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Assessing impacts of Yogyakarta earthquake 27 May 2006 on volcanic eruptions of Merapi volcano (central Java, Indonesia) and consequences on future volcanic risk mitigation

A. **Lucas Donny Setijadji** (1,2), and B. Koichiro Watanabe (1)

(1) Graduate School of Engineering, Kyushu University, Fukuoka 819-0395, Japan, (2) Department of Geological Engineering, Faculty of Engineering, Gadjah Mada University, Yogyakarta 55281, Indonesia (lucas@mine.kyushu-u.ac.jp)

Merapi volcano, the most active volcano in the Indonesian archipelago, is situated at the vicinity of major Yogyakarta city in central Java island. During the 20^{th} century this volcano has erupted continuously in every few years interval. The current eruption cycle started in March 2006 and a period of intensive activities lasted from May to July 2006. The 2006 eruption cycle was of special interest due to the fact that, during a period of high volcanic activities, a strong (Mw 6.4) and shallow (10 km bsl) earthquake hit the Yogyakarta region on 27 May 2006. We conducted a study to assess the impacts of tectonic earthquake on volcanic activities of Merapi by comparing volcanic behaviors before and after the quake through analyzing seismic records, thermal mapping using the ASTER (*Advanced Spaceborne Thermal Emission and Reflection Radiometer*) images, and field observation. The aim is to define the decision support system for volcanic hazard risk in case of earthquake-triggered volcanic eruptions.

Seismic activities of Merapi from late March to early May were dominated by multiphase and shallow volcanotectonic events associated with activities of shallow magma and growing of lava dome. Visual observation and ASTER TIR image confirm that a new lava dome at the summit was observed since April 2006. Pyroclastic flow events appeared since the second week of May whose direction was dominated toward the SW sector of Merapi. Immediately after the tectonic earthquake on 27 May, following changes of volcanic behaviors were observed. First, the number of pyroclastic flow and avalanches increased significantly on 27 May-5 June. Volcanic intensity then de-

creased on 5-13 June, increased again on 14-30 June, and since the end of June 2006 all activities decreased rapidly. The tectonic earthquake 27 May might have created new fractures that increased the eruption intensity. However, as the outflow rate of magma increased, the shallow magma chamber became empty quickly and volcanic activities soon decreased. After a refilling stage of empty magma by the rest of (lower) magma, another period of intensive eruptions occurred shortly until the end of June. After that volcanic activities decreased rapidly as the whole magma has been ejected. The second major change observed was that earthquake has changed the direction of eruption abruptly. Historical eruptions of Merapi since the 18^{th} century and eruptions 2006 before the earthquake were dominated towards the SW slope; after 27 May eruptions shifted abruptly toward SSE slope. We suggest that (at least) earthquakes have caused the collapse of topographic barrier near the crater, and then changed the direction of lava overflow.

As the earthquake 27 May 2006 has changed the behaviors and damaged areas of Merapi considerably, a new decision support system for volcanic hazards assessment must be developed by incorporating tectonic earthquake as an important factor in determining volcanic risk.