



## **Merapi Crisis 2010: Declaring alert levels based on deformation and seismic data**

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Merapi (2968 m), located in densely populated area of Central Java and Yogyakarta provinces, is one of the most active and dangerous volcanoes in Indonesia. In fact, more than 40,000 people living nearby the volcano in high risk due to volcanic eruption. Center for Volcanology and Geological Hazard Mitigation (CVGHM) has a task to monitor its activity and issue early warning to the people around the volcano. CVGHM declares alert level of Merapi volcano based on visual and instrumental data namely deformation and seismic data.

On September 20, 2010, Merapi activity increased from the alert Level I (normal) to Level II (waspada) where the number of volcano-tectonic earthquake (VT) reached 11 events, multiphase (MP) attained 38 events and rockfall (guguran) 3 events in a day. On 21 October 2010, the state of activity was raised to Level III (siaga) since within a day the number of VT earthquake reached 17 events, MP attained 150 events, rockfall recorded 29 events and the rate of deformation inflated 17 cm. The high activity of the volcano still continued as shown by increasing in number of VT earthquake (80 events), MP (588), rockfall (194) and the rate of deformation inflated 42 cm in a day causing a rise of alert level to its highest level, Level IV (Awas) on October 25, 2010. CVGHM recommended evacuation to the people living around the volcano to a safe zone out of 10 km in radius from the summit.

During the crisis in 2010, the first eruption occurred on October 26, 2010 generated pyroclastic flows and travelled down to 8 km into Kali Gendol, at southern part of the volcano. Since November 3, 2010, continuous and overscale tremor occurred that was suggested to be associated with high rate lava dome growth. This activity reached its peak on November 5, 2010 when lava dome collapse generating pyroclastic flows with traveling distance to 15 km from the summit into Kali Gendol. After that, Merapi activity fluctuated and tended to decrease and on December 3, 2010, the alert level was downgraded to Level III from Level IV.