

## GEO Grid Project: Pyroclastic flow simulation using ASTER DEM

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[http://www.gtrc.aist.go.jp/project\\_geo](http://www.gtrc.aist.go.jp/project_geo)

The GEO Grid is a grid technology system to provide securely and rapidly large archives of earth observation satellite data and integrated service with various observation databases and GIS data. The system aims at contributing to the solving of global social problems such as environment conservation, resource exploration, natural disaster prevention, and risk management. The core contents of the system are the observation data from the earth observation satellite (ASTER) of the Ministry of the Economy, Trade and Industry and geoscientific information, such as geological and environment technology data, accumulated for a long period of time at the National Institute of Advanced Industrial Science and Technology. Numerical simulation of pyroclastic flows on volcanoes using ASTER digital elevation model (15 m mesh) is one of the major application on the GEO Grid project.

More than 9500 lava dome-collapse type pyroclastic flows occurred at Unzen Volcano during the 1991-95 eruption. One of the major pyroclastic flows on June 3, 1991 killed 43 people. Pyroclastic flows are quite destructive due to high temperature (-600 C) and high speed (-100 km/h).

Volcanic disaster mitigation maps (Volcanic hazard maps) are available at most major active volcanoes in Japan. A GIS system overlaying various kinds of information and real time numerical simulations on a laptop computer and website are necessarily for the next generation volcanic hazard maps.

Pyroclastic flow simulation using the energy cone model was made on the GEO Grid system. An interactive user interface is available on the GEO Grid website. Only 2 parameters (column collapse height,  $H_c$  and equivalent coefficient of friction,  $H/L$ ) are necessarily to evaluate potential hazardous area by pyroclastic flows. In this stage, pyroclastic flow simulations are available at Merapi (Indonesia), Fuji, Unzen, Kirishima, Sakurajima, Yotei, Usu, Tarumai, and Bandai Volcanoes. It is possible to update the DEM data during the eruptions by taking new ASTER satellite data. Run time for each simulation is only 10 seconds to 3 minutes due to fast grid computing technology. The energy cone simulation on the GEO Grid system is applicable to other disasters such as debris avalanches and landslides. The pyroclastic flow simulation will be open to all scientists and local government officials soon. Numbers of applicable volcanoes are increasing. Numerical lava flow and grain flow simulations are planning for the next step.

