

ABSTRAK

ANALISIS DISTRIBUSI HIPOSENTER DAN MEKANISME FOKUS GEMPA *VOLCANO-TECTONIC* (VT) GUNUNG MERAPI PERIODE DESEMBER 2019

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Gunung Merapi yang terletak di perbatasan Jawa Tengah dan Daerah Istimewa Yogyakarta menunjukkan peningkatan aktifitas berdasarkan naiknya intensitas erupsi sejak Agustus 2018. Untuk memahami aktifitas magmatisme dan dinamika internal Merapi, dilakukan analisis distribusi hiposenter dan mekanika fokus dari gempa *volcano-tectonic*. Metode yang digunakan yaitu penentuan waktu tiba dan gerakan pertama polaritas gelombang P pada minimal 5 stasiun seismik, dengan asumsi mekanisme pola radiasi pasangan ganda dan medium penjalaran gelombang seismik homogen. Hasil dari pengolahan ini, didapatkan 76 kejadian gempa VT dan 76 bola fokus sumber gempa VT. Pengolahan dilakukan menggunakan perangkat lunak *SeisComp3* untuk mendapatkan distribusi hiposenter dan mekanika fokus gempa VT. Perangkat lunak *SeisComp3* mengimplementasikan algoritma *locator* HYPO71 menggunakan prinsip metode GAD (*Geigers Adaptive Damping*) untuk menentukan hiposenter gempa. Pengolahan selanjutnya, hasil analisis hiposenter dan mekanisme fokus dikaitkan dengan kejadian erupsi tahun 2019 - tahun 2020. Berdasarkan analisis distribusi hiposenter, didapatkan gempa VTA pada kedalaman 2,4 s.d. 4,8 km, gempa VTB pada kedalaman 1,4 s.d. 1,9 km dan zona *aseismic* pada kedalaman 1,9 s.d. 2,4 km yang ditafsirkan sebagai posisi kantong magma. Berdasarkan analisis mekanisme fokus gempa VT, didapatkan mekanisme fokus dominan berupa patahan geser (*strike-slip*) dan *oblique fault* dengan arah barat-barat laut – timur-tenggara (NWW - SEE). Arah ini diduga dipengaruhi oleh adanya gaya ekstensi tektonik regional. Berdasarkan analisis dinamika internal, didapatkan pada bulan Desember 2019 merupakan fase intrusi magma yang mencari jalur untuk bermigrasi ke permukaan, sehingga banyak rekahan (*crack*) terbentuk yang diindikasikan dengan gempa VT namun tidak diikuti dengan kejadian erupsi.

Kata kunci: Gunung Merapi, Gempa *Volcano-Tectonic* (VT), Mekanisme Fokus.

ABSTRACT

HYPOCENTER DISTRIBUTION AND FOCAL MECHANISM ANALYSIS OF VOLCANO-TECTONIC (VT) EARTHQUAKE AT MERAPI VOLCANO DURING DECEMBER 2019 PERIOD

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Merapi which is located on the border of Central Java and Special Region of Yogyakarta shows an increased in activity based on the rise of eruption intensity since August 2018. To understand the activity of Merapi magmatism and internal dynamics, hypocenter distribution and the focal mechanics analysis of the volcano-tectonic earthquake had been carried out. The method that being used was the determination of P wave arrival time and its first movement polarity at a minimum of 5 seismic stations, assumed with the mechanism of double pair radiation patterns and the transmission medium of the homogeneous seismic waves. The results of this processing were 76 events VT earthquake and 76 beach balls as the source of VT earthquake being obtained. Processing was done using the SeisComp3 software to obtain hypocenter distributions and the earthquake focal mechanism of VT. The SeisComp3 software implements the HYPO71 locator algorithm using GAD (Geiger's Adaptive damping) method principle to determine the earthquake hypocenter. Subsequent processing, the results of the hypocenter analysis and the focal mechanism were associated with the eruption between the year of 2019-2020. Based on the analysis of hypocenter distributions, VTA earthquake was obtained at a depth of 2.4 to 4.8 km, VTB earthquake at a depth of 1.4 to 1.9 km and aseismic zone at a depth of 1.9 to 2.4 km which was interpreted as the magma pocket position. Based on the VT earthquake focal mechanism analysis, the dominant focus mechanism was obtained in the form of strike-slip and oblique faults with west-northwest – east-southeast direction (NWW-SEE). This direction was thought to be influenced by the style of regional tectonic extensions. Based on the internal dynamics analysis that were being obtained in December 2019, magma intrusion phase was sought its pathway in order to migrate to the surface, so that many cracks were formed as indicated by the VT earthquake but not followed by the eruption events.

Keywords: Merapi, Volcano-Tectonic earthquake (VT), focal mechanism.