

# RMS® Canada Earthquake Model

Extensive, sophisticated earthquake modeling capabilities for Canada



## KEY BENEFITS

- Includes the latest scientific understanding of seismic sources affecting Canada from the Geological Survey of Canada and the United States Geological Survey (USGS)
- Single, complete model includes all ten Canadian provinces, and three territories
- New suite of ground motion prediction equations
- Updated magnitudes, geometry, and recurrence for the Cascadia Subduction Zone
- Upgraded soil amplification methodology, including high-resolution Vs30 data layer covering Canada
- Introduction of high-resolution basin amplification model for Vancouver
- Six vulnerability regions better reflect seismic vulnerability across Canada

## Benefit from the Latest Scientific View of Seismic Hazard for Canada

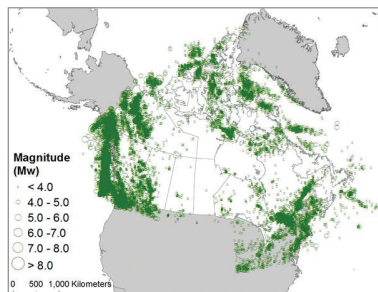
The introduction of new earthquake hazard data, published by the Geological Survey of Canada (GSC) in 2014 and 2015, provides a substantially updated earthquake catalog that includes events spanning nearly 400 years, from 1627 to 2010. The RMS Canada Earthquake Model incorporates this catalog dataset and includes new seismic source zone and maximum magnitude information from GSC to provide the latest scientific view of seismic hazard for Canada.

## Complete Seismic Model Across all Canadian Provinces and Territories

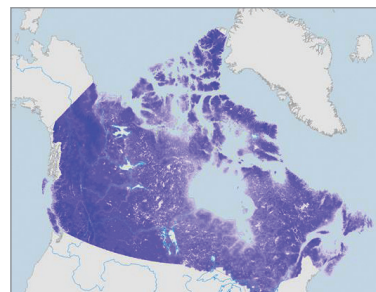
All ten Canadian provinces are included in the RMS Canada Earthquake Model, together with the three Canadian Territories (Northwest Territories, Yukon, and Nunavut). This delivers a complete view of seismic risk across the entire country.

## Accurate Risk Pricing Differentiation Using Latest Ground Motion Prediction Equations

The model incorporates the latest ground motion prediction equations (GMPEs) to estimate earthquake shaking decay rates, to allow for more differentiated pricing and risk selection. Subduction zone sources use GMPEs consistent with the Cascadia model implemented in the 2014 USGS National Seismic Hazard Mapping Project. Crustal sources use a suite of state-of-the-art ground motions, such as Pacific Earthquake Engineering Research Center's (PEER) Next Generation Attenuation Relationships for Shallow-Crustal Earthquakes in the Western U.S. (NGA-West 2), applied to Western Canada, and are differentiated by active crustal or stable continental tectonic environments.



Historical Canadian earthquakes:  
1627-2010



RMS-developed high resolution  
groundwater depth map used in  
liquefaction model

## REGIONS COVERED IN RMS CANADA EARTHQUAKE MODEL

**Shake and earthquake sprinkler leakage:**  
All Canadian provinces and territories

**Fire following earthquake:**  
British Columbia, Ontario, and Quebec

**Tsunami:**  
Cascadia Subduction Zone – Canadian west coast

**Liquefaction and landslide:**  
All Canadian provinces and territories

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RMS is the world's leading catastrophe risk modeling company. From earthquakes, hurricanes, and flood to terrorism and infectious diseases, RMS helps financial institutions and public agencies understand, quantify, and manage risk.

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## Extended and Updated Coverage of the Cascadia Subduction Zone

The Cascadia Subduction Zone is a convergent plate boundary extending 620 miles (1,000 km) from Vancouver Island to Cape Mendocino in California. Cascadia Subduction Zone events (interface and intraslab) are the leading cause of earthquake risk in British Columbia. The RMS implementation follows the source geometry and rates from the USGS 2014 Cascadia model, but also extends the subduction zone farther north than the USGS model to more accurately capture risk in Canada. Both time-independent and time-dependent views of recurrence are available.

## High Resolution Soil Amplification Models Ready for Next Generation Hazard Modeling

The Canada Earthquake Model includes an upgraded soil amplification methodology that empowers (re)insurers to enter a new era of high-resolution geotechnical hazard modeling. The new amplification model reflects the latest science and explicitly uses Vs30 (average shear wave velocity in the top 30 meters at a site). To enable the new methodology, RMS developed a high-resolution Vs30 data layer covering all of Canada, derived from direct Vs30 measurements and surficial geology.

RMS developed a new basin model for Vancouver, in order to capture the complex shaking amplification that occurs as a result of the deep soft soil layers in the area. The Vancouver basin model was analytically derived from more than 10,000 simulations using scientifically rigorous approaches and data from Natural Resources Canada.

## Analysis of Liquefaction Risk: Lessons from Christchurch

RMS has invested significant resources to understand the dramatic effects of liquefaction from the 2010-11 Canterbury Earthquake Sequence in New Zealand. By leveraging billions of dollars of claims data, RMS implemented a new probabilistic liquefaction model for Canada. The liquefaction model offers complete coverage of all Canadian provinces and territories, and allows (re)insurers to price differentially and use insights to select risk.

## Increased Definition of Regional Variations Provides Greater Clarity

The model now features six vulnerability regions within the vulnerability module for Canada, to better capture regional differences in design and construction practices and reflect the higher seismic design levels in western Canada, southern Quebec and Ontario, and the Maritimes, compared to other regions. The six regions, previously four, match seismic zones specified by the National Building Code of Canada, and "year built" bands align with the Code.

RMS worked with DIALOG, a Canadian structural engineering and architectural firm with offices in Vancouver, Calgary, Edmonton, and Toronto and experience in Quebec, who reviewed the new vulnerability module.

## Evaluate Tsunami Risk in Addition to Other Secondary Perils

Getting the full picture on earthquake risk for the Canadian West Coast requires analysis of tsunami. The RMS Canada Earthquake Model includes a suite of tsunami accumulation footprints for Cascadia Subduction Zone-induced events to calculate tsunami risk.

RMS has also made updates to the fire following earthquake model for Canada, and earthquake sprinkler leakage will now be modeled across all of Canada.

## Find out more

Ask your RMS sales or customer services representative for more information on the RMS Canada Earthquake Model, or email [sales@rms.com](mailto:sales@rms.com).