

Late Pliocene to Recent Seismic Stratigraphy of the Northland Basin, New Zealand: Implications for Complex Passive Margin Delta to Slope Evolution

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The Northland Basin, New Zealand is a sedimentary basin contiguous with the Taranaki Basin to the south, whose hydrocarbon potential is currently being explored. Two-dimensional seismic reflection data from the Northland Basin reveal the evolution of an extensive turbidite system and shows that shelf margin growth was significantly influenced by an offshore stratovolcano complex that formed in the Miocene. The shelf system comprises:

- a) A shelf margin delta
- b) Submarine channel systems
- c) A basin floor fan
- d) Mass transport deposits

During the Late Pliocene-Recent period the shelf margin delta exhibited highstand progradation with minor aggradation type growth. While the overall growth pattern of the shelf margin delta is that of a highstand, reflection terminations and analysis of the shelf break has shown that the shelf margin delta to have evolved through a series of downstepping progradation, transgression and aggradational and progradational phases, implying sea level and sediment input variations. Periods of clinof orm oversteepening occur to the south of the Northland Basin where the delta progrades over volcanic massifs.

The initiation of submarine channel incision and turbidite deposition in the Late Pliocene coincided with that of the shelf margin delta. However, to the north, channel development and shelf margin growth have been inhibited by a large volcanic massif. The northern channels were abandoned by the Calabrian (c. 1.6 Ma), where seismic facies indicate low energy deposition. Submarine channels offshore of the Kaipara Harbour are ubiquitous throughout the Late Pliocene to recent, indicating a long lived link between terrestrial and marine environments. A large basin floor fan related to these channels is observed to the north and south, onlapping the base of the Late Pliocene to recent sequence. Minor unconformities within the fan are tentatively linked to complexities of the shelf margin delta evolution. Mass transport deposits are observed only in a limited zone to the south of the Northland Basin, where they are sourced from the flanks of stratovolcanoes.

Isochron maps of an earlier Miocene to Late Pliocene sequence and the Late Pliocene-Recent sequence show a shift of preferential deposition from northwest to southeast, indicating a regional tilt and/or a change in ocean dynamics and sediment source during these time periods.