

G-EVER Next-generation Volcanic Hazard Assessment System

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The Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management (G-EVER) is a consortium of geohazard research institutes that was established in Asia-Pacific region in 2012. G-EVER aims to formulate strategies to reduce the risks caused by earthquakes, tsunamis and volcanic eruptions worldwide. The G-EVER next-generation volcano hazard assessment working group is developing a useful system for volcanic eruption prediction, risk assessment, and evacuation strategy at various eruption stages. The assessment system is based on volcanic eruption history datasets, eruption database and numerical simulations. Eruption history datasets including precursor phenomena leading to major eruptions are important for the prediction of future volcanic eruptions. A high quality eruption database which contains compilations of eruption dates, volumes, and styles, is important for the next-generation volcano hazard assessment system. Formulating international standards on how to estimate the volume of volcanic materials is important to establish a high quality volcanic eruption database. GIS-based spatial distribution database of volcanic materials (e.g. Tephra and pyroclastic flow distributions) is important for accurate area and volume estimation and risk assessments. The volcanic eruption database is developed based on past eruption results, which only represent a subset of possible future scenarios. Therefore, numerical simulations with controlled parameters are needed for more precise volcanic eruption predictions. The "best-fit" parameters of the past major eruptions in the world have to be estimated and the simulation results database should be made.

The use of the next-generation system should enable the visualization of past volcanic eruptions datasets such as distributions, eruption volumes and eruption rates, on maps and diagrams using timeline and GIS software. Similar volcanic eruption types should be easily searchable from the eruption database. Using the volcano hazard assessment system, prediction of the time and area that would be affected by volcanic eruptions at any location near a volcano should be possible using numerical simulations. The system should be able to estimate volcanic hazard risks by overlaying the distributions of volcanic deposits on major roads, houses and evacuation areas using a GIS enabled systems. The next-generation real-time hazard assessment system will be implemented with user-friendly interface, making the risk assessment system easily usable and accessible online.

Preliminary version of the next-generation volcanic hazard assessment system is available since June 2013. This can run energy cone simulations at any volcano in the world using ASTER Global DEM, and the links to major volcanic databases, such as Smithsonian, VOGRIPA and Quaternary volcanoes. Almost all volcanoes in the world can be evaluated using this volcanic hazard assessment system. Currently, the system covers more than 3200 Quaternary volcanoes worldwide. Links to major volcanic databases in the world are useful to examine eruption history in detail. Using Google and Bing maps as base maps provide more information for hazard evaluations. A hazard evaluation system using Titan2D will be available soon. Hazard assessment system using probabilistic analysis is also being planned in collaboration with INGV in Italy. This hazard assessment system is expected to be used for hazard mapping and risk management planning by government authorities and policy makers.

G-EVER Next-generation Hazard Assessment System URL (<http://volcano.g-ever1.org/vhazard/HazardAssessment/>)

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