

Volcanic gravity flow simulation on GEO Grid: toward the next generation real-time hazard mapping

Shinji Takarada^{1*}, Shinsuke Kodama¹, Minoru Urai¹

¹AIST

GEO (Global Earth Observation) Grid is an E-Infrastructure to accelerate GEO sciences based on the concept that whole data related to earth observation are virtually integrated with a certain access management. The GEO Grid is easy to handle by the end users those are enabled by a set of Grid and Web service technologies. The core contents of the system are the observation data from ASTER onboard Terra satellite and geoscientific information, such as geological and environment technology data in AIST. Numerical simulation of volcanic gravity flows on volcanoes is one of the major applications of the GEO Grid project.

Volcanic disaster mitigation maps (Volcanic hazard maps) are available for most major active volcanoes in Japan. A web-based GIS system combining various types of information with real time numerical simulations are necessarily for the next generation of volcanic hazard maps. Volcanic gravity flow simulations using the energy cone model were made on the GEO Grid system. An interactive user interface is available on the GEO Grid website. Column collapse height and the equivalent coefficient of friction are necessarily to evaluate the potential area affected by volcanic gravity flows. The ASTER Global DEM (G-DEM, 30m mesh), STRM3 (90m mesh) and GSI 10m DEM are planning to be installed on the GEO Grid system in this year. Therefore, the users simulate any volcanoes in the world on the GEO Grid system. OGC (Open Geospatial Consortium) standard WCS (Web Coverage Service) and WMS (Web Mapping service) are used in the system. Runtime for each simulation is only 10 seconds to 3 minutes due to grid computing technology. The simulation results are can be downloaded as a shape or KML files. The energy cone simulation on the GEO Grid system is applicable to other disasters such as debris avalanches and landslides. The gravity flow simulation is open to all scientists and local government officials at <http://geoapp.geogrid.org/gridsphere>. More sophisticated simulations such as Titan 2D and Lahar Z are planning to be installed on the system near future.

Keywords: GEO Grid, volcano, gravity flow, simulation, hazard map, satellite data