Thesis Abstract: Reef Growth and Lagoonal Sedimentation at High Latitudes, Lord Howe Island, Australia

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The southern limit of coral reef growth in the world occurs on Lord Howe Island (33°30′S, 159°05′E) in the form of a discontinuous 6 km long fringing reef along the western side of the island. Compared with other fringing reefs worldwide it is large being attached to the shoreline only at its northern and southernmost ends while the central portion encloses a lagoon over a kilometre wide. The reef and lagoon are developed over an antecedent surface composed of reefs of Last Interglacial age and calcarenite dunes; however, there appears to be little relation between its topography and that of the modern surface.

Carbonate sediments were being deposited within the lagoon around 6500 years BP coincident with sea level reaching close to its modern level. High-energy open ocean conditions dominated the reef with robust branching corals dominating the developing reef. Sedimentation during this initiation phase strongly reflected the morphology of the antecedent surface. Growth of the reef crest between 6000 and 5000 years BP lead to a reduction in the energy environment of the lagoon allowing for mud deposition. During this period sedimentation occurred at rates of around 5 mm/yr, but up to 10 mm/yr, which infilled almost all the available accommodation space in the lagoon. By 4000 years BP the reef and lagoon were very close to the modern surface having accumulated over 11 m, possibly up to 30 m, of sediment. Sediments younger than 3000 years BP form a veneer over these older units with the main deposition being confined to embayments, the coastal plain and infilling blue holes.

Reef growth and lagoonal infill at the southernmost environmental limit have been luxuriant and rapid, comparable with low-latitude reef systems. The main period of growth occurred during the mid-Holocene. Modern sedimentation appears to be restricted to the lagoon and there is little reef progradation. The reef on Lord Howe therefore appears to be related to luxuriant growth in the mid-Holocene.

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