

Seismic Sequence Stratigraphy of the Intra-Barrow Group, Barrow Sub-Basin, Northwest Shelf, Australia

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Regional exploration in the Barrow Sub-basin has dominantly focused on the Top Barrow Group and its associated structural traps. A lack of discoveries in recent times has focused attention more towards the intra- and lower Barrow Group plays, targeting potential stratigraphic/structural traps of economic proportions.

The objective of this study was to interpret the seismic sequence stratigraphy of the intra- Barrow Group sediments within the Barrow Sub-basin, with special emphasis on identifying stratigraphic traps. The study area lies south of Barrow Island, and contains the topsets of the 'Barrow delta' which comprise an amalgamation of Mesozoic sand-prone fluvial, coastal deltaic and deepwater successions. The dataset used was the Flinders 3-D seismic survey and logs of some 35 wells.

The breakup of Gondwana was in its final stages during the Early Cretaceous, and attributed to the structural development of the Barrow Sub-basin. During the Early Cretaceous within the study area part of the Barrow Sub-basin there was a large fluvial/deltaic system building out toward the north to north-east. This contributed to northerly shelf margin accretion, with large-scale clinoform features and associated depositional environments interpreted on seismic throughout this interval.

The study has identified eleven new seismic sequences and developed a sequence stratigraphic framework tied to the wells. These eleven, second-order sequences have been further subdivided into systems tracts. The unraveling of the intra-Barrow Group succession has helped position the palaeo-shelf break, slope and base of slope throughout each sequence. A series of palaeo-geographic maps for each sequence have been developed to illustrate the basin's evolution. The key outcome of the study is that stratigraphic plays can be accurately tied to their sequence stratigraphic position and thus to their likely environment of deposition.