

## **Basin Architecture from the Integration of FALCON Airborne Gravity Gradiometer and Seismic Data in the Canning Basin, Western Australia**

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### **ABSTRACT**

Most of the available information about the subsurface structure of the Canning Basin is from 2D seismic. To obtain an improved 3D understanding of the basin architecture and prospectivity, Buru Energy acquired a FALCON<sup>®</sup> Airborne Gravity Gradiometer (AGG) survey (38,800 km<sup>2</sup>) over the SW margin of the Fitzroy Trough and Gregory Sub-basin. An interpretation of the 3D basin architecture was produced by applying a new method of integration of AGG and seismic data, including ‘vintage’ seismic data. The integrated interpretation of the AGG, seismic, magnetic, well, an existing seismic interpretation and other available data allowed for an improved understanding of 3D distribution of structures and stratigraphy. The products include distribution map of interpreted gravity sources and structure maps at three levels, including top basement. Seismic traverses, interpreted with the assistance of AGG data and validated through 2.5D gravity modelling, have reduced ambiguities in the original seismic interpretation. These traverses greatly enhanced the understanding of the basin geometry. The results, integrated in a 3D geological model, produced with SKUA-GOCAD and validated by forward modelling and heterogeneous property inversion in VPmg, show that:

A sequence of Ordovician carbonate and shale bearing formations of relatively constant thickness overlying the metamorphic basement is clearly defined as  $g_D$  and  $G_{DD}$  highs in the AGG data. The fault structure of the platforms and terraces is well-defined by low  $G_{DD}$  values in the fault heave areas of these formations. In the northern part of the survey, thickness variations in the Ordovician-Silurian Carribuddy Group are linked to large listric growth faults, defining the WNW Fitzroy Trough trend.

The distribution of Devonian carbonates formed during the Pillara Extension, defines the NW trending Gregory Sub-basin. The Ordovician-Silurian listric faults were reactivated as transfer faults during the Pillara Extension.

Deposition of the Devonian-Carboniferous Fairfield Group was followed by the Meda Transpression. After deposition of Permian sequences in the Gregory Sub-basin and Fitzroy Trough, the Triassic Fitzroy Transpression inverted the WNW trending growth faults in the Fitzroy Trough and the major faults between platforms, terraces and troughs. As a result of better 3D basin definition with AGG data, Buru Energy now actively uses this data to assist in seismic interpretation and in planning future exploration activities.