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Holocene evolution of turbid-zone, nearshore shoal reefs, central Great Barrier Reef, Australia

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High sedimentation and elevated turbidity are conditions traditionally viewed as detrimental to coral health and limiting to coral reef development. However recent studies have highlighted the potential for active reef accretion within a range of turbid-zone settings. Despite the ecological and geological significance of these reefs very little is known about their structure, sedimentology and evolutionary history. To advance our understanding of the development of these important inshore reef systems a study has recently been initiated at two contrasting turbid-zone sites on the central GBR. This presentation reports on the initial findings from one site at Paluma Shoals. Paluma Shoals is a series of shoal reefs that occur within Halifax Bay on the inshore regions of the central Great Barrier Reef (GBR). It is located in a nearshore zone of wave-driven sediment resuspension and high turbidity.

Assessments of the modern coral community structure have identified two main areas of active reef development, the southern detached shoal and the northern shoal complex which is shore-attached. The southern shoal is a site of high diversity and very active coral growth (live coral cover is up to $\sim$80% across most of the reef flat). The northern shoal exhibits a progressive decline in coral cover northwards due to inundation from the landward attached edge. Despite inundation from the landward side there is substantial active coral recruitment occurring across the entire reef flat. This highlights the potential for active coral growth and ‘healthy’ coral community structure under conditions that have traditionally been viewed as unfavourable for coral and “reef” growth. It also presents evidence of a reef community which has initiated and evolved under such conditions.

In order to investigate the wider sedimentary setting in which these reefs occur and their internal sedimentary structure detailed sediment facies analysis is being conducted. A series of shore-normal transects have been established extending from the upper intertidal to the seaward reef margins, from which surface sediments have been collected. Off-reef (intertidal) areas are dominated by silciclastics, whilst the reef flat area is dominated by mixed carbonate-siliciclastic sediments. In addition eight cores were collected from across the shoal complex to investigate reef depositional facies. These demonstrate that the reef sequence typically comprises a coral rubble floatstone facies. Near surface units are dominated by branching rubble (much of which appears to be *Acropora* sp.) set within a silty-sandy sediment matrix. Mud content increases downcore grading into muddy fine sands and clays with predominantly angular rubble along with fragments of branching corals. There is evidence of intensive bioerosion by sponges, bivalves and worms, but limited encrustation (coralline algae, bryozoan and serpulid worms form thin, patchy crusts). There is a distinct lack of biological binding or cementation. Basal 'reef' units comprise mud rich sediments with coral clasts, or muddy clay/fine sands with minor coral and bivalves (articulated and disarticulated). Mud-rich layers with no rubble occur in 10cm units, possible indicating storm deposits. Three cores recovered Pleistocene clays at the base of the cores confirming that the entire sequence of Holocene reef accumulation had been penetrated, and establishing that reef initiation occurred over a stiff clay substrate.