

PRINCIPAL NEW ZEALAND EARTHQUAKES IN 1988

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The Te Anau earthquake on 1988 June 4 was felt over much of the South Island. The epicentre was near the north end of the lake, where a seiche was reported. A slip closed the Milford Road for some hours. Despite the focal depth of about 70 km, intensities reached at least MM VIII at Te Anau, the Eglinton Valley and Manapouri. An automatic switch was tripped at the Manapouri Power Station, and power supplies to Christchurch, Te Anau and Invercargill were disrupted. But there was no structural damage reported from any of the South Island hydro dams.

With a magnitude of 6.6, this was probably the largest in Fiordland for more than 40 years. The uncertainty reflects the difficulty is assessing magnitudes. The 1960 and 1976 Milford Sound earthquakes were both originally assessed as magnitude 7.0, but revision of these using the procedure developed by Haines (1981), which accounts for observed propagation characteristics, reduces both of these to 6.5. Two earthquakes in 1943 may have been slightly larger. But large as it was, the effects of the Te Anau earthquake were tempered by the focal depth of about 70 km. Had it been shallow, as was the Edgecumbe earthquake in March 1987, there would have been much more damage due to surface waves and near-source effects.

The Te Anau quake provided the first occasion for the Seismological Observatory to use its new digital recorders, which are now being installed at the permanent stations of the New Zealand network. Two portable seismographs were used in the Te Anau-Eglinton Valley area for a week after the earthquake, and many aftershocks were recorded. The analysis of these data will be done in a study to be funded by Electricorp, to determine the mechanism of the main shock and to elaborate the details of the seismogenic zone in Fiordland. The question of the likelihood of similar or larger earthquakes is important, particularly for the electricity generating facilities in the region.

The earthquake which caused the most publicity was that which struck Wellington on 5 July. It was of magnitude

4.7, and was centred about 20 km west of the city, off the Makara coast, at a focal depth of about 30 km. Its occurrence was particularly timely, because the safety of Parliament Buildings had recently been called into question, and this earthquake was felt quite sharply there and elsewhere in the Capital. Its small size can be put into perspective with other, larger earthquakes, by the fact that the recording on the old Imamura seismograph at the Seismological Observatory showed a ground displacement there of only 1 millimetre. Seismologists and engineers still have quite a task in making the public aware of the reality of large earthquakes, when what was referred to in the news media as a large earthquake was actually so small. Perhaps the two large Soviet earthquakes in recent months will help to provide the perspective.

Most of the earthquakes over magnitude 5 in New Zealand in 1988 were deep ones. They were generally felt over wide areas, but (apart from the June 4 shock) did little or no damage. This was particularly true of those beneath the central North Island on 5 January (magnitude 5.5), 4 August (5.5), and 21 November (5.0). Further south also, earthquakes occurred deep beneath the south Taranaki Bight on 29 April (magnitude 5.4) and 31 May (4.9).

The main seismic region extends well out to sea, east of Hawke's Bay. Shallow earthquakes occurred there on 12 April (magnitude 5.5), 20 May (5.2) and 6 Sep (5.4). All three were large enough to inflict substantial damage, had they been on land and close to populated areas. Because of their offshore locations, these three were felt only moderately, in Hawke's Bay and Wairarapa.

Apart from the Te Anau earthquake, the Fiordland area was also shaken on 16 May (magnitude 5.1) and 19 July (5.0). Fiordland is a very small seismic region, yet it accounts for nearly one fifth of the country's earthquakes. But the lack of population there means that the risk of substantial damage or injury is small.

REFERENCE

Haines, A.J. 1981. A local magnitude scale for New Zealand. Bull. Seism. Soc. Pm. 71, 275-94.

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