

Methods for eruption prediction and hazard evaluation at Indonesian volcanoes

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We report methods, based on geophysical observations and geological surveys, for the prediction of eruptions and the evaluation of the activity of 4 volcanoes in Indonesia. These are Semeru, Kelud, Guntur and Sinabung volcanoes. Minor increases in tilt were detected by borehole tiltmeters prior to eruptions at the Semeru volcano depending on the intensity of explosion earthquakes. The results show the possibility of prediction of the type and magnitude of eruption and the effectiveness of observation with a high signal-to-noise ratio. The establishment of background data is important for evaluating volcanic activity in long-term prediction. The cumulative volume of eruptive products is valuable for evaluating the potential for future eruption. The eruptive rate of the Kelud volcano is ca 2×10^6 m³/y (DRE), but the volume of the 2007 eruption was only 2×10^7 m³, suggesting a still high potential for eruption. Typical distributions of volcanic and local tectonic earthquakes were obtained around the Guntur volcano, where geodetic monitoring by continuous GPS observation is valuable. Based on geological surveys and dating, an eruption scenario is proposed for the activity of Mt. Sinabung, where phreatic eruptions occurred in 2010 after a historically long dormancy.

Keywords: short-term prediction, long-term prediction, eruption scenario