Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

HDS06-P04 Room:Convention Hall Time:May 22 13:30-15:00

Evaluation of activity of Guntur, Sinabung and Merapi volcanoes, in Indonesia based on continuous GPS observations

OHKURA, Takahiro[1*], IGUCHI, Masato[2], Muhamad HENDRASTO[3], Umar ROSADI[3]

[1]AVL, Faculty of Science, Kyoto Univ., [2]DPRI,Kyoto Univ., [3]CVGHM, ESDM,Indonesia

Indonesia has 127 active volcanoes along its archipelago and the volcanoes have experienced tremendous disasters in the past with variety of eruption styles and appearance of volcanic disaster. Therefore, prediction of volcanic eruption and mitigation of volcanic hazards are urgently required. However, many active volcanoes are equipped with only one seismic station. For the mid- and long- term prediction and evaluation of post-eruptive activity, continuous observations of ground deformations are necessary. Therefore, we have installed GPS stations in Guntur, Sinabung and Merapi volcanoes, by a project "Multi-disciplinary Hazard Reduction from Earthquakes and Volcanoes in Indonesia" under the Science and Technology Research Partnership for Sustainable Development (SATREPS) started in 2009.

Guntur volcano complex is located 35 km SE of Bandung, West Java. The volcano was quite active, repeating volcanic explosions and effusion of lava flows in 18th and 19th centuries. Although Guntur volcano has been dormant in eruptive activity since 1847, seismicity s is active and this volcano is regarded as one of the high-risk volcanoes due to the dense population SE of the volcano. For the mid- and long-term prediction, continuous observations of ground deformation are necessary.

Mt. Sinabung is an andesitic stratovolcano (2460-m-high) located 40 km northwest of Lake Toba, North Sumatra. Historical eruptions have not been reported prior to the phreatic eruptions during August-September 2010. Although the eruptive activity declined after September, seismicity on and around the volcano was still high .

An explosive eruption occurred on October 26, 2010 at Merapi volcano in Central Java and the eruptive activity was followed by continuous occurrence of pyroclastic flow from the summit crater during the period from November 3- 5.

Four stations were installed around Gntur volcano in October 2009, Merapi volcano in December 2010 and Sinabung volcano in February 2011, where three stations are located on the volcano edifice and one at a base station at the foot of the each volcano. GPS stations on the edifice are connected to the base station via WLAN. We applied a PPP (precise point positioning) using GPS analysis software, GIPSY-OASIS II Ver.6.1 to the data of Guntur and Merapi volcanoes. In the analysis, JPL precise ephemeris is used, and dairy coordinates are calculated in the frame of ITRF2008. From the obtained coordinates, we can calculate baseline among stations. The GPS data at Sinabung volcano is being analyzed automatically using Leica GNSS Spider software.

As a result in Guntur volcano, inflation was detected 5 months prior to seismic crisis in September 2011, suggesting intrusion of magma beneath the volcano at that time. Also, inflation was detected in Merapi volocano, suggesting restart of magma accumulation just after the huge eruption in 2010. And almost no deformation has been detected in Sinabung volcano suggesting little possibility of imminent magmatic eruption.

Keywords: GPS, ground deformation, volcanic activity, Indonesia