Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

MAG022-P05 Room: Convention Hall Time: May 27 17:15-18:45

Tilt observation at Semeru volcano, east Java, Indonesia

Takeshi Nishimura[1*], Masato Iguchi[2], Tomoya Yamazaki[2], Ryohei Kawaguchi[1], Surono Surono[3], Muhamad Hendrasto[3], Sri Hidayati[3], Hetty Triastuty[3], Umar Rosadi[3]

[1]Geophysics, Science, Tohoku Univ., [2]DPRI, Kyoto Univ., [3]CVGHM, Indonesia

Semeru volcano in east Java, Indonesia, is the one of the most active volcano in the world. The volcano intermittently explodes every a few to tens of minutes effusing volcanic ashes above. Since the magnitude of eruption is not so big, it is a very good field to study the eruption mechanism by deploying geophysical instruments close to the active crater. To clarify the magma ascent process in the shallow conduit before each eruption, we installed two tilt meters (Pinnacle, hybrid type with analog output) on the flank of the volcano in July 2009. We first planned to set one tilt meter on the summit, which is located about 0.7 km from the active crater. However, we could not reach the summit, because the Indonesian government prohibited the access to the summit due to a sudden decrease in volcanic activity that started from April. So, we set two tilt meters at Arcopodo and Kalimati, which are about 1.7 km and 3 km north of the active crater, respectively. The tilt meters are embedded in 4 m depth boreholes that were dug by hands. The tilt signals are digitized with a sampling frequency of 250 Hz and an A/D resolution of 18 bit, and are continuously saved in compact flash memories by data loggers (Kinkei, EDRX7000). The observation started from July 6 in 2009 as a corporative study of Japan and Indonesia by JST-JICA project. The tilt data at the two sites are well recorded from the beginning, and we have now the data from July to the beginning of November. The volcano had not showed intermittent eruptions since April, but the activity gradually increased and a new lava dome was found in the active crater on November. The tilt data at the two sites show anomalous pulses from the latter half of August. The tilt pulse activity once declined in the middle of September, but became very high in October. The tilt pulses indicate subsidence of the summit and recovery for a few tens to hundreds second. The amplitudes and directions of the tilt vectors at the two sites are explained by a pressure source of dike-like shape beneath the summit with a strike of NNW-SSE and a depth of about 500 m. Although the pressure source may be related to the appearance of new lava dome, short-period oscillations due to volcanic earthquakes might have generated such tilt pulses so that we may need to examine the sensor response to the ground oscillation for further discussion.

Keywords: Semeru, volcano, tilt, observation