

Analysis of Grant Group channel systems on the margin of the Lennard Shelf, Canning Basin using 3D seismic data: implications for the Permo-Carboniferous ice sheet dynamics

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Interpretation of Grant Group using a recent high quality 3D seismic data acquired on the Lennard Shelf, Canning Basin integrated with data from 17 wells within the survey area, allows analysis of seismic facies and the depositional architecture of Permo-Carboniferous glaciogenic sediments. The results offer new insights into the influence of tectonics and climate on ice sheet dynamics and distribution in the region.

The Carolyn Formation (140-560 m thick) consists of massive and cross-bedded sandstones, and mudstones. Seismic facies vary from chaotic low amplitude reflectors to discontinuous high amplitude reflectors. Two distinct erosional surfaces are observed within the seismic data which possibly represent two major glacial advances separated by a significant glacial retreat and sediments deposition. RMS attribute extractions indicate the presence of a network of anastomosing northwest-southeast oriented channels running oblique to the regional trend of the Fitzroy Trough. These channels are associated with the older erosional surface and their infill is characterised by low amplitude chaotic reflectors. The Carolyn Formation's maximum thickness is observed in a north-south trending valley (up to 450 m deep and 3500 m wide) that in places completely eroding the underlying section almost down to the Base Grant Unconformity and is interpreted to represent the latest glacial advance in the Basin. The morphology and size of these channel systems support their glacial origin with a large resemblance with tunnel valleys in the North Sea.

These results provide valuable data on the glacial evolution of the basin and development of channel systems, within a section that has proven hydrocarbon potential.