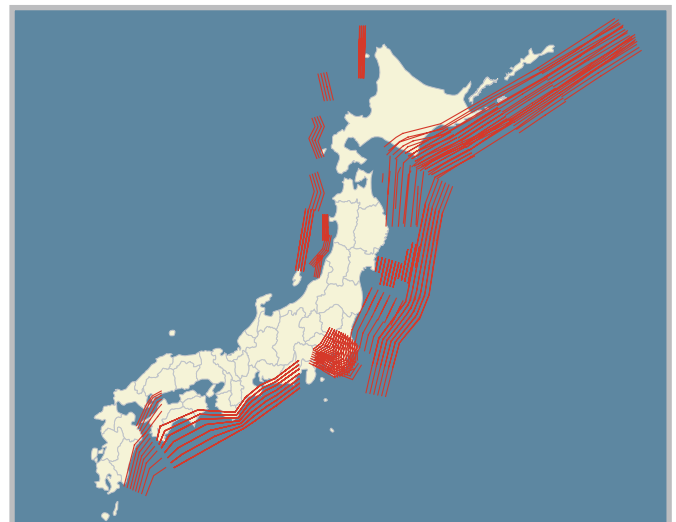


Japan lies in one of the most seismically active areas of the world, at the junction of the Eurasian, Pacific, and Philippine Sea Plates. The RMS® Japan Earthquake Casualty Model uses the latest methodologies and innovations to quantify earthquake risk in Japan, along with its impact on the lines of businesses covering human exposures. Using this information, underwriters and portfolio managers are able to identify and manage risk to populations exposed to earthquake losses.

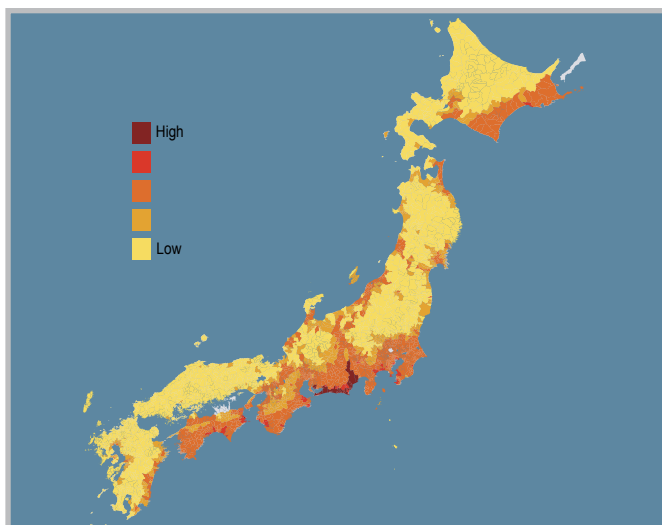
## Japan Earthquake Casualty

### RMS EARTHQUAKE CASUALTY MODELING

The RMS® Japan Earthquake Casualty Model is built on RMS' industry-leading earthquake model for property lines. The first RMS earthquake model for Japan was released in 1995, and later updated and improved to higher detail of resolution in 1999. RMS released a major revision of the Japan property earthquake model in 2005 to reflect increased understanding of seismic hazard in the region. The RMS earthquake casualty modeling methodology has been used by the Federal Emergency Management Agency and the National Institute of Building Sciences. Casualty rates for the model were developed using human casualty data from over 135 earthquakes around the



*Japan has many seismic source zones capable of generating large magnitude earthquakes*



*Casualty patterns expected from earthquakes are highly regional*

world, including detailed analysis of the death and injury patterns that occurred due to earthquakes in Japan over the last 50 years, especially the 1964 Niigata, 1968 Tokachi-Oki, 1978 Miyagiken-Oki, 1995 Hyogoken-Nanbu, and 2004 Niigataken-Chuetsu earthquakes. Observed casualty data was used to correlate the number of casualties with local ground motion and building construction class.

### PROBABILISTIC CASUALTY MODELING

The RMS Japan Earthquake Casualty Model simulates nearly 30,000 earthquakes that represent the frequency and severity likely to cause significant loss in Japan. The base seismic source model is

derived from the Earthquake Research Committee's 2005 National Seismic Hazard Maps for Japan. These maps are a culmination of 10 years of research on seismic sources in Japan developed for disaster planning and mitigation.

### CAUSES OF CASUALTIES IN EARTHQUAKES IN JAPAN

Building collapse is the primary cause of casualties from Japanese earthquakes. In most of the earthquakes occurring in Japan during the 20th century, there was an average of 1 person killed for every 10 buildings that collapsed, or a 'lethality ratio' of 0.1. This average figure varies considerably – one in 10 earthquakes has a lethality ratio of 0.25 (i.e., kills 1 person for every 4 buildings that collapse).



One of the most destructive earthquakes in Japanese history, the 1923 Great Kanto Earthquake caused extensive casualties (Source: NISEE)

### CONSTRUCTION STANDARDS IN JAPAN

Japan continues to improve the design and construction quality of its building stock to make it more earthquake-resistant and safer for occupants. The 1995 Kobe Earthquake illustrated several shortcomings of the building code, and several new laws and key code amendments were quickly introduced, including design requirements to prevent 'soft story' failures that cause collapse. In recent years, Japan's engineering community has moved away from safety-based design guidelines in favor of performance based design guidelines, which assess the design standard in relation of the performance expected of the structure. International engineers estimate that design code requirements make modern buildings in Japan some of the world's most earthquake-resistant. The Japanese population is generally becoming safer as older, timber buildings are being replaced by multi-story, high-occupancy engineered structures. As a result, there is now the threat of massive casualties from collapses of high-occupancy engineered buildings.

## Model Specs

### HISTORY

Original release for 2006 RMS study "Catastrophe Mortality in Japan." To be released in Spring 2007 for Risklink® and RiskBrowser®

### GEOGRAPHIC SCOPE

Japan

### GEOCODING RESOLUTION

Latitude/Longitude, Postal Code, City/Ward, Prefecture and CRESTA

### LINES OF BUSINESS AND COVERAGES

Life Insurance, Personal Accident Insurance, Workers Compensation Insurance