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THE QUATERNARY HISTORY OF CHATHAM ISLAND, NEW ZEALAND

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The North Red Bluff Quaternary sequence, Petre Bay, Chatham Island.

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ABSTRACT

The Quaternary geology of Chatham Island has been investigated using several different techniques, including: tephrochronology, mineralogy, palynology and stratigraphy; in an attempt to draw together a Quaternary history for the Island.

The Quaternary record of Chatham Island comprises mainly deposits from terrestrial environments, predominantly thick blanket peats and aeolian sand, all of which range from latest Castlecliffian to Haweran/Recent in age. Quaternary deposits that demonstrably predate this age range (i.e. > Oxygen Isotope Stage 12) have not been recognised anywhere on the Island. Their absence is, at this stage, attributed to a major marine transgression across much of the northern and central portions of the Island during Oxygen Isotope Stage 11.

Two rhyolitic tephra produced during two of the largest eruptions from the Taupo Volcanic Zone are present on Chatham Island. The 27.1 ka Kawakawa Tephra is well preserved across most of the Island, occurring within most pre-Holocene sequences. The 345 ka Rangitawa Tephra, not previously recognised on Chatham Island, is found in a few scattered coastal locations where older, late Castlecliffian sediments are preserved. In the absence of any other forms of radiometric age control these two tephtras have provided the principal means for time control within and between stratigraphic sequences on the Island.

Palynology has been used predominantly to determine climatic conditions at the time of sediment accumulation. Palynological investigations of seven sections of peat deposits have also demonstrated that cyclic changes in vegetation patterns have

occurred throughout the Quaternary on Chatham Island. However these changes have not been as significant as those that occurred on mainland New Zealand over the Quaternary. It is concluded that this indicates climatic deterioration during glacials may not have been as pronounced on Chatham Island as on the mainland.

Marine terraces created during former high sea level stands are preserved in several areas on Chatham Island. Quaternary terrace surfaces ranging in age from Last Interglacial (OIS 5e) to OIS 11 occur at heights of 3-5 m, 9 – 10 m, 16 m, 20 m and 30 - 40 m above sea level. An exhumed surface of Late Pliocene age occurs at 7 – 14 m a.s.l.. Terrace ages have been determined using cover-bed stratigraphy, and in particular the presence or absence of tephra marker beds.

Height-age relationships of marine terraces have been used to develop preliminary rates of tectonic uplift on Chatham Island. The resulting values range between 0.01 – 0.13 mm/yr and are very low compared with more tectonically active areas of mainland New Zealand. However, there is considerable variation in these rates across Chatham Island, indicating that the tectonic history of the Island over the Quaternary may be complex.

This thesis has also demonstrated that considerably more work is required to fully understand the Quaternary history of Chatham Island. In particular, better numerical age control on key deposits; more detailed, high-resolution pollen records from key locations; and obtaining stratigraphic records from a greater range of locations. This is particularly so for the southern uplands where older records are virtually inaccessible due to a thick blanketing of post-glacial peat deposits.

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