

Facies, Outcrop Gamma Ray and Isotopic Signature of Exposed Miocene Subtropical Continental Shelf Carbonates, North West Cape, Western Australia

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Exposed, uplifted Miocene carbonate sequences of the Cape Range, North West Cape, Western Australia, provide outcrop analogues of seismic sequences from offshore parts of the shelf. Facies include deep shelf marls (very fine and fine packstone), larger foram wackestone, floatstone and muddy rudstone, foram-coraline algal skeletal fragment packstone-wackestone (shallow seagrass facies), lagoonal wackestone/mudstone with scattered corals, and tidal flat laminites. The exposed Early Miocene units include the Mandu highstand, a sequence in the Tulki and one in the Middle Miocene Trealla Limestone. Sequences contain decameter scale (5 to 20 m thick), 4th-order parasequences evident on gamma ray logs and by facies stacking, that shallow and coarsen up; they appear to be due to eccentricity driven sea-level changes which may have been up to 50 m.

Higher frequency meter-scale parasequences of deep water marl up into larger foram rudstone/floatstone (perhaps obliquity/eccentricity) are evident at the base of the exposed Mandu section. These parasequences are not merely random storm deposits. This is indicated by the covariance of C and O isotopes, with the lighter values associated with deepening and deposition of deep shelf marls, and the heavier values being associated with shallowing and deposition of larger foram facies.

The uplifted Miocene continental shelf sediments of the North West Cape preserve a record of eustasy, paleoclimate and paleoceanography and thus provide a window into factors affecting the shelf, that can be compared with coeval, better studied deep sea cores.