

High-Resolution Quaternary Reservoir Analogues from the Northern New South Wales Shelf

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The Pleistocene paleogeography to present day geomorphology of the Northern New South Wales Shelf has been constructed using an integrated sequence stratigraphic analysis. The data set comprises 34 000 bathymetric soundings, 320 surface samples and 450 km of closely spaced side scan sonar data. Subsurface data includes 46 vibracores, 349 km of closely spaced (250-500 m) seismic profiles and 450 line km of regional seismic. Absolute age control is provided by 37 radiocarbon samples and an optically-stimulated thermoluminescence (OSL).

Pleistocene (30 to 130 ka BP) progradational shoreface-barrier complexes, marine sands, bayhead delta, estuarine channels and flood-tide deltas occupy a 14 km wide by 15 m thick zone beneath the inner shelf. These paleo-environments are separated by strong seaward dipping reflectors that dissect Oxygen Isotope Stage 3 and 5 barrier complexes, which are interpreted as Transgressive Surfaces of Marine Erosion. Less laterally extensive, sub-horizontal reflectors are interpreted as Regressive Surfaces of Erosion that formed during low sea level times.

Latest Pleistocene-Holocene estuarine clays, muds, sands, gravels up to 8.5 m thick overlie the Pleistocene barrier complexes. These estuarine units resemble cores from the modern NNSW coastal plain. A diachronous (12-14 ka BP) transgressive wave-ravinement surface produced during the Latest Pleistocene sea level rise is correlatable across the entire shelf. Internal tidal ravinement surfaces are also preserved despite microtidal conditions, high wave energy and the low accommodation setting.

The present day Northern New South Wales Margin is a mixed siliclastic-carbonate province that experiences both year-round high-energy waves and a strong oceanic current. Quaternary studies from the NNSW margin challenge classic sequence stratigraphic models of sand-body geometries, as well as the character and distribution of major stratigraphic surfaces.