the adjacent Carnarvon, Browse, and offshore Canning basins, is the subject of a regional mapping program at Geoscience Australia. The lower part of the Triassic succession includes sediments of the Keraudren Delta in the Bedout Sub-basin, which has been identified as Australia's new offshore oil and gas province.

The study investigates the palaeogeographic evolution of the basin fill, including the distribution of carbonate, siliciclastic and volcanic lithologies. Structural and stratigraphic mapping is yielding new insights into petroleum systems elements. In addition, geochemical analyses will lead to a refined understanding of Triassic petroleum systems in the region. The results will inform future assessments of the hydrocarbon prospectivity across the central North West Shelf.

SPEAKER BIOGRAPHY

Steve Abbott earned his qualifications in sedimentary geology from Flinders (Hons, 1987) and James Cook (PhD, 1994) Universities. He joined the Energy Systems Branch at Geoscience Australia in 2013, where he works on regional tectonostratigraphic studies of the North West Shelf. Steve's past roles include mineral exploration (mainly for sedimentary uranium in central Australia), teaching and research (Southern Cross University, James Cook University, and the University of Tasmania), and regional mapping with the Northern Territory Geological Survey. Steve is President of PESA-ACT.



ORAL PRESENTATION

Dorado: An Overview of the Largest Oil Discovery on the North West Shelf of Australia in the Last 30 Years

Ian Cockerill¹

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The Dorado field was discovered by Quadrant Energy (now Santos) and partner Carnarvon Petroleum in August 2018. Carnarvon Petroleum released a 2C Gross Contingent Resource of 186 million barrels of oil and condensate and 552 Bcf of Gas (20 August 2018) making Dorado the largest oil discovery made on the Northwest Shelf in the last 30 years and far exceeding the pre-drill (gross, Pmean) estimate of 125 million barrels of oil equivalent.

Dorado is located in the Bedout sub-basin 160 km north of Port Hedland in approximately 90 m of water. The reservoirs are at a depth of around 4000 m in the Caley, Baxter, Crespian and Milne clastic units of the Middle Triassic Lower Keraudren Formation.

The Bedout sub-basin covers an area of approximately 15,000km². Six wells were drilled in the basin between 1971 and 1983 including what was originally interpreted to be a tight gas discovery in the Phoenix-1 and Phoenix-2 wells. Despite the early indications of a proven petroleum system, exploration drilling in the area didn't return until 2014 with the Phoenix South discovery. The Roc discovery followed in 2016 and Dorado (2018) has rounded up a record of 100% geological success for exploration drilling in this renewed period of activity in the Bedout.

The Dorado prospect was a new stratigraphic play concept for the sub-basin, targeting high amplitude seismic events of the Lower Keraudren Formation terminating against a deep incising canyon referred to as the Dorado canyon. The shale-filled Dorado canyon provides the side seal to Dorado. Multiple prospects have been identified on trend from Dorado on the east-west trending canyon system including the Roc South prospect which will be drilled together with two appraisal wells on Dorado in 2019.

The 22,000km² Capreolus 3D Survey owned by TGS covers Dorado, all of the discoveries made in the Bedout sub-basin and the majority of the most prospective part of the Bedout sub-basin. RISC has interpreted this survey and this presentation will describe the Dorado play and highlight other untested potential plays within this exciting emerging oil province of the Northwest Shelf of Australia.

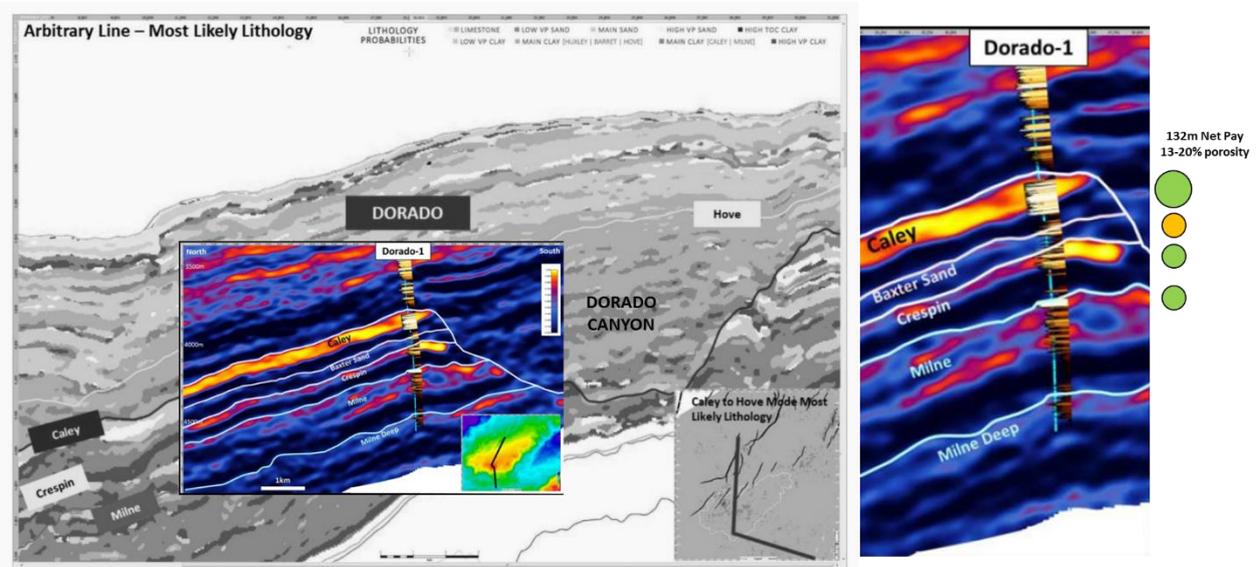


Figure 1. Dorado-1 north-south section (Source: Santos ASX Release 22 August 2018)

SPEAKER BIOGRAPHY

Ian has 20 years of experience as a geoscientist with a successful record of value creation through oil and gas discoveries, new venture development, and asset / corporate promotion. Ian has a background in geological and geophysical interpretation with experience in conventional and unconventional exploration and development projects in a wide range of geological settings. He has worked in technical positions for Hunt Oil and Apache and in executive positions for Transerv Energy, Verona Energy and TSV Montney. Ian is currently based in Perth, Australia and is the Head of Geoscience with RISC.



ORAL PRESENTATION

Exploring the Triassic Oil Potential on the North West Shelf, Australia

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The exploration history of the North West Shelf suggests that the Australian petroleum systems are predominantly gas prone, typically found beneath the mid Cretaceous regional seal.

Carnarvon Petroleum regional and local seismic mapping, in conjunction with exploration drilling results, indicates that the Triassic has three oil prone petroleum systems, the Early, Middle and Late Triassic.

Fundamental to understanding the areas where these three petroleum systems will work is a thorough understanding of palaeogeographies, palaeoenvironments and stratigraphy.

Carnarvon believe the petroleum systems have a distinct palaeogeographic distribution and are not ubiquitous source rock/reservoir horizons across the North West Shelf.

Various laboratory analyses, sedimentology, seismic mapping and seismic facies work have contributed to the identification of the most encouraging areas to explore.

Additionally, the proximity of the Triassic geology of the North West Shelf to SE Asia Triassic geology, with their similar depositional setting, prior to Gondwana break-up, adds credence to the proposed theories.

Examples of the early, middle and late Triassic oil petroleum systems will be illustrated and identified in some of the major basins on the NW Shelf.

SPEAKER BIOGRAPHY

Claudia Valenti obtained a BSc in Geological Resources and an MSc in Applied Geological Sciences from University of Pavia, Italy in 2012. She moved to Australia and started working for Carnarvon Petroleum as a geoscientist in 2014. For the last five years her main focus has been interpreting the geology of the Browse, Roebuck Basin and Vulcan Sub-basin. Claudia is a member of PESA.



ORAL PRESENTATION

Exmouth Sub-Basin: New Data, New Insights

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The Exmouth Sub-basin represents part of the intra-cratonic rift system of the Northern Carnarvon Basin, Northwest Shelf, Australia. It has undergone a complex tectonic history with multiple phases of rifting, magmatic underplating, uplift, erosion, inversion and regional tilting.

Hydrocarbon exploration has resulted in the discovery of a variety of oil and gas accumulations mainly in Upper Jurassic and Lower Cretaceous intervals. However, the distribution of the different petroleum system elements, including Jurassic and Triassic intervals, is poorly determined but required for improved understanding of the complex charge history, as indicated by the variety of hydrocarbon types ranging from heavy, biodegraded oil, through light oil with gas caps to dry gas columns.

The new 12,000km² WesternGeco Multiclient 3D seismic survey was specifically designed to cover the entirety of the Exmouth sub-basin and incorporate the full acquisition record length in the processing sequence to image deeper basinal elements giving a comprehensive basin-wide coverage. As illustrated herein, the seamless volume imaged to depth allows accurate mapping across the full record length which is critical to unravel the complex evolutionary history in a basin with proven and remaining hydrocarbon potential.

SPEAKER BIOGRAPHY

Alex is the Exploration Lead for Australasia based in Perth. His role includes interpretation on depth imaging and reprocessing projects and also supporting the Exploration and Petroleum Systems Modelling Groups working on exploration campaigns and hydrocarbon assessment projects around the world. Since joining Schlumberger Alex has worked on multiple projects in varying geological settings including the Gulf of Mexico, North West Europe, North Africa and more recently in the Asia Pacific region, with a primary focus on the North West Shelf of Australia.