1. INTRODUCTION

The oceanic region between the Tonga-Kermadec Trench and New Zealand to the east and Australia to the west (see map at the back of this volume) has long been regarded as an anomalous region. Prior to development of the plate tectonic theory, it was known that the eastern boundary of the region was tectonically active, the western relatively passive. The Lord Howe Rise and the Norfolk Ridge were once thought to be mid-ocean ridges or foundered continents. Brodie (1964), however, clearly summarized the geophysical evidence for the region that suggested the Lord Howe Rise may have an underlying continental-type crustal structure. Le Pichon (1968) showed how the Tonga-Kermadec Trench, New Zealand, and the Macquarie Ridge formed a boundary between two major oceanic crustal plates.

Sea floor spreading rates and crustal origin of the easternmost of the two crustal plates are well defined, crustal spreading having reached rates of up to 10 cm/year in the past 30 million years. The crust of the eastern plate has been shown to be moving into the Tonga-Kermadec Trench, where it is absorbed, and along the northern edge of the Fiji Plateau, where it is moving northwestwards (Isacks et al., 1968).

Regarding the linear ridges, the Lord Howe Rise and the Norfolk Ridge, apparently, do not have any symmetrical magnetic anomalies associated with them, therefore, it is doubtful that these ridges mark any extensive regions of sea floor spreading (Taylor and Brennan, 1969). Furthermore, although the Lord Howe Rise and the Norfolk Ridge are two parallel ridge-like features, the former appears to have a smooth, sediment covered, cross-section, whereas the latter has a block-like, sediment-free cross-section (van der Linden, 1967). Le Pichon (1968) has indeed suggested, from analysis of Pacific and Indian Ocean magnetic anomalies, that the Tasman Sea has been the site of both crustal extensions and compressions since the early Tertiary. From the analysis of geophysical data, including seismic reflection records, Ewing, Houtz and Ewing (1969) suggest that in the past 10 million years the whole of the Melanesian region has undergone considerable uplift. The eastern margin of the Tasman tectonic plate is marked by a series of ridges and basins. Karig (1970) carried out detailed studies of the Tonga-Kermadec Trench, the Lau Basin, and the Lau Ridge and came to the conclusion that the present morphology of these tectonic features originated towards the end of the Tertiary.

The Tasman Sea and its marginal features mark the boundary between the Indian and Pacific crustal plates. The age relationship of the tectonic features contained within the Tasman Sea region has remained largely unknown. The Leg 21 overall objective was to provide initial coring data which would aid in reconstructing the tectonic history and relative plate movements of the Pacific and Indian crustal plates and determining the age of the tectonic features contained within the Tasman Sea region. To accomplish this, a number of specific objectives were established. These were to determine:

1) The age and biostratigraphy of the oldest Pacific crustal section now being subducted into the Tonga-Kermadec Trench (Site 204).

2) The age and composition of the interarc basin sediments contained within the Lau Basin (Site 203).

3) The age and composition of the South Fiji Basin and of the basement rock (Site 205).

4) The relationship of the New Caledonia Basin to the Lord Howe Rise, and at the same time the age and composition of the sediments in the stratigraphic section (Site 206).

5) The age and biostratigraphic history of the Lord Howe Rise, including the age of the basement rock (Sites 207 and 208).

6) The biostratigraphy, lithology, and age of underlying crust, and the relationship between the Coral Sea and the Queensland Plateau (Sites 209 and 210).

These objectives were in large measure accomplished during the leg which took place during the period 9 Nov. 1971 to 11 Jan. 1972. Nearly continuous coring resulted in excellent stratigraphic sections, but the unexpected thickness of sediments at all sites resulted in failure to reach basement at all but one.

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