PRINCIPAL EARTHQUAKES IN NEW ZEALAND IN 1991

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During 1991 there were two earthquakes which exceeded magnitude 6 in New Zealand, one near Taupo on July 12 (6.4) and one north of Wanganui on September 9 (6.3). Both were of intermediate depth (71 and 87 km respectively). Their magnitudes were comparable with that of the Edgecumbe earthquake in the Bay of Plenty in March 1987. The September 9 shock was felt from Coromandel to Christchurch, and resulted in about 2500 claims to the Earthquake and War Damage Commission, mostly from Wanganui. The Observatory received two isolated reports of intensity MM VII, but nothing else above MM V, in keeping with the focal depth of the event. High intensities in earthquakes are a well-known feature of Wanganui, established first by Hayes (1936). The Observatory conducted an intensity survey, with the assistance of the Wanganui Chronicle, and despite the limitations of a procedure which relies solely on questionnaire returns from the public, definitely established amplification of ground motion due to weak ground. The pattern was nevertheless found to be an extremely scattered one with very little in the way of systematic microzoning effects.

The July 12 shock was also felt as far south as Christchurch, but only at moderate intensities. Effects near the epicentre were not as great as near Wanganui on September 9, because of the different geological basement in the Taupo area.

There were two more earthquakes exceeding magnitude 6 offshore: 140 km north-east of East Cape on November 20, and 40 km north of Tauranga but 285 km deep, on November 16. Neither was felt very strongly onshore.

On January 29 there were two shallow earthquakes within five hours, both about 15 km south of Westport in the area of the lower Buller Gorge. They have been named the Hawk's Crag earthquakes, and were the subject of a field survey and subsequent analysis. Their magnitudes were 5.6 and 5.8. They caused some chimney damage in Westport, Waimangaroa and Inangahua. Goods were displaced off shelves in Reefton, Hokitika and Greymouth. Felt reports have been received as far away as Paraparaumu and Christchurch. There were a few aftershocks, but rather less than expected for main shocks of this magnitude, and this is an item of current investigation.

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Occasional aftershocks of the earthquakes near Weber in Southern Hawkes Bay, in February and May 1990, have continued, all of them small. Aftershock sequences such as this do tend to persist for many months after the main shocks.

On February 15 an earthquake of magnitude 5.5 occurred off the coast from Greymouth. It was felt throughout much of the northern and western South Island, although no damage has been reported. This is at the southwestern end of the Main Seismic Region: between Greymouth and Milford Sound, earthquakes are less frequent despite the presence of the Alpine Fault which runs much of the length of the South Island.

A deep earthquake (106 km) occurred to the south of Patea on 9 June. The magnitude was 5.8, and it was felt from New Plymouth to Greymouth. Earthquakes at that depth are common in the South Taranaki Bight.

Southern Fiordland experienced an earthquake of magnitude 5.0 on September 5. It was centred near the head of Dusky Sound, and was reported felt as far east as Dunedin. Focal depth was 74 km.

Goods were shaken from shelves in Ruatoria on 31 October, when an earthquake of magnitude 5.0 occurred near East Cape. At the same time a swarm of very small earthquakes was in progress near Kaikoura, attracting considerable public attention. This phenomenon of a swarm of small events is one which needs further study in New Zealand. It is simply not known how often these occur, because the sensitive network which can now detect these has not long been in place, a product of the recent upgrading of instrumentation. On such occasions, there is always an outside chance that the swarm will develop into a major earthquake, but the process is not understood. It is fortunate that the most common outcome seems to be that the swarm dies away within a few days, as indeed happened in Kaikoura.

Reference

Hayes, R.C. 1936. Intensity distribution in New Zealand earthquakes. N.Z.J. Sci. Tech. XVIII, 508-511.