

Unlocking the Potential of the Grant Group (Canning Basin, West Australia), Part of the Gondwanan Glaciogenic Hydrocarbon Province

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The Grant Group of the Canning Basin, despite numerous exploration campaigns over many decades, has failed to deliver significant hydrocarbons, with only limited production to date from the Lennard Shelf area. Although a complex suite of sediments, the Grant Group has excellent reservoir properties and oil and gas discoveries, although small, attest to an active petroleum system. Several key risks, notably presence of seal, hydrocarbon charge, timing of migration, and reservoir distribution and quality, have contributed to a largely unsuccessful exploration history. Exploration often suffers from permit specific studies that neglect the regional perspective, and the Canning Basin is no exception. Outstanding regional questions include Grant Group nomenclature, age, sedimentology and depositional setting.

This study has adopted an integrated approach in an attempt to address the regional scale evolution of the Grant Group. Detailed core logging from the extensive subsurface database, integrated with outcrop descriptions, provides the basis to understanding the Grant Group's depositional setting. Reinterpretation of 2-D seismic provides an insight into the controls on deposition, whether primarily by climatic (glacial) or tectonic processes, and also allows interpretation of the large scale depositional architecture. Provenance techniques (heavy mineral petrography and LA-ICPMS U-Pb and Lu-Hf isotopic analysis of detrital zircons) in conjunction with field data (e.g. palaeocurrent and subglacial striation measurements) have been utilised to determine source terranes and sediment transportation routes. To provide the regional perspective for future hydrocarbon exploration in the Canning Basin, comparison is made with prolific coeval reservoir analogues from the Al Khlata Formation (Oman).