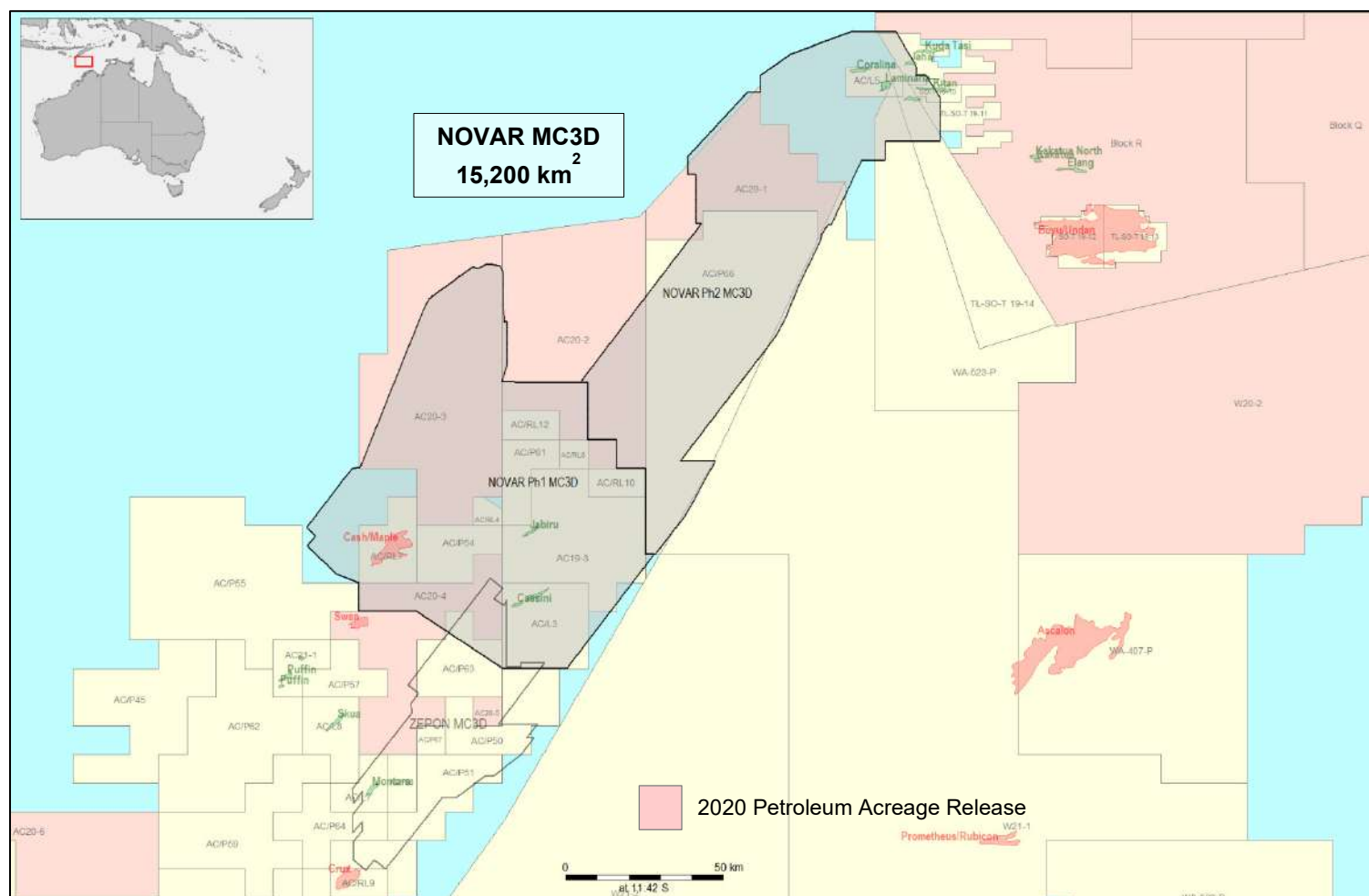


NOVAR MC3D

North Vulcan Sub-Basin Advanced 3D Reprocessing



Project Overview

Multi-Client Resources (MCR) in collaboration with DUG, has produced a very large, advanced 3D seismic reprocessing project in the Vulcan Sub-Basin, North West Shelf, Australia.

The North Vulcan Advanced 3D Reprocessing project (NOVAR MC3D), incorporating ten legacy 3D surveys reprocessed through a high order PreSDM sequence with FWI imaging now provides the industry with a superlative seamless 3D dataset covering four proven petroleum provinces. This project will be essential for defining new prospects and redefining play fairways.

The NOVAR MC3D data has significantly improved imaging of the deeper Jurassic & Triassic structural & stratigraphic objectives and will allow E&P companies to undertake a more extensive evaluation of the petroleum potential and complex fault-seal risks in the basins.

The continuous 15,200 km² 3D dataset extends across the basin margins of the northern Vulcan Sub-Basin and north east across the Nancarrow Trough and Laminaria High. It covers high impact exploration, field development and production acreage including:

- **2020 Offshore Petroleum Acreage Release blocks**
- **Orchid-1 commercial gas/condensate discovery**
- **Cash/Maple multi-TCF field development**
- **Jabiru & Challis shut-in fields**
- **Laminaria-Corallina and Buffalo oil field rejuvenations**

Molyneux Advisors, has undertaken a regional seismic interpretation study of the NOVAR MC3D and is available for licensing with the seismic data.

DUG, has produced a seismic inversion and quantitative interpretation of the NOVAR MC3D and is available for licensing with the seismic data.

Processing Parameters

The NOVAR MC3D survey encompasses the merging and reprocessing of over 18,000 km² of 3D marine seismic data.

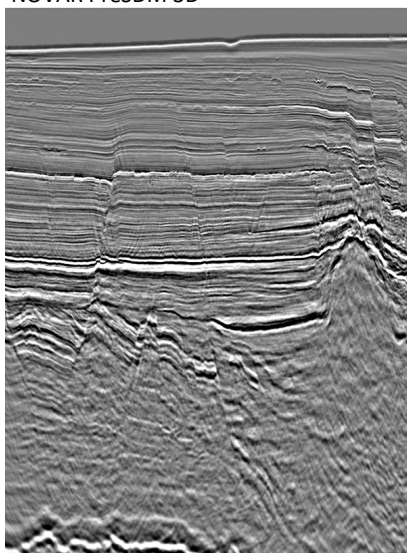
It incorporates 10 legacy surveys from field tapes through a comprehensive, broadband, pre-stack depth migrated workflow including source & receiver de-ghosting, 3D SWSRME & 3D SRME, Tau-P Deconvolution, High Resolution Radon Demultiple, 3D Interbed Multiple Elimination (IME), 4D Regularisation, five iterations of reflection and refraction tomography and Anisotropic Pre-Stack Kirchhoff Depth Migration.

The Phase 2 area includes FWI imaging within the data processing workflow to improve sub-surface imaging below the extensive distribution of the shallow shoals in the area.

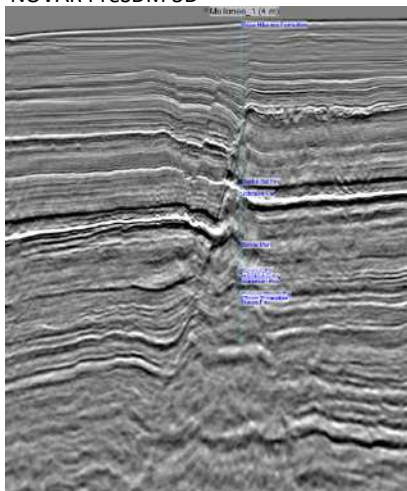
Deliverables

- Image gathers after migration
- Full fold stacks & angle stacks in time & depth
- Migration velocity fields
- FWI products
- Navigation data & final processing report

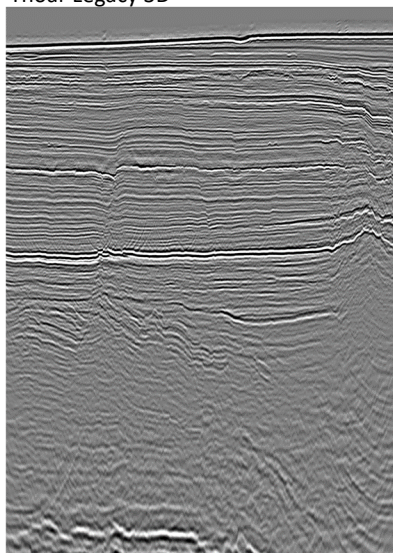
NOVAR PreSDM 3D



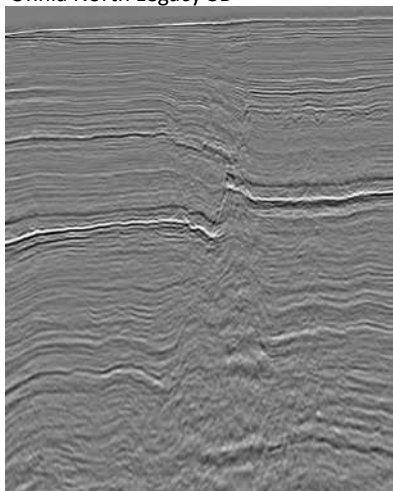
NOVAR PreSDM 3D



Thoar Legacy 3D



Onnia North Legacy 3D

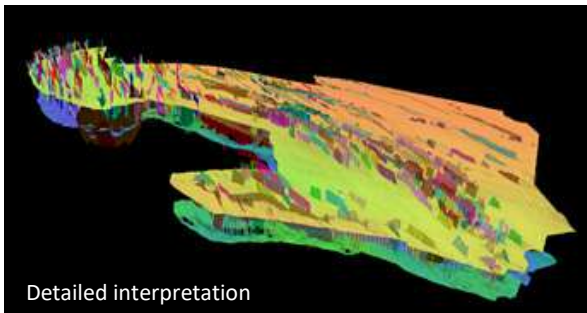
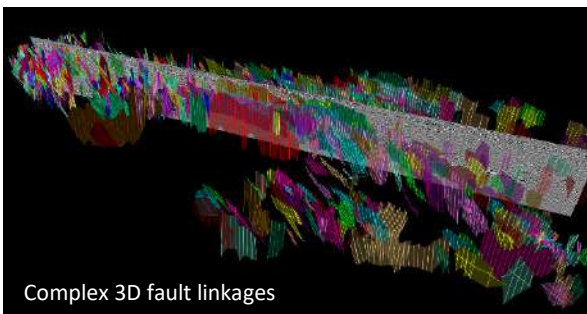
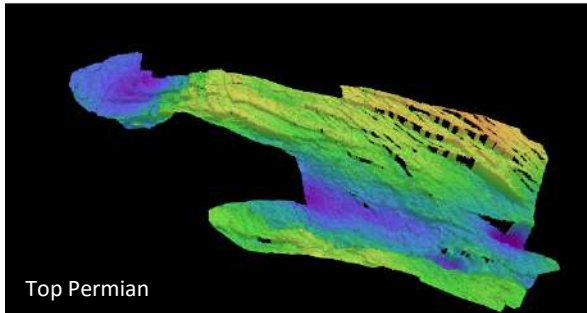


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Molyneux Advisors in collaboration with MCR has produced an updated regional interpretation of the northern Vulcan Sub-Basin based on the new NOVAR 3D reprocessed pre-stack depth migration.

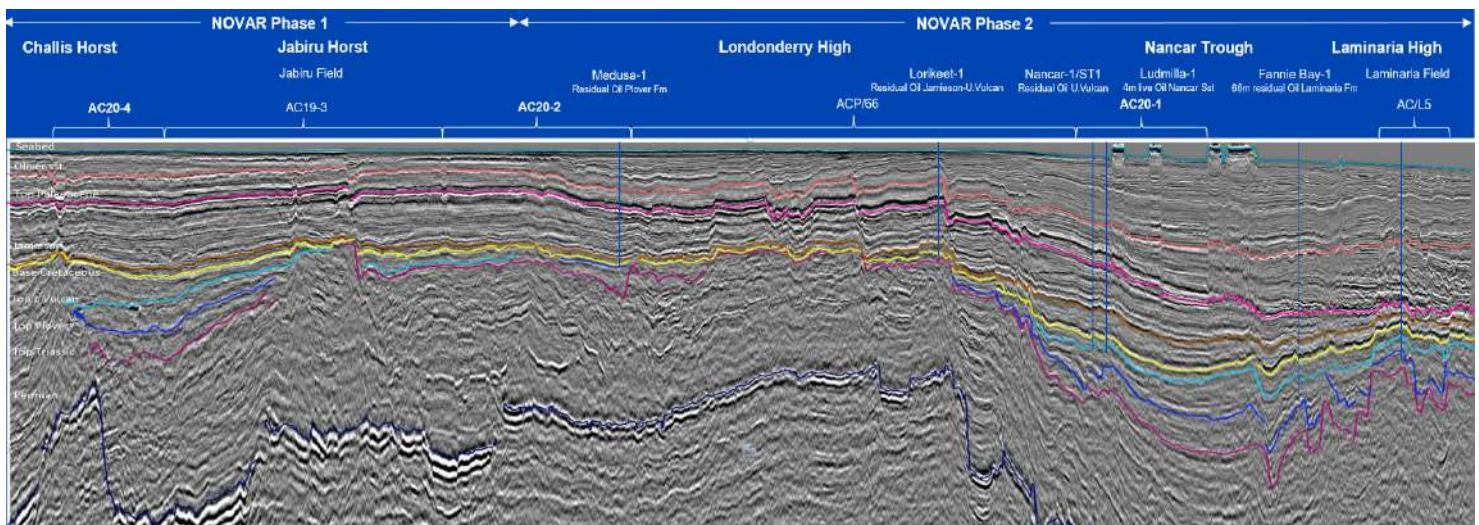
The study covers both the NOVAR MC3D Phase 1 & 2 survey areas and totals 15,200km² using an extensive well database. It includes four prospective 2020 Acreage Release blocks and is designed to accelerate E&P company evaluations at a regional and prospect specific scale.

Nine interpreted surfaces in time and depth from Seabed to Permian are included along with more than five hundred interpreted faults. In addition, a number of exciting leads and prospects have been identified.

The study gives your acreage screening work a head-start with prospective areas identified, and set in the context of an improved regional understanding of the subsidence history, high-level depositional architecture and linkage between basement faulting, sediment deposition, salt movement and reactivation over the northern Vulcan Sub-basin, Nancarrow Trough and Laminaria High.

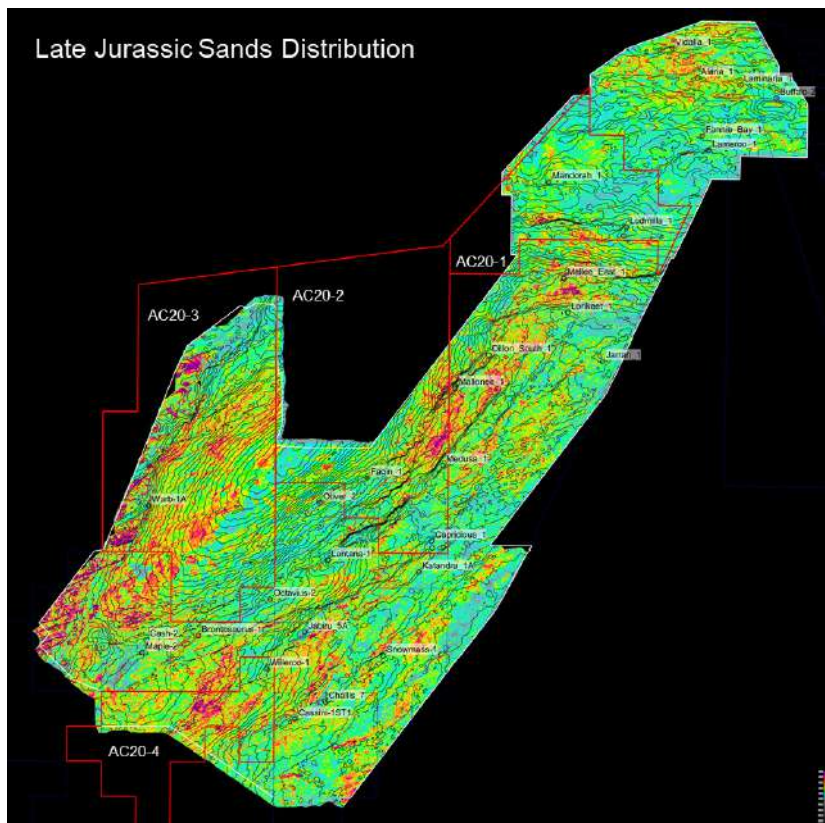
Deliverables:

- Time and Depth horizons at:
 - Seabed
 - Oliver Sandstone
 - Top Palaeocene
 - Top Jamieson
 - Base Cretaceous
 - Top Lower Vulcan
 - Mid Jurassic (Nr. Top Plover)
 - Top Triassic (Nr. Top Nome)
 - Permian
- 600+ faults
- Structural elements maps; Top Palaeocene, Base Cretaceous & Permian
- Summary report

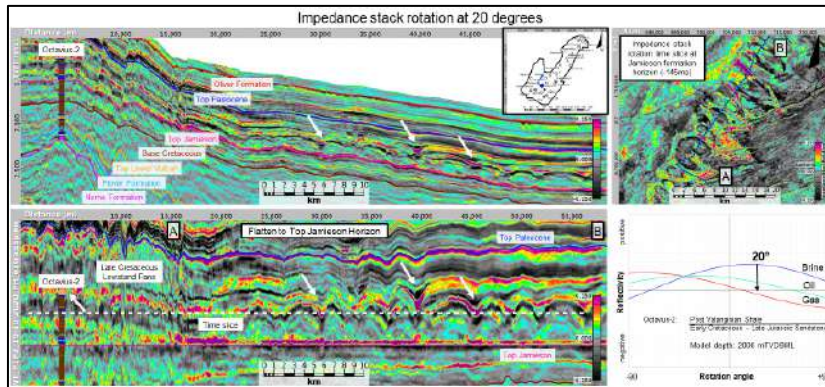




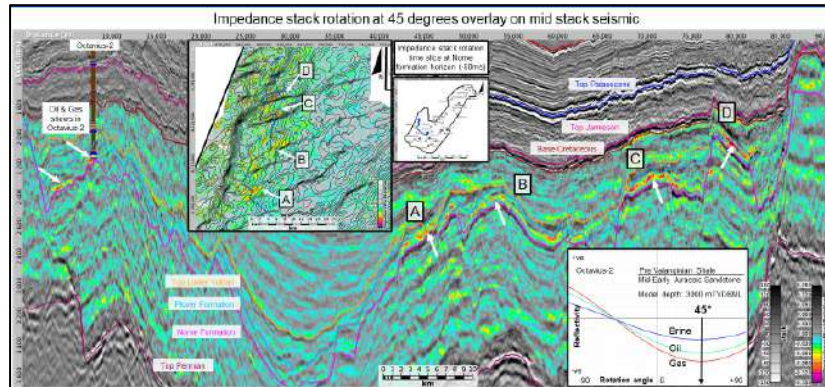
Late Jurassic Sands Distribution



Late Cretaceous Lowstand Fans



Jurassic Plover Fm. Sands



DUG in collaboration with MCR has produced a seismic inversion and quantitative interpretation of the NOVAR MC3D survey.

The QI study comprising of a constrained relative simultaneous inversion was performed on the entire NOVAR MC3D survey comprising of 15,200km² broadband PreSDM reprocessed data. Elastic property volumes have been created to supplement the NOVAR MC3D seismic dataset for E&P companies to carry out a more enhanced evaluation of the petroleum potential and recovery within the Vulcan Sub-basin.

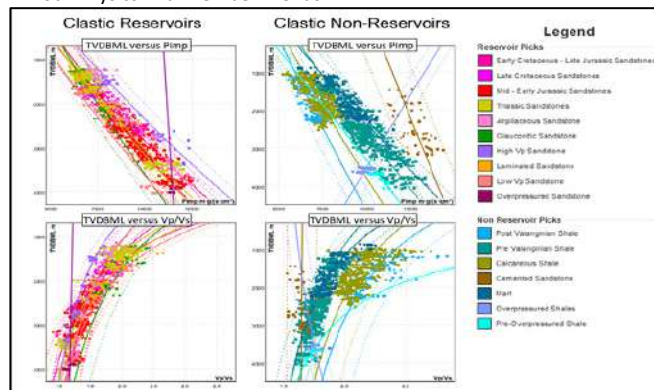
Relative simultaneous inversions used three input angle stacks tied to 34 wells. The inversion window was defined by Top Oliver Sst. and Top Permian horizons using Molyneux Advisors regional interpretation study. Constrained interpretations were calibrated to DUG's rock physics models from 56 regional wells. Focused AVA stack rotation interpretations of the relative inversion results, calibrated to analogue wells, can provide interpretations of lithology and / or fluid distributions.

Results from the study demonstrate the value of the QI products and have highlighted the potential for hydrocarbon charged sands in a variety of structural and stratigraphic settings across the survey area.

Deliverables:

- QI Conditioned Seismic:
 - Near, Mid, Far & Ultra-Far Stacks
- Relative Simultaneous Inversion Products:
 - Relative G-impedance & P-impedance Stacks
 - Relative Near, Mid & Far Impedance Stacks
 - Inversion Residual Near, Mid & Far Stacks
 - Inversion Synthetic Near, Mid & Far Stacks
 - AVA Impedance Stack Rotations -90° to 90° (10° steps)
- Final QI report

Rock Physics End-member Trends



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