



High risk volcanism at the active margin of the Sunda Arc

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Within the frame of the special initiative "GEOTECHNOLOGIES: continental margins" of the German Federal Ministry of Education and Research and the Deutsche Forschungsgemeinschaft the joint research project "SUNDAARC" was launched in January 2004, in co-operation with Indonesian science institutions. The aim is to study the various expressions of volcanism, its relations to the active subduction environment, and to install a real-time multi-parameter (MP) monitoring station. Three different Indonesian volcanoes were selected: Krakatau, Merapi and Kelut. The interdisciplinary project is subdivided into three sub-projects:

(1) Krakatau Monitoring (KRAKMON) comprises real-time observations of the volcanic activity parameter like micro-seismicity, of electro-magnetic, gas-chemical and thermal parameters as well as of the deformation of the volcanic edifice and meteorological influences. Video monitoring and a sea level gauge are integrated. Correlation of the different data sets to another in relation to volcanic activity phases is expected to give insight into the controlling mechanisms and to enable the distinction between fluid-mechanical and fragmentation processes. The procurement and the installation of the complete system (MP monitoring station and data center) were accomplished in 2005. The system was tested and is in continuous operation.

(2) Merapi Amphibious Experiment (MERAMEX) aims at tomographic studies (V_p and Q_p) on the Merapi conduit system and its surroundings in central Java by active and passive seismic surveys simultaneously along with nearly 120 land stations and 14 Ocean Bottom Sensors providing high-resolution 3-dimensional models from the

surface down to the plate interface in order to image the complete pathways of fluids and melts. The field work with its coincident onshore and offshore activities was successfully accomplished in 2004 comprising two cruises of Research Vessel SONNE. The landstations recorded data sets of 150 days duration providing about 6 suitable local seismic events per day. First velocity models have been derived from the active seismology data. They show that there are strong changes in subsurface parameters at the location of the volcano arc stretching down to the subduction plane.

(3) Development of Highly Explosive Volcanoes at Active Continental Margins (DEVACOM) analyses samples of erupted material from selected volcanoes under in-situ eruption conditions in order to mineralogically and petrophysically model the active processes. The reliability of the models will be examined by comparison of different volcano types. Visual video monitoring will provide direct correlation to the data sets observed at the Krakatau MP station. The required samples from all target volcanoes including Augustine, Bezymianny, and Colima have been collected in 2005. First laboratory studies are accomplished.

Besides a great number of Indonesian partner institutions, the German project partners are: BGR, GFZ, IfM-GEOMAR, University of Kiel and University of Munich. The joint interpretation and overall results shall contribute to a better understanding of the processes in the volcano interior and shall lead to a better hazard assessment in the study area including the establishment of improved early warning systems. This aspect gained particular importance after the disastrous flood catastrophe on boxing day 2004. It was internationally agreed that volcano early warning will be included in a global system which will be launched soon.