

# **PLIO-QUATERNARY EVOLUTION OF AN INTRA-SHELF BASIN IN MIXED SILICICLASTIC-CARBONATE SETTINGS (BONAPARTE BASIN, NW AUSTRALIA)**

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During the Plio-Quaternary, the Bonaparte Basin is characterized by the development of a wide (up to 200km) intra-shelf basin (the Malita ISB) evolving under conditions of low tectonic activity. Based on 3D and 2D seismic surveys combined with exploration well data, this study demonstrates that the stratigraphic organisation of the Malita ISB is mainly driven by fluctuations of the relative sea-level. It can be divided in three main 3<sup>rd</sup>-order system tracts: (1) a transgressive system tract, corresponding to a period of active carbonate aggradation during the late Pliocene, (2) a highstand system tract, associated with a period of strong carbonate progradation during the early-middle Quaternary, and; (3) a last system tract phasing late Quaternary high-frequency fluctuations of the accommodation space, and associated with backstepping and progressive burial of most of antecedent carbonate platforms by mixed siliciclastic/carbonate sediments. In detail, 3D seismic stratigraphy and geomorphology analysis reveals that the mixed sedimentary system of the Malita ISB is also associated with higher-order sequences, marked by phases of carbonate growth during 4<sup>th</sup> to 5<sup>th</sup> order transgressions and highstands, while tide-dominated shallow water deposits accumulate during 4<sup>th</sup> – 5<sup>th</sup> order lowstands. Throughout the late Pliocene and up to the middle Quaternary, periods of lower sea-levels were associated with widespread tidal and fluvial incisions across the intra-shelf basin, resulting in a complex stratigraphic architecture in the inter-reef areas. Our findings clearly indicate that the well constrained Plio-Quaternary evolution of the Malita ISB represents an outstanding analogue to improve the knowledge of ancient intra-shelf basin depositional settings, which frequently coincide with prolific hydrocarbon systems.