

Sedimentary environments of the Central Region of the Great Barrier Reef of Australia

Terence P. Scoffin¹ and Alexander W. Tudhope²

¹ Department of Geology, University of Edinburgh, Edinburgh EH9 3JW, Scotland

² Department of Geology and Mineralogy, University of Aberdeen, Aberdeen AB9 1AS, Scotland

Accepted 14 March 1985

Abstract. The sediments and calcareous organisms on the outer reefal shelf of the Central Region of the Great Barrier Reef were collected and observed by SCUBA diving and research vessel techniques (including underwater television) to understand the production and processes of deposition of the sediment. The carbonate grains are mainly sand and gravel size and solely of skeletal origin. Over the whole area the major CaCO₃ producers, in order of decreasing importance are: benthic foraminiferans (chiefly *Operculina*, *Amphistegina*, *Marginopora*, *Alveolinella* and *Cycloclypeus*), the calcareous green alga *Halimeda*, molluscs and corals. Coral abundance is high only close to reefs and submerged rocky substrates. Benthic foraminiferal sands dominate the inter-reef areas i.e. the bulk of the shelf, and *Halimeda* gravels form an outer shelf band between 60 and 100 m depths. Seven distinct facies are recognised after quantitative analyses of the sediments. These are: A. Shelf edge slope (>120 m depth); B. Shelf edge (with rocky outcrops); C. Outer shelf with high *Halimeda* (>40%); D. Inter-reef I; E. Inter-reef II (<100 m depth but >2% pelagics); F. Lee-ward reef talus wedge (<2 km from sea level reefs); G. Lagoonal.

Dip in the north; a central group containing The Slashers and Kelso Reef, and a group flanking the west of the area with Trunk Reef in the south and Pith Reef in the north. Many coral reefs and rocky prominences detected by echo sounding do not reach sea level; these are, however, most abundant within the clusters of sea level reefs.

The shelf edge is not rimmed by continuous reefs in this region; only Myrmidon Reef is located at the break in slope. Palm and Magnetic Passages (Fig. 1), which were formerly major drainage channels (Johnson et al. 1982), slope from a depth of 50 m at the shelf centre to 80 m near the shelf edge. Echo-sounding profiles (Fig. 2) reveal essentially flat, sediment-covered, bottoms to the passages with only rare rocky outcrops. At the oceanward mouths of the passages on the shelf margin at a depth of about 110 m there are local rocky prominences and steep gullies with as much as 30 m relief. Beyond these rocky outcrops the shelf margin slopes gently at approximately 1° to abyssal depths.

The area studied (Fig. 1) is the outer part of the shelf (the High Carbonate Facies of Maxwell 1968) where numerous reefs reach sea level and the inter-reef sea bed ranges in depth from about 50 m (inner shelf) to 80 m (outer shelf). Observations were made and samples collected down the shelf edge slope to 240 m depth.