GEM | OQ
GLOBAL EARTHQUAKE MODEL | OPENQUAKE

QUANTIFY YOUR EARTHQUAKE RISK

Expert Solutions from the GEM Foundation

WHY CHOOSE US?

The Global Earthquake Model (GEM) Foundation, is a non-profit organisation, committed to open access to reliable and scientifically robust risk information for public benefit. Profits derived from commercial sales of products or services are used to fund GEM's core programs, with an emphasis on providing support to developing countries. Core programs include advancing capabilities in earthquake and multi-hazard risk, pioneering scientific risk assessment methods, and expanding risk and resilience applications to downstream users.

FEES AND LICENSING

GEM offers customised pricing for its consulting services and product licensing, tailored to the unique needs of each client.
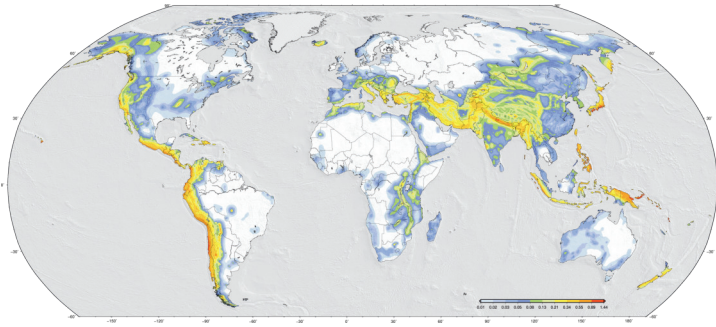
Contact product@globalquakemodel.org to schedule a demo of our flagship products and learn more about our flexible pricing schemes and subscription options.

Unlock the power of GEM's products and services to enhance your risk assessment and mitigation strategies.
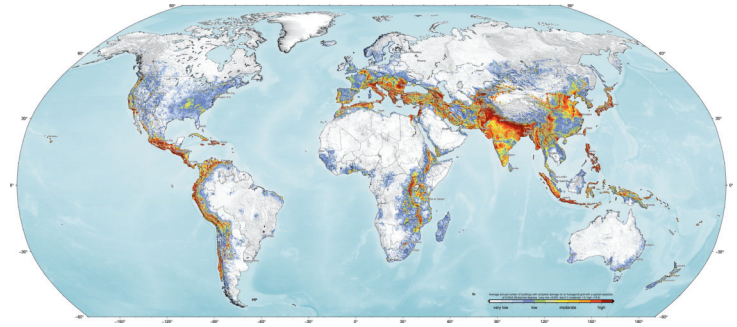
Global Seismic Hazard Map

Global Seismic Risk Map

Global Seismic Hazard Map

Gain access to available global datasets portraying peak ground acceleration with a 475-year return period on rock.

The GEM Foundation's Global Seismic Hazard Map (version 2023.1) displays Peak Ground Acceleration (PGA) distribution, representing a 10% probability over 50 years. Utilising national and regional probabilistic seismic hazard models, this map is collaboratively developed and features enhanced spatial resolution compared to prior releases. Available in raster format under a CC BY-NC-SA 4.0 license, or a custom license for commercial applications, offering comprehensive seismic hazard insights for any use case.

Global Seismic Risk Map

Unlock insights with the Global Seismic Risk Map (v2023.1), providing updated global risk metrics and rankings for enhanced earthquake risk assessment.

The Global Seismic Risk Map presents several average annual metrics due to ground shaking in residential, commercial, and industrial sectors. Updated from 2018 releases, this map utilises publicly accessible datasets and models, offering insights into earthquake risk metrics and top-ranking countries. Available as shapefiles for research and communication purposes, it empowers stakeholders to understand the comparative risk between regions all over the world.

Global Exposure Model

Access comprehensive datasets detailing residential, commercial, and industrial building stock globally, facilitating detailed risk assessment and mitigation strategies.

The Global Exposure Model offers detailed information on building stock at the smallest administrative division level. Developed and maintained by GEM Foundation, it integrates national statistics and local datasets, enabling identification of vulnerable areas and building types. Available under a CC BY-NC-SA license at Administrative Level 1, or with a custom license in high-resolution for commercial applications, the model provides insights into building characteristics and distribution, crucial for effective risk management.

OpenQuake Engine

Utilise the OpenQuake Engine, an open-source software, for advanced seismic hazard and risk modeling, enabling precise risk assessments worldwide.

The OpenQuake Engine, a cornerstone product of GEM Foundation, facilitates seismic hazard and risk assessments globally. As an open-source software, it equips users with state-of-the-art tools for calculating earthquake risk scenarios and their impacts. With its robust capabilities, including event-based risk analysis and classical probabilistic seismic hazard assessment, the OpenQuake Engine remains a benchmark in seismic risk modelling since its inception in 2010. GEM offers bespoke OpenQuake Engine applications, enhancements and plugins.

Country-Territory Seismic Risk Profiles

Access concise summaries of seismic risk metrics for countries/territories worldwide, facilitating informed decision-making in risk management.

GEM Foundation offers Country/Territory Seismic Risk Profiles summarising key risk metrics, including social indicators, loss estimates, and hazard maps. These profiles enable stakeholders to assess seismic risk at a glance, aiding in risk management strategies. Derived from event-based risk analysis, these profiles offer insights into residential, commercial, and industrial sectors, supporting decision-makers with valuable risk assessment tools.

Atlas - Global Seismic Hazard Curves

Access hazard curves worldwide instantly through Atlas, a dynamic web portal and API, providing a GIS-style map viewer for comprehensive risk assessment.

Atlas, a dynamic web portal and API, offers subscribers access to hazard curves derived from the Global Seismic Hazard Map. With its intuitive GIS-style map viewer, users can instantly view and download hazard curves for selected sites, facilitating detailed risk assessment. Designed as a subscription service, Atlas provides a flexible alternative for accessing hazard data layers, catering to diverse user needs and workflows.

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GEM's Collaborative Work in Earthquake Risk Assessment: Project Highlights

Leveraging expertise from over 50 projects worldwide, GEM has a proven track record of collaborating with experts and institutions to advance earthquake risk assessment and mitigation through a collaborative approach. Our diverse portfolio includes regional risk models, innovative tools, and capacity building initiatives, all designed to strengthen resilience against seismic hazards. Below: Ongoing projects in light blue and completed projects in light green.

Multi-Hazard Expert Advice System for European Emergency Response Coordination Centre

This project combines services to rapidly assess natural hazards (earthquakes, tsunamis, floods, etc.) and their potential impact. GEM Foundation contributes by estimating earthquake impacts (collapsed buildings, displaced people) using global models. This enhances existing rapid loss assessment tools.

Forecasting and Communicating Earthquake Hazard and Risk (FORCE)

Supported by USAID's BHA, FORCE aims to enhance earthquake hazard modelling in vulnerable countries and small island communities and improve risk models considering changes in occupants, structures, economic value, and climate change effects. It evaluates future earthquake risk losses, providing decision-makers with evolving risk metrics crucial for designing long-term risk reduction measures.

Developing a Disaster Risk Transfer Facility in the Central Asia Regional Economic Cooperation Region

The project focuses on disaster risk assessments and modelling across CAREC countries, designing a regional pilot disaster risk transfer facility, and conducting capacity building and awareness-raising activities for public and private stakeholders.

Earthquake Vulnerability and Systemic Risk Assessment in Bangladesh

This project aims to develop a detailed sub-national earthquake risk model for Bangladesh at the zila and upazila level, including probabilistic seismic hazard, building exposure, and seismic vulnerability models. Critical scenarios for key cities are identified through consultation with local stakeholders and experts.

GeoINQUIRE: Geosphere INfrastructures for QUestions into Integrated Research

GeoINQUIRE enhances access to geospheric data, products, and services, enabling detailed monitoring and modelling of geospheric processes. With 51 partners including national research institutes, universities, and geological surveys, GeoINQUIRE offers Virtual and Transnational Access installations, including the earthquake and secondary hazard impact data access service by the GEM Foundation.

ASCE Earthquake Loads Overseas (AELO)

A web service providing design ground motions (on rock and soil) compliant with ASCE standards (US) for 500 locations worldwide. This collaboration between GEM, USGS, and US government agencies supports international earthquake-resistant building design.

Training, Innovation, and Regional Assessments: GEM's notable projects in the past

- Training and Communication for Earthquake Risk Assessment (TREQ)
- Methods and Tools Innovation for Seismic Risk Assessment (METIS)
- South America Risk Assessment (SARA)
- Caribbean and Central America Earthquake Risk Assessment (CCARA)
- Sub-Saharan Hazard and Risk Assessment (SSAHARA)
- Collaborative Risk Assessment for Volcanoes and Earthquakes (CRAVE)

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How to support our goal

GEM offers flexible mechanisms to enable potential partners to contribute to its ongoing and future work programs. Partners and collaborators can enter into sponsorships, project partnerships and service agreements, and can select the level of engagement based on their needs and requirements.

Core Programs

Advancing science, core capability, products, applications and services in **earthquakes and secondary hazards**; **multi-hazard and systemic risk assessment**; and **integrated risk and resilience solutions**.

Sponsorship

GEM's sponsorship structure and fees have been designed to incentivise participation of public and private organisations with various sponsor types and contributions: public governor, governor, advisor and small business advisor.

Projects	Bespoke Products & Services	Technical Cooperation & Research
Sponsors and other partners may support and (co)fund a specific project that is effectively promoting and improving earthquake and natural hazard risk reduction and resilience globally.	GEM develops bespoke services, products and other resources that can be used for public and commercial purposes by organizations or individuals worldwide.	GEM conducts research and technical cooperation on earthquake hazard and risk science. Contact us for more details on the topics we can work on together.

Roadmap to 2030 targets

1

EARTHQUAKES AND SECONDARY HAZARDS

- Advanced earthquake and secondary earthquake hazards modelling
- Future exposure, vulnerability and risk
- Homogenised global hazard and risk model and map
- Applications to building regulation and urban planning
- Country and global portfolio loss assessment

2

MULTI-HAZARD AND SYSTEMIC RISK ASSESSMENT

- Multi-hazard risk modelling: earthquake, flood, severe wind, wildfire
- Cascading risk: infrastructure networks and critical facilities
- Exposure for all hazards
- Multi-hazard risk assessments at urban to national scale

3

INTEGRATED RISK AND RESILIENCE SOLUTIONS

- Hazard and risk metrics and indicators for risk managers and policy makers
- Predicting recovery and incorporation of social vulnerability
- Global resilience indicators and maps
- Multi-hazard, future-risk models and maps
- Hazard and risk information for downstream users

Supporters

GEM is comprised of collaborators from public, private, academic and non-government organisations worldwide. These partners work together to advance the state-of-the-art for disaster risk reduction by developing data, tools and information and conducting hazard and risk assessments for improving our understanding of earthquake hazard and natural hazard risk globally.

Public Governors

Associate Partners

Project Partners

Private Governors

Advisor Sponsors

Product Distribution Partners

Learn more, visit our website:
WWW.GLOBALQUAKEMODEL.ORG