Scientists assess earthquake potential of faults close to West Coast

Seismic research by NIWA scientists off the West Coast of the South Island has identified faults capable of causing earthquakes with magnitudes of up to 7.8.

Their work in reassessing the faults will be important for updating the New Zealand National Seismic Hazard Model which combines historic and prehistoric earthquake information to estimate how often earthquakes have occurred and where.

NIWA marine geologist Philip Barnes says the work fills in a huge gap in this area, making it a significant advance in understanding seismic hazard in a region vulnerable because of its infrastructure and proximity to a fault-controlled coastline.

Co-author of the report, Francesca Ghisetti (of geological consultancy company TerraGeoLogica), says this work builds on work done by industry and previous scientific contributions from other researchers.

NIWA led the two-year mapping project for the West Coast Regional Council (WCRC) which wanted to assess the tsunami risk for its coastal communities.

However, Dr Barnes said it was impossible to provide that information without knowing whether there were active fault structures close to the shore.

“The oil industry has been very active off the West Coast and has collected a lot of data about some of the faults over several decades. However, this is the first time the offshore data have been analysed to determine whether these faults are active and the potential earthquake hazard they pose.”

In its report to the WCRC, NIWA says:

* The faults are parallel to the coast within 30km of the shore.
* There are 10 marine faults in the 320km between Cape Farewell in the north, to Hokitika in the south.
* These include five segments of the Cape Foulwind Fault, the Kahurangi and Kongahu faults, and three others referred to informally as the Farewell, Elizabeth, and Razorback faults.
* The faults range in length from 10km to 120km and are expected to generate earthquakes ranging in magnitude from 6.4 to 7.8.
* It is estimated earthquakes of these strengths would recur on individual faults between once every 7500 to 30,000 years.

Dr Barnes said while these faults were relatively large and capable of causing fairly severe earthquakes, it is thought that they have extremely long recurrence intervals, meaning that large earthquakes would be very infrequent.

However, it is impossible to tell when previous earthquake ruptures may have taken place, and there are significant uncertainties in the rates of fault activity.

Further progress addressing the tsunami risk for the West Coast is a step closer but Dr Barnes says there is still a lot to be done.

“This information will underpin future work to improve the modelling of seismic and tsunami hazards that will help coastal communities and authorities better understand the potential risk associated with future earthquakes.”

Michael Meehan, planning and environmental manager at the West Coast Regional Council, said the information fits into work to be carried out in the future.

“The council thought it important to gauge what we are dealing with, and to help us decide where to from here,” he said.

The West Coast has been the location of two of New Zealand’s most severe earthquakes in recent history: the Murchison earthquake in 1929 which measured 7.8 and the 7.1 Inangahua earthquake in 1968. These earthquakes were caused by ruptures on onshore faults that share many similarities with the offshore faults.

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