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GEO Grid volcanic gravity flow simulation system: A case study on the 2011 eruption at Shinmoedake, Kirishima Volcano

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GEO Grid is an E-Infrastructure to accelerate GEO sciences related information retrieval, storage and processing based on the concept of virtual integration of all data related to earth observation, with certain access management. The GEO Grid system using a set of Grid and Web service technologies would be easy to handle by the end users. Numerical simulation of volcanic gravity flows on volcanoes is one of the major applications of the GEO Grid project. A web-based GIS system combining various types of information with real-time numerical simulations are necessary for the next generation of volcanic hazard mapping system. Volcanic gravity flow simulations using the energy cone model are currently implemented on the GEO Grid system. An interactive user interface to evaluate the probability of an area to be affected by volcanic gravity flows is available on the GEO Grid website. The simulation results could be downloaded as shape or KML files. We applied GEO Grid simulation system on the recent 2011 eruption at Shinmoedake, Kirishima Volcano, Japan. This system was quite useful to evaluate the potential danger zone in this area. The best-fit parameters of the pyroclastic flows were $H/L=0.2-0.3$ and the H_c (column collapse height) =300m. The GEO Grid simulation system is available at: <http://volcano.geogrid.org/applications/energycone/>. The ASTER Global DEM (G-DEM, 30m resolution), STRM-3 (90m) and GSI 10m DEM are planned to be installed on the GEO Grid system. The energy cone simulation on the GEO Grid system could be applied to other geological hazards such as debris avalanches and landslides. The gravity flow simulation is open to all scientists in the world.

Keywords: GEO Grid, pyroclastic flow, volcano, simulation, Kirishima, hazard map