



## **Volcanic structure under Gede, West Java, Indonesia, results from three-dimensional local earthquake tomography and small long-period earthquake analysis**

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Gede Volcano is one of the active volcanoes in Indonesia located about 60km from the capital Jakarta. Due to its proximity to the large population around Gede, Center for Volcanology and Geological Hazard Mitigation (CVGHM) closely monitored this volcano since 1985. It is considered active; however, there has not been any eruption in the past 60 years. Historical records suggest that in the past few centuries, Gede have had frequent VEI 1-2 sometimes Vulcanian-type eruption and sometimes small-volume extrusion of viscous lava. Since the first installation of seismometer and observation post, Gede is observed to exhibit seismic swarm every few years with only minor visible degassing from its central craters. In collaboration between Earth Observatory of Singapore (EOS) and CVGHM, we gradually upgraded seismic, tilt, geochemical and hydrological monitoring network on Gede Volcano and the neighbouring volcano Salak to further investigate its potential activity and hazard associated with its eruption. Our seismic network recorded swarms consists of tens to a couple hundred Volcano Tectonic (VT) earthquakes in few days to a few weeks period. The initial study of swarms of earthquakes and tilt shed light into possible periods of magma intrusion that did not reach the surface with some control of the tectonic forces around Gede Volcano. However, another later on study suggests since seismic swarms associated with no deformation and no seismic migration, the swarms probably caused by interaction of meteoric water and existing remain of magmatic bodies under the volcano. Further evaluations suggest that earthquakes swarms consist of not only VT type earthquakes but also long-period (LP) earthquakes that occurred at shallow depths. We conducted three-dimensional seismic P-wave travel time tomography to image the magma sources beneath Gede Volcano. We used travel time arrivals from > 700 VT earthquakes that occurred beneath the volcano over the period 2011-2018. Combining results from the tomography and long-period earthquakes analyses, we aim is to further find the magmatic body under the volcano at shallow depths (< 2 km) up to about 8km.