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**Sequence Stratigraphy of Plio-Pleistocene  
Sediments in Lower Turakina Valley, Wanganui  
Basin, New Zealand**

A thesis presented in partial fulfilment of the requirements for the  
degree of Master of Science in Quaternary Science at Massey  
University

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## ABSTRACT

The Wanganui Basin is a large south westerly facing embayment which contains up to 4000 m of Plio-Pleistocene shallow marine sediment deposited during periodic glacio-eustatic sea-level fluctuations. The basin depocentre has shifted progressively southward over time in response to uplift in the north.

Ten cycles recorded within the late Pliocene to mid-late Pleistocene sediments exposed along the coast at Castlecliff are correlated to lower Turakina Valley, Whangaehu Valley and Rangitikei Valley.

The cyclic basin fill in the study area has been interpreted in terms of sequence stratigraphy. Facies successions of the Transgressive Systems Tract (TST) consist of sediment deposited within shoreface to innermost shelf environments during relative sea-level rise. In the Turakina Valley section, it was found that several depositional sequences show anomalously thick TST's. Where these thick TST's are evident, a relatively thin HST occurs. These anomalously thick TST's occur along the flanks of the Marton Anticline and may represent periods of uplift of the anticline or a significant increase of sediment supply into this part of the basin during relative rises in sea-level.

Type A1 Shellbeds in the Turakina Valley section are particularly well represented and tend to be thicker compared to those at Castlecliff. The increase in thickness towards the east of the basin is attributed to increased sedimentation rate with closer proximity to the axial ranges. The faunal assemblage of Type A1 Shellbeds in the Turakina valley section were found to be similar to those at Castlecliff.

Condensed Mid-cycle Shellbeds (MCS) (= Type B Shellbed) are rich in well preserved *in situ* and near *situ* fauna within a muddy, fine sand or silt matrix. The mid-cycle shellbeds in the Turakina Valley section are thinner than those at the Castlecliff section. This thinning out of the MCS towards the east of the basin is attributed to higher

sedimentation rates. Sediment starved conditions necessary for the development of mid-cycle shellbeds are therefore less pronounced.

A new kind of Type B shellbed was recognised in the Turakina Valley section (Facies TCS-1) and consists of a basal shell conglomerate followed by a muddy phase with abundant, diverse fauna. This type of shellbed appears to succeed a period of uplift on the Marton Anticline or follows a period of increased sediment supply into this part of the basin.

In general, the faunal assemblage of Type B Shellbeds in Turakina Valley was similar to that recorded from the Castlecliff section. The assemblage, however, was more diverse in the Turakina Valley section, perhaps reflecting higher sedimentation and subsidence rates towards the east of the basin.

The Highstand Systems Tract (HST) consists of a thick unit of blue-grey siltstone which represents the latter part of a relative sea-level rise and beginning stages of a relative sea-level fall. The siltstone facies that make up the HST were deposited on the inner and inner-middle shelf. The HST's exposed on the onland section of the Wanganui Basin are incompletely preserved. Similarly, the Lowstand Systems Tract (LST), which would be made up of progressively more terrestrial facies as sea-level falls, is only seen at one site in Rangitikei Valley. Both the upper part of the HST and the LST were eroded away and redeposited as the next rise in sea-level occurred, forming the unconformity that represents the sequence boundary.

In the depositional sequences where sedimentation wasn't affected by uplift on the Marton Anticline or by a diverted sediment source, HST's are considerably thicker compared to those at Castlecliff. This thickening of siltstone units towards the east of the basin reflects an increasing sedimentation rate due to closer proximity to the axial ranges and increasing subsidence rate with respect to the position of the contemporaneous depocentre.

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