

PRINCIPAL NEW ZEALAND EARTHQUAKES IN 1986

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The year 1986 was one of only very little earthquake activity in New Zealand. This confronts the seismologist and the earthquake engineer with a problem: how are we, in public forums, to keep the awareness of earthquake hazard alive when most people's experience of earthquakes is limited to small shocks such as we have had during the last year? For instance, the earthquake which was felt strongly in Wellington on 13 November was billed by the media as "the biggest to hit the capital in years". The magnitude was actually only 3.9, the ground amplitude at the Observatory in Kelburn was only one millimetre and acceleration only one percent that of gravity. There were of course some microzoning effects so that the ground motion was stronger in other parts of the city, and there were some resonance effects in buildings of appropriate period, but this was actually a very small earthquake which was felt strongly because it happened to occur close to Wellington. Fortunately the Civil Defence authorities have no illusions about the possibilities of larger earthquakes occurring, and endeavour to convey their message from time to time.

No shallow earthquake within the land area of New Zealand or the close inshore area reached magnitude 6 during 1986. There were a number that reached magnitude 5: on 13 February in Hawke's Bay (5.0), on 11 July to the south of Fiordland (5.3), on 12 July to the south-east of Arthur's Pass (5.4), on 18 September near the top of Lake Pukaki (5.0), on 10 October in southern Hawke's Bay (5.1), and on 28 November near Arthur's Pass (5.0).

These all had maximum reported intensities about MM V. The February 13 shock was felt most strongly in the Waipukurau area and less so in Napier, Hastings, Palmerston North and Wanganui. The maximum intensity in the July 11 shock was at Lake Te Anau; it was also felt in other parts of Fiordland and Southland. That on July 12 was felt from Christchurch to Dunedin. The September 18 shock was felt in Arthur's Pass at various localities on the West Coast. The October 10 event was felt in Palmerston North and north as far as Napier. The November 28 shock was felt around the Arthur's Pass and Otira area and on the West Coast (Hokitika: "a real good shake").

There were some significant earthquakes deep below the North Island, which were felt quite widely: beneath the South Taranaki Bight on 3 March and 25 March, and beneath the central North Island on 16 May, 28 July and 27 October. All of these were of magnitude about 5.5, but because they were so deep (150 km and more) they were not felt strongly. They are of scientific interest because they define the region

where the floor of the Pacific Ocean (the Pacific Plate) is being thrust down in a north-westerly direction beneath the North Island. This deep earthquake activity is characteristic of the New Zealand region, and marks a significant difference from California. The Main Seismic Region, which extends as far south as about Greymouth and Christchurch, is underlain by a dipping zone of earthquakes which reaches a depth of 300 km under Tauranga, shallowing southwards to about 200 km under Nelson. Californian earthquakes, in contrast, are all shallow, mostly less than 10 km. Occasionally deep earthquakes have been known to cause damage in New Zealand, but it is the shallow activity which contributes most to the earthquake hazard.

There were some larger earthquakes to the north of New Zealand which were felt here and serve to remind us that we are part of a continuous system of seismicity which will eventually affect us more directly. One such was on 20 October: about magnitude 8, and some 1700 km from Wellington. The meteorological team on Raoul Island reported goods off shelves there, despite being 250 km away from the epicentre. Some occupants of tall buildings in Wellington and Lower Hutt reported the long slow vibrations characteristic of large earthquakes felt at great distances: chandeliers swinging in the gentle, swaying motion. The earthquake was far enough from populated islands that it caused no great damage.

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