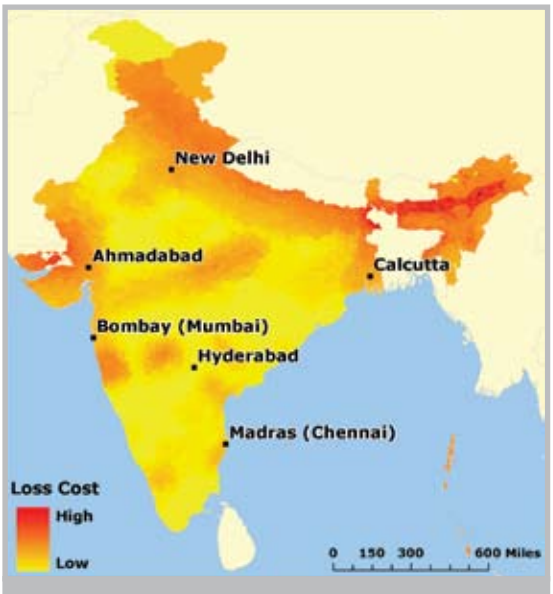
Recent damaging earthquakes in India, such as the 2005 Kashmir and 2001 Gujarat earthquakes, accentuate the highly geologically active nature of this region. These significant events, coupled with the rapid growth and transformation of the insurance market in India, highlight the role of catastrophe models in helping companies to manage accumulations, set pricing, and report solvency margins.

India Earthquake

India is a seismically active region, prone to some of the world's largest continental earthquakes. The majority of India's earthquakes follow the boundary zone along the Himalayan Arc, formed by the collision of the Indian and Eurasian tectonic plates. However, damaging earthquakes also occur within the interior of the Indian plate. The most recent of these intra-plate events was the magnitude 7.6 Bhuj (Gujarat) Earthquake in 2001. This event, felt from Madras to Kathmandu, killed at least 19,200 people and injured 166,000 others. Approximately 348,000 houses were destroyed and an additional 844,000 were damaged.

Salt factory damage caused during the 2001 Gujarat earthquake

The uncertainty around the recurrence of such events, combined with growing exposure and potentially high losses, has led to increasing concern over earthquake risk in India. The RMS® India Earthquake Model addresses these concerns by providing a standardized probabilistic framework for assessing seismic risk in India. The model is the first RMS has released for the country, and marks the increased importance of the Indian market as a growth area.



Residential loss cost due to earthquakes in India

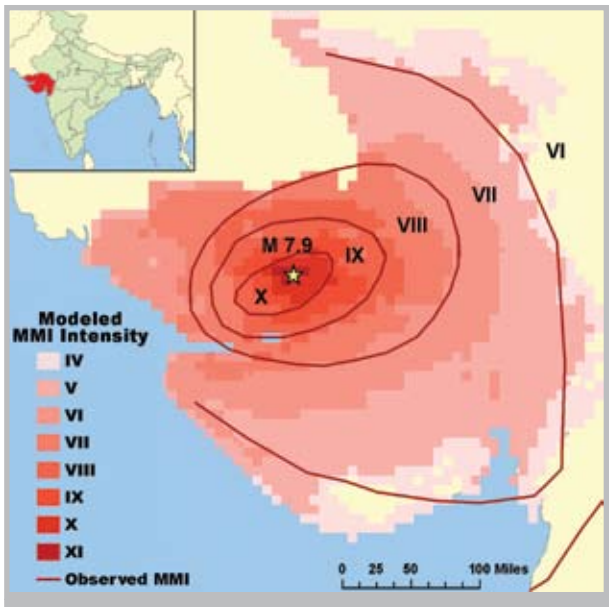
Earthquake Model Applications

The release of the RMS model coincides with a period of rapid transformation in India's insurance industry; premium volumes are experiencing rapid growth, and deregulation is boosting competition and attracting foreign players in the market. In this dynamic setting, the earthquake model will facilitate insurance companies in managing earthquake risk accumulations, setting pricing, and reporting solvency margins to the rating and regulatory bodies.

Global Partnerships

The global earthquake expertise of RMS is supported and strengthened through a local presence in the market — the RMSI operations in New Delhi. Close collaborations with leading

experts, including scientists of the National Geophysical Research Institute in Hyderabad, have allowed RMS to use a wide breadth of knowledge relating to seismic hazard, soil data, inventory information, and expertise on local building standards in India.



2001 Gujarat earthquake reconstruction — modeled versus observed intensities

Modeling India's Earthquake Hazard

The Indian subcontinent is broadly classified into two types of seismic regions: the Himalayan belt (inter-plate seismicity) and the Indian peninsula (intra-plate seismicity). RMS has developed a seismic source model and stochastic event set to capture the seismic hazard across both regions. Over 42,500 stochastic earthquakes and 14 historical events generated from nearly 100 seismic area sources are included.

Ground shaking, the most significant component of earthquake hazard, is analyzed using peak ground acceleration (PGA) converted to the Modified Mercalli Intensity (MMI) scale. For a given event on a specific earthquake source, the model analyzes the attenuation of seismic energy with distance to determine the level of ground shaking at a particular site. Ground motion calculations capture the effects of local site conditions, such as soil type and susceptibility to liquefaction, by using a proprietary RMS geographic indexing system known as the variable resolution grid (VRG), with up to 5-km resolution to store detailed hazard data. Grid cell size varies depending on exposure density and hazard gradient, enabling more accurate loss calculations.

Building Vulnerability and Inventory Modeling

The vulnerability module, the final component of the loss calculation linking seismic ground motion to reconstruction cost, includes loss data from recent events such as the 2001 Gujarat and 2005 Kashmir events, and has been validated through the reconstruction of 14 historical events. The building vulnerability data included in the model captures seismic behavior specific to India's building stock. The model provides the option to enter building attributes on a risk-by-risk basis; or, in cases where building information is not available or aggregate data is entered, users can retrieve building inventory distributions from India-specific databases.

Model Specs

History

ALM release 2006, DLM release 2007

Geographic Scope

All of India

Geocoding Resolution

Coordinate, City, District, State, CRESTA Zone

Lines of Business and Coverages Modeled

42 residential, commercial, and industrial line occupancies; building structure and contents included

Risk Management Solutions, Inc. ■ 7015 Gateway Blvd., Newark, CA 94560, USA ■ http://www.rms.com