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The Global Earthquake Model - Past, Present, Future

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The Global Earthquake Model (GEM) is a unique collaborative effort that aims to provide organizations and individuals with tools and resources for transparent assessment of earthquake risk anywhere in the world. By pooling data, knowledge and people, GEM acts as an international forum for collaboration and exchange. Sharing of data and risk information, best practices, and approaches across the globe are key to assessing risk more effectively. Through consortium driven global projects, open-source IT development and collaborations with more than 10 regions, leading experts are developing unique global datasets, best practice, open tools and models for seismic hazard and risk assessment.

The year 2013 has seen the completion of ten global data sets or components addressing various aspects of earthquake hazard and risk, as well as two GEM-related, but independently managed regional projects SHARE and EMME. Notably, the International Seismological Centre (ISC) led the development of a new ISC-GEM global instrumental earthquake catalogue, which was made publicly available in early 2013. It has set a new standard for global earthquake catalogues and has found widespread acceptance and application in the global earthquake community. By the end of 2014, GEM's OpenQuake computational platform will provide the OpenQuake hazard/risk assessment software and integrate all GEM data and information products. The public release of OpenQuake is planned for the end of this 2014, and will comprise the following datasets and models:
• ISC-GEM Instrumental Earthquake Catalogue (released January 2013)
• Global Earthquake History Catalogue [1000-1903]
• Global Geodetic Strain Rate Database and Model
• Global Active Fault Database
• Tectonic Regionalisation Model
• Global Exposure Database
• Buildings and Population Database
• Earthquake Consequences Database
• Physical Vulnerabilities Database
• Socio-Economic Vulnerability and Resilience Indicators
• Seismic Source Models
• Ground Motion (Attenuation) Models
• Physical Exposure Models
• Physical Vulnerability Models
• Composite Index Models (social vulnerability, resilience, indirect loss)
• Repository of national hazard models
• Uniform global hazard model

Armed with these tools and databases, stakeholders worldwide will then be able to calculate, visualise and investigate earthquake risk, capture new data and to share their findings for joint learning. Earthquake hazard information will be able to be combined with data on exposure (buildings, population) and data on their vulnerability, for risk assessment around the globe. Furthermore, for a truly integrated view of seismic risk, users will be able to add social vulnerability and resilience indices and estimate the costs and benefits of different risk management measures.

Having finished its first five-year Work Program at the end of 2013, GEM has entered into its second five-year Work Program 2014-2018. Beyond maintaining and enhancing the products developed in Work Program 1, the second phase will have a stronger focus on regional hazard and risk activities, and on seeing GEM products used for risk assessment and risk management practice at regional, national and local scales. Furthermore GEM intends to partner with similar initiatives underway for other natural perils, which together are needed to meet the need for advanced risk assessment methods, tools and data to underpin global disaster risk reduction efforts under

the Hyogo Framework for Action #2 to be launched in Sendai/Japan in spring 2015