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**MIXED SILICICLASTIC AND CARBONATE FACIES ON AN INCISED CARBONATE
PLATFORM, PHAR LAP MEMBER (MIDDLE DEVONIAN),
GRAVEYARD CREEK BASIN, NORTHEASTERN AUSTRALIA**

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ABSTRACT

The Phar Lap Member consists of an extensive sheet (approximately $>10 \text{ km}^2$ x 20 m thickness) of mixed siliciclastic and carbonate facies that infill incised tidal channels (5 to 130 m deep x 100's m wide) on the eroded 'Dosey' carbonate platform. The Phar Lap Member consists of cross-bedded, well-sorted, calcareous arenites and polymictic conglomerates, interbedded with quartzose, bioclastic limestones. Limestone clasts, cannibalised from the underlying limestone platform, are common throughout, whereas *in situ* coralline and stromatoporoid buildups occur near the middle to top of the sequence. Bi-directional and low-angle planar cross-bedding indicative of both tidal and wave-influence occur in the upper half of the Member, and the whole sequence is blanketed by transgressive marine shale.

A depositional model is proposed for the Phar Lap Member that may represent a useful ancient analog for hydrocarbon exploration in similar depositional systems. The model shows how mixtures of siliciclastic and carbonate facies may accumulate in lowstand and transgressive systems tracts confined mainly within incised carbonate platforms. During lowstands, craton-derived siliciclastics are transported seaward via incised channels and mixed with locally - derived limestone debris, some of which form allochthonous limestones deposited offshore beyond the carbonate platform. During the following transgression, these channels become influenced by tidal currents and waves, and biogenic carbonate sedimentation may begin as the channels become nearly filled. A rapid eustatic rise in sea level may lead to rapid 'drowning', and the mixed siliciclastic-carbonate facies may be transgressed by deeper-water facies.

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