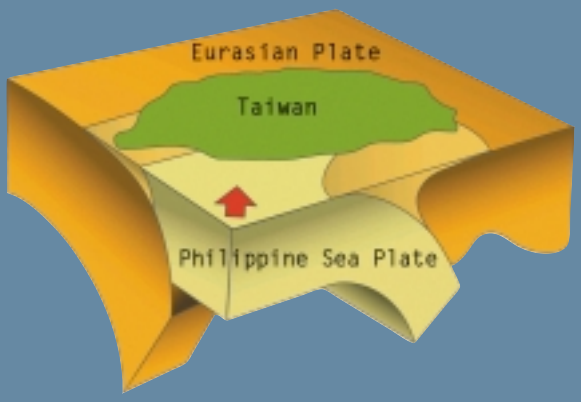
Taiwan Earthquake

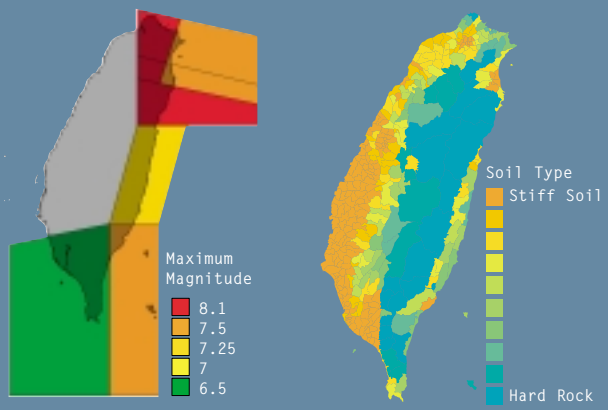
Taiwan sits on an extremely active tectonic region, with seismicity and rates of crustal motion among the highest in the world. The country is also home to a dense population and numerous manufacturing operations. Reflecting extensive research on regional seismicity, geology, and building vulnerability, the RMS™ Taiwan Earthquake model offers the most complete solution for managing earthquake risk to insured portfolios and industrial facilities in Taiwan.

RMS™

Risk Management Solutions



The tectonics of Taiwan result in seismicity and rates of crustal motion that are among the highest in the world



Modeled subduction zone sources and postal code soil data for Taiwan

Market Trends and Earthquake Exposure

Although Taiwan is relatively small, it is home to numerous industrial facilities. Among these are high-technology and semi-conductor plants that provide a major portion of the technology-based products used worldwide. These facilities are at risk to earthquake losses and business interruption that can affect the global economy, as evidenced in the M7.3 1999 Chi-Chi Earthquake.

Prior to the Chi-Chi event, about 20% of households had fire policies. Of these, only 1% carried earthquake coverage. The Chi-Chi event led to greater awareness of the risk and an increased demand for earthquake insurance. For example, lenders began requiring earthquake insurance for mortgage customers.

The high seismicity in Taiwan, coupled with increased demand for earthquake coverage points toward an increase in insured risk for all lines of business. The RMS™ Taiwan Earthquake model provides the information needed to capture market opportunities while effectively managing risk.

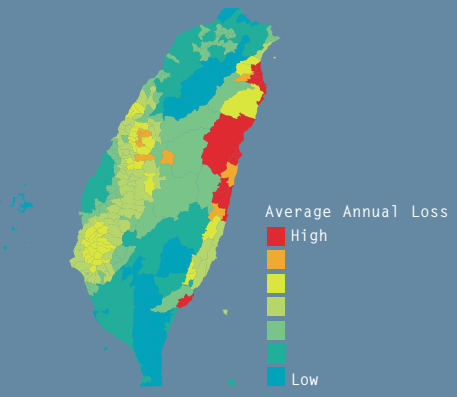
Full Hazard Modeling and Geologic Data

The island of Taiwan is situated near the junction of the Eurasian and Philippine Sea tectonic plates, placing the island over two major subduction zones. RMS has conducted extensive research in modeling the seismic severity, frequency, and the geographic variation of risk across Taiwan. The RMS Taiwan Earthquake seismic source model includes:

- Shallow crustal faults at two depths
- Deep seismic sources including subduction sources to reflect the tectonics of Taiwan
- The Chinsen fault line source near Taipei to refine the local risk analysis in this area of particularly high exposure

In addition to comprehensive seismic source coverage, the model incorporates attenuation functions that are based on the earthquake source mechanism. Local amplification of earthquake ground motion is calculated using geotechnical data for soil type, landslide, and liquefaction, compiled at the postal code level.

Relative damageability for reinforced concrete structures built following the 1996 seismic building code update



Geographic pattern of risk based on multi-family residential line of business

Taiwan-Specific Building Vulnerability

The RMS Taiwan Earthquake model includes a detailed classification of buildings by construction class, occupancy class, height, and year of construction. The vulnerability characteristics within each class capture the building and contents performance typical of Taiwan. Modeled vulnerability also reflects the variation in local construction practices and regional building design provisions in the Taiwan seismic code. Loss modeling can be further refined using secondary modifiers when additional structural or building information is available.

RMS vulnerability functions incorporate research on seismic building codes, building performance in other countries with similar seismicity, and the actual performance of buildings in previous earthquakes. The model is also validated through damage data from the Chi-Chi Earthquake, as reported by the scientific community and by RMS structural engineers in post-event reconnaissance surveys.

The RMS Perspective on Earthquake Risk in Taiwan

The RMS model offers the industry an improved perspective on earthquake risk in Taiwan:

- Loss potential is generally higher than industry perception in CRESTA Zones 5 (Taichung), 6 (Nantou), and 12 (Ilan) due to poor soil conditions and higher regional earthquake activity
- Technical rates (average annual loss per unit value) are higher in Taichung than in other areas with high exposure such as Taipei and Kaohsiung
- RMS estimates a return period of about 60 years for losses similar to those seen in the 1999 Chi-Chi Earthquake
- The model indicates four historical earthquakes over the past 200 years that would cause losses higher than those in the Chi-Chi event if they were to occur again (the highest loss, about 1.4 times that of the Chi-Chi event, would come from a repeat of the M7.0 1867 Keelung Earthquake)

Taiwan Earthquake Model History

- Released 2001
- Available in RiskLink®-ALM and RiskLink®-DLM

Geographic Scope

All of Taiwan

Exposure Data Resolution

Postal Code/City, County/Prefecture, or CRESTA Zone

Probabilistic Event Set

- 5,914 stochastic events from 12 intermediate and deep zone sources, 54 shallow crustal sources, and 1 fault line source
- Event recurrence based on Poisson models

Hazard Modeling

- 2 attenuation functions specific to tectonic settings and earthquake mechanisms
- Soil, liquefaction, and landslide data at postal code resolution for all of Taiwan
- Calibrated using seismic intensity distributions for events dating back 100 years

Vulnerability Modeling

- Buildings, contents, and business interruption
- Separate damage curves accounting for variation in building vulnerability across 3 seismic building code zones
- 14 distinct building classes and 4 height ranges
- Taiwan-specific vulnerability functions for pre-1974, 1974-82, 1983-96, and post-1996 construction to reflect code revisions
- Secondary modifiers include shape/configuration specification, soft story, setbacks and overhangs, short column, structural upgrade, engineered foundation, equipment bracing, and construction quality

Special Features

- Seismic sources include all of Taiwan as well as offshore sources
- Model validation using extensive research and data from the 1999 Chi-Chi Earthquake

ALM® Profiles

- Resolution: CRESTA Zone
- Lines of Business: Residential, Commercial, and Industrial

Risk Management Solutions, Inc.

7015 Gateway Blvd.
Newark, CA 94560
USA

Tel 1.510.505.2500
Fax 1.510.505.2501
Tel 44.20.7256.3800 (Europe)

Worldwide Web
http://www.rms.com

E-mail
info@rms.com