Next-generation database and hazard assessments

Shinji Takarada

(GSJ, AIST)

1. Eruption Scenario
2. Eruption Database
3. Simulation
4. Hazard Assessment System

Eruption Scenario

1. Precursor phenomena leading up to major eruptions
2. Database of precursor phenomena, such as dates, distributions, essential materials, chemical compositions, volcanic tremors, and GPS.
3. Eruption scenario after the major eruption.
4. Precursor events database (WOVOdat).
5. Prehistoric eruptions. Field works and dating.
6. Eruption volume problems. Should use a standard method for volume estimation.
7. High-quality volume-age diagram

Eruption Database

1. Eruption age, volume, style, distribution, and chemical composition. More precise datasets are needed.
2. Quaternary Volcanoes and active volcano database
3. VOGRIPA and Global Volcano Model.
4. Deposits older than 10ka. Hard to distinguish small-scale eruptions. Careful investigations.
5. Distributions should be stored in GIS format

Simulation

1. Database: past eruption results. Subset of possible future scenario.
2. Numerical simulations are needed for different conditions, such as vent position, volume, eruption rate, wind direction, and topography.
3. Numerical simulations of pyroclastic flows, surges, debris avalanche, lava flows, tephra falls, ballistics, and lahars should be done at major active volcanoes.
4. Hazard assessments using probabilistic approch.
5. Appropriate simulation model should be selected.
6. Online numerical simulations (GEO Grid, V-Hub)

Hazard Assessment System

1. Next-generation hazard assessment system based on eruption scenario datasets, eruption database, and numerical simulations.
2. Visualization of past volcanic eruptions datasets, such as distributions, volumes, eruption rates on maps and diagrams using timeline and GIS.
3. Similar volcanic eruption scenarios should be easily searched from the eruption database archive.
4. Prediction of arrival time and area affected by volcanic eruption at any locations near the volcanic area should be possible using numerical simulations.

Hazard Assessment System

5. Estimate the volcanic hazard risks by overlaying the distributions of the deposits on major roads, houses and evacuation area using a GIS enabled system.
6. Probabilistic volcanic hazards maps at active volcanoes based on numerous numerical simulations are needed.
7. Next-generation real-time hazard assessment system. Implemented as a user-friendly interface, accessible online anywhere in the world.