



RMS New Zealand Earthquake HD Model

New model introduces advanced modeling methodology for New Zealand earthquake risk, including high-resolution liquefaction modeling and a fully probabilistic tsunami model



KEY FEATURES

- The most sophisticated and up-to-date view of earthquake risk in New Zealand
- First ever to include liquefaction, landslide, fire following earthquake, and tsunami
- Collaboration with local experts, scientific agencies, and insurers
- Model development calibrated against billions of dollars of claims data
- Assessment of new regulatory requirements including 1,000-year return-period loss

The RMS® New Zealand Earthquake HD Model incorporates important lessons learned from the 2010-2011 Canterbury Earthquake Sequence (CES). The CES started as a magnitude (M) 7.1 earthquake on September 4, 2010, some 40 kilometers west of Christchurch. A series of earthquakes followed, with the strongest on February 22, 2011, registering M6.3 just 10 kilometers southeast of the center of Christchurch.

It was this M6.3 event that caused the largest destruction, with building collapses in the Christchurch central business district, widespread liquefaction, and 185 fatalities. The CES resulted in an estimated \$33-38 billion NZD (\$22.8-26.2 billion USD) in overall insured losses, making this the second-largest insured loss from earthquake ever.

A new view of New Zealand earthquake risk

The CES uncovered unforeseen aspects of earthquake risk in New Zealand, including extreme liquefaction and the important contribution of seismic hazard from previously unknown faults. Before the CES, New Zealand earthquake risk received relatively little attention from the global (re)insurance industry, however since CES there has been a significant shift in the recognition of New Zealand earthquake risk.

New model highlights

Post-CES data has driven scientific advances in earthquake modeling, and RMS collaborated closely with local experts, scientific agencies, and insurers to develop the new model for a more complete, robust representation of earthquake risk in New Zealand.

This is the first to include liquefaction, landslide, fire following earthquake, and probabilistic tsunami, and is also the first RMS earthquake model built using a high-definition (HD) approach. Enhancements include:

- **Updating all main source model components:** The model integrates the new underlying science and data within the 2010 National Seismic Hazard Map¹ and the seamless 2014 Geological Map of New Zealand (QMAP)² from GNS Science.
- **Liquefaction model for New Zealand completely redesigned and calibrated:** RMS collaborated with local geotechnical engineers and used locally collected data for accurate modeling of liquefaction risk.

HD MODELING BENEFITS

- First earthquake model to benefit from the RMS HD modeling framework
 - Simulation-based framework enables tens of thousands of realizations of earthquake losses in a future year
 - Advanced liquefaction modeling
 - First RMS probabilistic tsunami model
- **Updating the vulnerability component and inventory regions:** The model captures updates to the local building codes and construction practices as reflected in enhanced vulnerability curves, updated design code regions, and updated building inventories to reflect local building stock.
 - **Inclusion of probabilistic tsunami as a new sub-peril:** The probabilistic tsunami risk for New Zealand is based on a full hydrodynamic model of tsunami events generated on local sources, modeled at very high resolution.
 - **Introduction of a unique HD financial model:** The new financial model expresses a wide range of contracts, including implementation of New Zealand-specific policy structures and terms.
 - **Release of New Zealand Earthquake Industry Exposure Database (IED):** The new IED has been developed on the basis of the 2015 RMS New Zealand Economic Exposure Database (EED) and provides insured earthquake exposure aggregated to census meshblock by line of business.

Managing New Zealand earthquake risk

Using the underlying HD paradigm framework, (re)insurers can use the model to identify losses at a granular level, which enables better risk management decisions. This model can also be used to assess loss capital requirements to satisfy the requirements of local regulators.

Find out more

Contact sales@rms.com, your local RMS sales office, or visit the RMS website at www.rms.com for more information about the RMS New Zealand Earthquake HD Model.

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¹ Stirling, M., G. McVerry, and M. Gerstenberger, et al. (2012). National Seismic Hazard Model for New Zealand: 2010 update, *Bull. Seis. Soc. Am.*, 102(4), doi: 10.1785/0120110.170.

² <http://www.gns.cri.nz/Home/Our-Science/Earth-Science/Regional-Geology/Geological-Maps/1-250-000-Geological-Map-of-New-Zealand-QMAP>