



GEM - The Global Earthquake Model

A. Smolka

Munich Reinsurance Co., Geo Risks Research, Munich, Germany (asmolka@munichre.com)

Over 500,000 people died in the last decade due to earthquakes and tsunamis, mostly in the developing world, where the risk is increasing due to rapid population growth. In many seismic regions, no hazard and risk models exist, and even where models do exist, they are intelligible only by experts, or available only for commercial purposes. The Global Earthquake Model (GEM) answers the need for an openly accessible risk management tool. GEM is an internationally sanctioned public private partnership initiated by the Organisation for Economic Cooperation and Development (OECD) which will establish an authoritative standard for calculating and communicating earthquake hazard and risk, and will be designed to serve as the critical instrument to support decisions and actions that reduce earthquake losses worldwide. GEM will integrate developments on the forefront of scientific and engineering knowledge of earthquakes, at global, regional and local scale. The work is organized in three modules: hazard, risk, and socio-economic impact. The hazard module calculates probabilities of earthquake occurrence and resulting shaking at any given location. The risk module calculates fatalities, injuries, and damage based on expected shaking, building vulnerability, and the distribution of population and of exposed values and facilities. The socio-economic impact module delivers tools for making educated decisions to mitigate and manage risk. GEM will be a versatile online tool, with open source code and a map-based graphical interface. The underlying data will be open wherever possible, and its modular input and output will be adapted to multiple user groups: scientists and engineers, risk managers and decision makers in the public and private sectors, and the public-at-large. GEM will be the first global model for seismic risk assessment at a national and regional scale, and aims to achieve broad scientific participation and independence. Its development will occur in a coordinated global network of regional centers, with a high degree of interaction among the centers and the central secretariat. Broad acceptance of the models will be ensured by including local knowledge in all aspects of hazard and risk assessment and securing participation of local experts throughout development. All GEM efforts will be carried out using a common global software infrastructure and consensus standards. In accordance with principles of open-source development, and to ensure comprehensive global representation, contributions are welcomed and encouraged from a broad group of participants. To ensure uniformity and conformance with the highest scientific standards, all contributions, including models, tools, and data, will be rigorously vetted and independently tested. Recently the EUCLCENTRE in Pavia/Italy has been selected as the host institution of the GEM secretariat. The project will formally launch in early 2009 by creating the non-profit GEM foundation. While GEM serves a humanitarian imperative it is considered as offering a key to long-term economic development. GEM will enhance risk awareness at global, national and local scales. Greater risk awareness is a precondition for motivating public and private parties to investing into risk reduction and loss prevention, and to promote a greater use of financial risk transfer instruments.