Although the focus of U.S. earthquake risk is often on high-frequency, high-severity regions such as California, a damaging earthquake can potentially occur anywhere in the U.S. The RMS® U.S. Earthquake Model combines nationwide coverage—incorporating the many components of loss important to insured risk—with state-of-the-art seismic source modeling, high-resolution site condition data, and spectral response-based damage estimation, offering insurers, reinsurers, and brokers the most robust tool available today for assessing earthquake-related risk.

U.S. Earthquake

U.S. Earthquake Model Highlights

- Comprehensive view of risk for the entire U.S.
- Seismic hazard assessment and ground motion modeling incorporating USGS science
- Enhanced risk differentiation for better portfolio modeling and improved underwriting/risk selection
- Uncertainty characterization around model assumptions and loss results

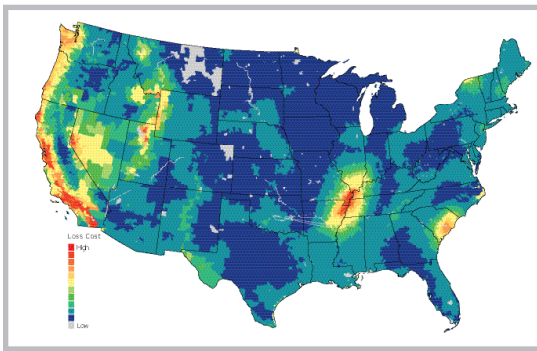
From the highly seismic regions of the Western U.S., Alaska, and Hawaii—to the New Madrid Seismic Zone in the central U.S., where rare but devastating events can occur—the RMS U.S. Earthquake Model offers the complete picture of seismicity across the U.S. To ensure superior quantification of risk, from the location to portfolio level, the model incorporates:

- Seismic source modeling based on the 2008 U.S. Geological Survey (USGS) National Seismic Hazard Maps, with the latest scientific consensus on earthquake rates and ground motions such as Next Generation Attenuation relationships for the west; advanced ground motion relationships for the Cascadia Subduction Zone and New Madrid Seismic Zone
- Time-dependent modeling to better assess earthquake probabilities for seismically active regions at time scales most relevant to (re)insurance applications
- Over 125,000 events on thousands of fault-specific and area sources, incorporating multiple rupture geometries and event parameters to generate a robust exceedance probability (EP) curve
- Innovative applications of new structural and analytical tools, integrating results of full-scale destructive testing with historical claims data for improved vulnerability assessment
- High-resolution risk differentiation enabling building-specific loss estimations
- Region and coverage specific post-event loss amplification factors

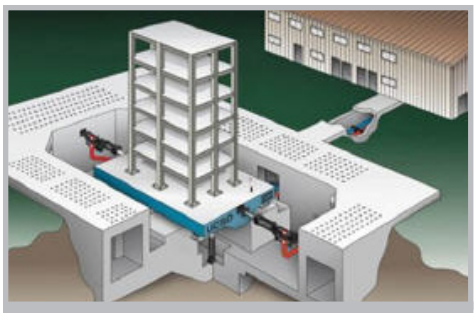
Facilitating a Complete View of Risk

Founded on a seamless source model across North America, the model provides a consistent framework for modeling loss from location to portfolio level, within a city or across country borders. RMS' event-based approach readily handles multi-location accounts, portfolio roll-ups, and aggregation with other RMS model outputs.

The model explicitly treats loss to structure, contents, and time element coverages from ground shaking, fire following earthquake, and sprinkler leakage. It incorporates region-dependent factors that



RMS provides complete regional coverage of seismic risk for the U.S.



Full-scale destructive testing advances the understanding of vulnerability (Source: UCSD)

capture the impact of post-event loss amplification due to demand surge and consequent events, and accumulation footprints for areas at risk from flooding due to earthquake-induced levee failures or tsunamis.

Enabling Detailed Risk Differentiation

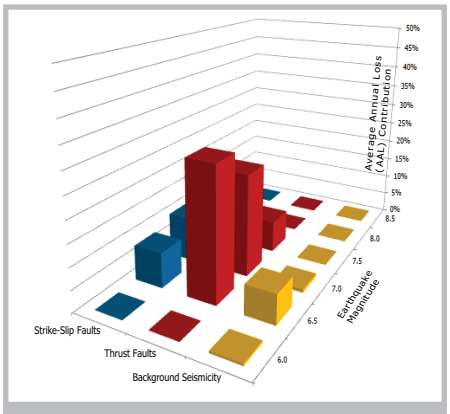
Discriminating among risks at the hazard and vulnerability stages of modeling enables better underwriting pricing and risk selection. High-resolution databases specify local hazards, including soil amplification, liquefaction and landslide susceptibility, and basin characteristics, which can materially alter the degree of shaking experienced at any site. To optimize the capture of site conditions in major urban areas, the model utilizes RMS' proprietary variable resolution grid (VRG), designed for high-resolution spatial differentiation based on population density and hazard levels.

Advances in assessing a building's vulnerability to ground shaking are achieved through an extensive suite of structural model simulations and spectral response-based calculations. The model accounts for the impacts of structural characteristics to develop building-specific loss estimations—with detailed, high-resolution inventory databases to supplement missing primary construction characteristics.

Characterizing Uncertainty

Loss estimation for catastrophic events is an inherently uncertain endeavor—uncertainty around the timing, location, and magnitude of an event, as well as the size of the resulting loss requires a probabilistic approach to incorporate the potential range of outcomes. The U.S. Earthquake Model addresses the largest sources of uncertainty in ground motion modeling—attenuation relationships, direction of fault rupture, building vulnerability, and post-event loss amplification—for improved loss estimates and a more robust tail of the EP curve.

To explore sensitivities in key areas, the model includes features such as the ability to compare time-dependent loss results with those generated by a time-independent modeling approach, and "what if" scenarios that assess the impacts of missing data on loss results.



The model provides insight into key drivers of loss from location to portfolio

Model Specs

History

Original release in 1989, complete upgrade in 2009

Geographic Scope

The 50 United States and the District of Columbia

Geocoding Resolution

Latitude/longitude, street address, ZIP Code, city, county, PML Zone (California only)

Lines of Business and Coverage

Residential, commercial, and industrial line occupancies; building, contents, time element, and appurtenant structures are included

Related Models

- Fire Following Earthquake
- Sprinkler Leakage
- Canada Earthquake
- Mexico Earthquake
- U.S. Earthquake Casualty and Workers Compensation
- Industrial Facilities
- Builders Risk

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