

Focal mechanism of volcano-tectonic earthquakes at Guntur volcano, Indonesia

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1. Introduction

Guntur Volcano is an andesitic stratovolcano with 2249 m high above sea level and located in West Java, Indonesia. Guntur volcano as the youngest of Guntur-Gandapura complex lies on the edge SE of a NW-SE. Guntur volcano's crater covered by forest and minor fumarolic activity has remained where large fumaroles area is located in the Kamojang caldera, west of the summit of Guntur and continues to southwest, Darajat caldera. From 1690 until the middle of 19th century, eruptions frequently occurred. For almost 160 years since 1847 until now, Guntur volcano has been in a quiet state. With such long time of quiet state, it is obvious about the threatened by the incoming eruption in the future.

In order to monitor the activity of Guntur volcano, Volcanological Survey of Indonesia and Sakurajima Volcanological Observatory reinforced seismic network at the volcano in 1994 by adding 3 seismic stations at Pasir Cileungsing (PSC), Gunung Putri (PTR) and Legokpulus (LGP), to the previous monitoring station Citiis (CTS). Next, station Kabuyutan (KBY) was installed, and PSC had been moved to Pasir Kiamis (MIS).

The hypocentral distribution shows the hypocenters are located mainly in the summit area and in Kamojang caldera area west of the volcano. The hypocenters in the summit area are distributed at depths of 0-5 km, the epicenters are aligned along the volcanic cone-belt from NW to SE. The hypocenters in caldera area are a little bit deep; 5-10 km. Based on the hypocentral distributions, we determined the possible solution of VT events.

2. Focal Mechanism

The focal mechanism of Guntur volcano is determined using polarity and amplitude of P-wave first motions at more than 4 seismic stations, assuming double couple mechanism and homogeneous half space.

The locations of events are divided into three active areas; Kamojang, Gandapura and summit of Guntur. In Kamojang area, the fault plane solution shows strike-slip fault with nodal line in the NE-SW and NW-SE direction, coincide to the fault of NE and SW direction.

The fault plane solutions in Gandapura caldera was indicate by normal or reverse fault mechanisms including the two of felt-earthquakes in 1999. The nodal line striking in the direction of NE-SW, it suggests that the active fault in this area is trending in this direction.

In the summit area, mechanisms are normal and reverse faults with nodal line in NE-SW direction. These mechanisms occurred because the rocks in hypocentral zones beneath the crater are fractured more in many directions as the result of previous volcanic activity.

3. Conclusion

The mechanism results show coincide with the geological setting of the area. This suggests the active areas are with the direction of the faults in Kamojang, Gandapura and summit of Guntur area.