PETROGRAPHY OF PYROCLASTIC ROCK MOUNT MASURAI JAMBI PROVINCE

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ABSTRACT

[Title: Petrography of Pyroclastic Rock Mount Masurai Jambi Province] *The magmatic arc of Sumatra Island, which is indicated by the presence of the Barisan Mountains zone on the west side of Sumatra Island with a general direction northwest - southeast, makes Mount Masurai, which is administratively in Merangin Regency, Jambi Province, become one of the volcanoes on Sumatra Island. Geographically, the peak of Mount Masurai is located at coordinates 101° 51' 28.60" E and 2° 30' 09.19" S with an elevation 2915 masl. The eruption period of Mount Masurai is estimated to have occurred twice during the eruption period. Based on the lack of information about volcanoes, this research was conducted to determine the characteristic and distribution of pyroclastics from Mount Masurai. In the area around Mount Masurai, remnants of volcanic eruptions were found, in the form of pyroclastic flows and falls. From data collection based on the results of geological mapping and petrographic analysis, pyroclastic rocks were found in the area around Mount Masurai with lithology in the form of Andesite Breccia, Laharic Breccia Pumice Breccia, Lapilli stone and Tuff. This is reinforced by the results of petrographic analysis of rock samples which are dominated by the presence of a glass.*

Keywords: *Mount Masurai; Pyroclastic Rock; Petrography analysis*

INTRODUCTION

Mount Masurai is one of volcanoes that located in the southern part of Merangin Regency, Jambi Province. Geographically, the peak of Mount Masurai is located at coordinates 101^0 51' 28.60" E and 2^0 30' 09.19" S at an elevation of around 2915 masl. The morphology of Mount Masurai forms a caldera with an area of about 7 km. Based on a study of satellite imagery by (Rohiman et al., 2019), it appears that the morphology of Mount Masurai's caldera has openings in both directions, namely the northwest and southeast. Both directions appear to be covered by post-caldera products that led to the formation of Kumbang and Mabuk lakes. There are remnants of parasitic eruption holes in the caldera courtyard, one of which is known as Biru Lake.

The Mount Masurai area is a hilly plateau with a long east-west stretch of around 30 km and a north-south stretch of around 50 km. In the south it is bounded by Bukit Barisan and the main Sumatran fault (Semangko Fault). According to (Kusnama et al., 1992) geologically, this region consists of Quaternary sedimentary units, Qv, Qhv, and Qtv as described on the geological map of the the Sungai Penuh and Ketaun sheet.

Pyroclastic rocks are composed of fragments that originate from volcanic eruptions or as a direct consequence of an eruption. Eruptions giving rise to pyroclastic fragments may be grouped into two general categories: (1) those caused byexpansion of gases initially contained within the magma [i.e., pyroclastic (magmatic) eruptions], and (2) those caused by vaporization of external water in contact with hot magma or lava (hydroclastic eruptions) (Fisher,et al. 1984). Pyroclastic types: Ash, Lapilli stone, Bomb, Block (Marshak, 2013). Pyroclastic material has a diversity of fragments with a certain magnitude which will decrease as the distance from

the eruption center increases (De Belizal, et al. 2013). Based on the mechanism, pyroclastic deposits can be grouped into 3 types, namely pyroclastic flows, pyroclastic surges and pyroclastic falls. Pyroclastic surge and pyroclastic flows often cannot be separated, so they are called ignimbrite. ignimbrite deposits consist of flow deposits and pyroclastic deposits that cannot be re-sorted (Mulyaningsih, 2015).

The Masurai volcanic-tuff breccia unit (Qhv) is the formation that is the main study in this research with lithology in the form of tuff, lava, volcanic breccia, tuff breccia and lava. The direction of distribution of this formation is relatively spread towards the northeast - east of the center of Mount Masurai. In the area around Mount Masurai, remnants of volcanic eruptions were found, in the form of pyroclastic flows and falls. (Kirana, 2019). Based on the analysis of the main elements and traces of 102 rock samples consisting of: ignimbrite, tuff/tephra, lava and pumice, the results of the C-14 dating analysis of charcoal and paleosol samples obtained ages of 32,786 calBP and 21,335 calBP. This can be interpreted that Mount Masurai has experienced two periods of eruption (Rohiman, 2018)

So far, the study of volcanic geology, both through education and research, is still underdeveloped. Based on the lack of information about volcanoes, this research was conducted to determine the characteristic and distribution of pyroclastics from Mount Masurai by utilizing petrographic analysis to distinguish the characteristics of pyroclastic material from Mount Masurai.

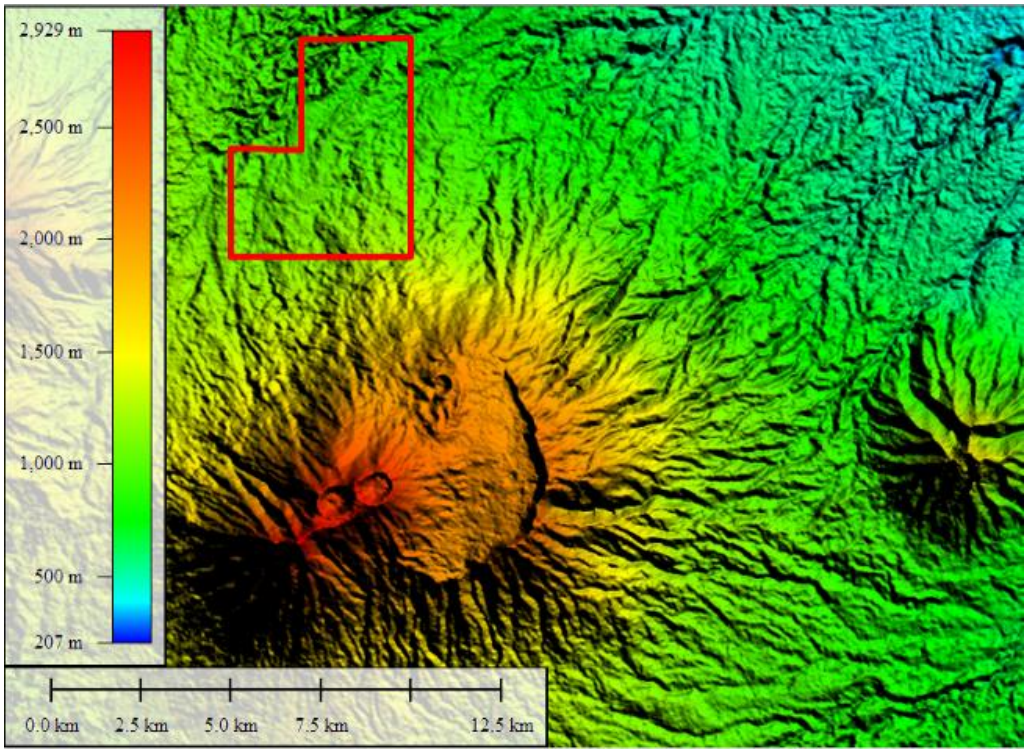


Figure 1. *Research Area of Mount Masurai, Lembah Masurai District, Merangin Regency, Jambi Province (Coordinate 81600E -82100E, 973700S – 9731000S zone 48S UTM)*

DATA AND METHOD

The method used in the research can be divided into geological mapping activities for takes rock samples which aims to obtain field data that can represent geological conditions and pyroclastic characteristics in the research area and petrographic analysis activities to determine the types of minerals and rock characteristics using a polarizing microscope. Then the last stage is the study activity where the author tries to make a Pyroclastic Characteristic Zoning Map based on field data and laboratory analysis results.

RESULT AND DISCUSSION

Based on data collection and analysis, the research area is covered with pyroclastic material from falls and flows. With the discovery of this material, the author refers to the volcanic facies model according to (Bogie & Mackenzie 1998) that Mount Masurai is in the proximal-medial facies (figure 2).

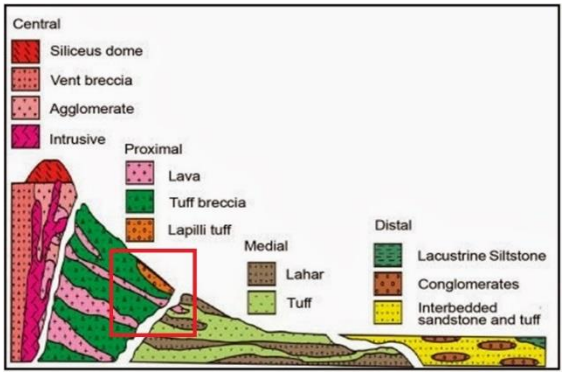


Figure 2. Volcanic Facies in research area

This facies is determined based on the pyroclastic characteristics and distribution of Mount Masurai consist of three (3) units, namely: Masurai Old Flow Pyroclastic; Masurai Young Flow Pyroclastic; Masurai Fall Pyroclastic (Figure 3)

Masurai Old Pyroclastic flows

Old pyroclastic flows have a characters that depends on the explosion of the eruption, changes in the mechanism of the eruption, and the distance from the source. Based on the physical appearance of old pyroclastic flows, the outcrops were found to be in a weak - moderate weathering condition. The matrix is slightly brown in color. The dominant fragment found in this rock unit is igneous rock in the form of andesite with a generally bright gray color with a size of 3 – 640 mm with an afhanitic texture. The shape of the fragment is generally angular. This pyroclastic flow is produced by andesite breccia of various sizes and does not have a graded structure and alignment of the fragments this is because the material flows at high speed and randomly. (Fig.4)

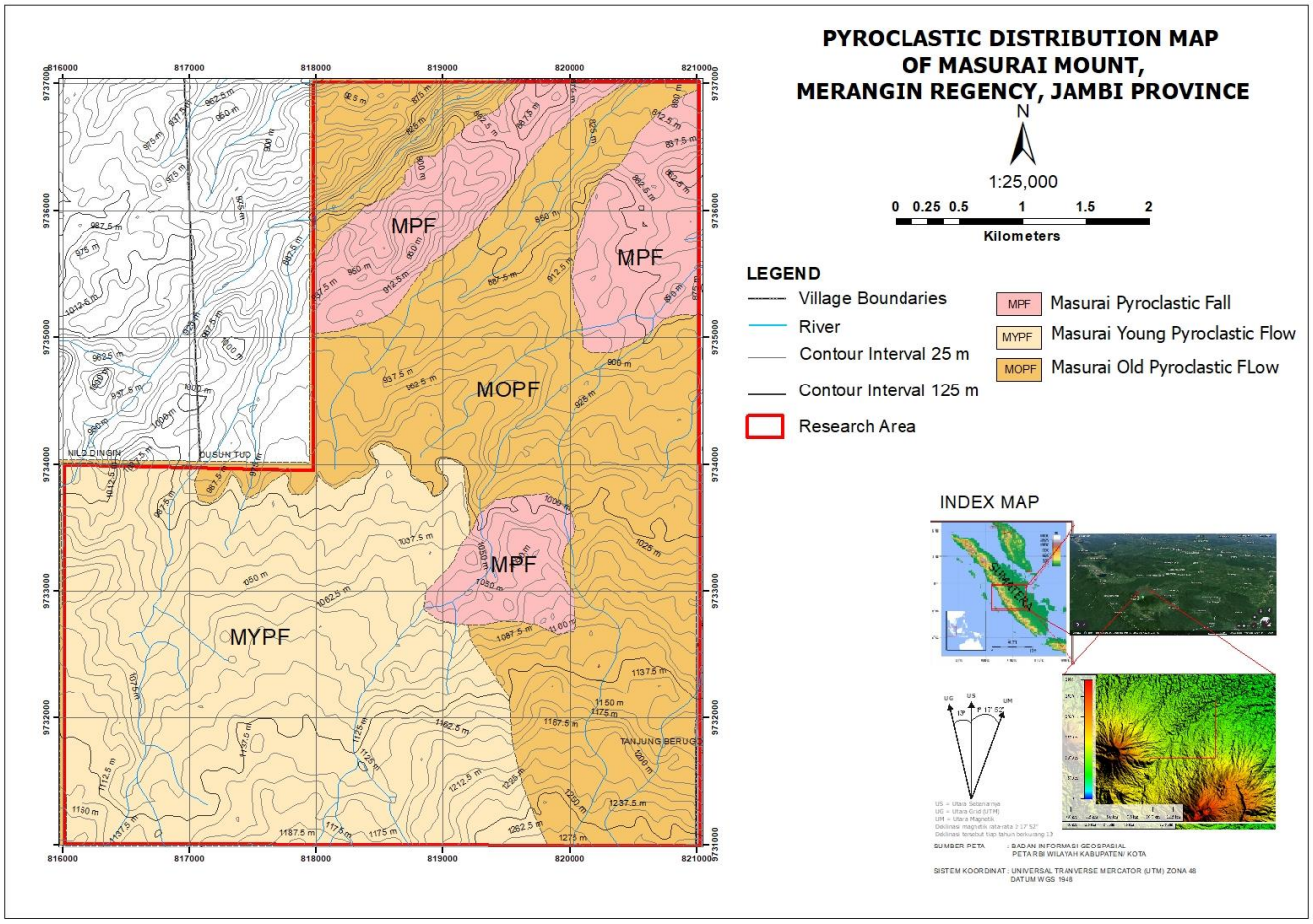


***Figure 3**. Pyroclastic Distribution Map of Research Area*

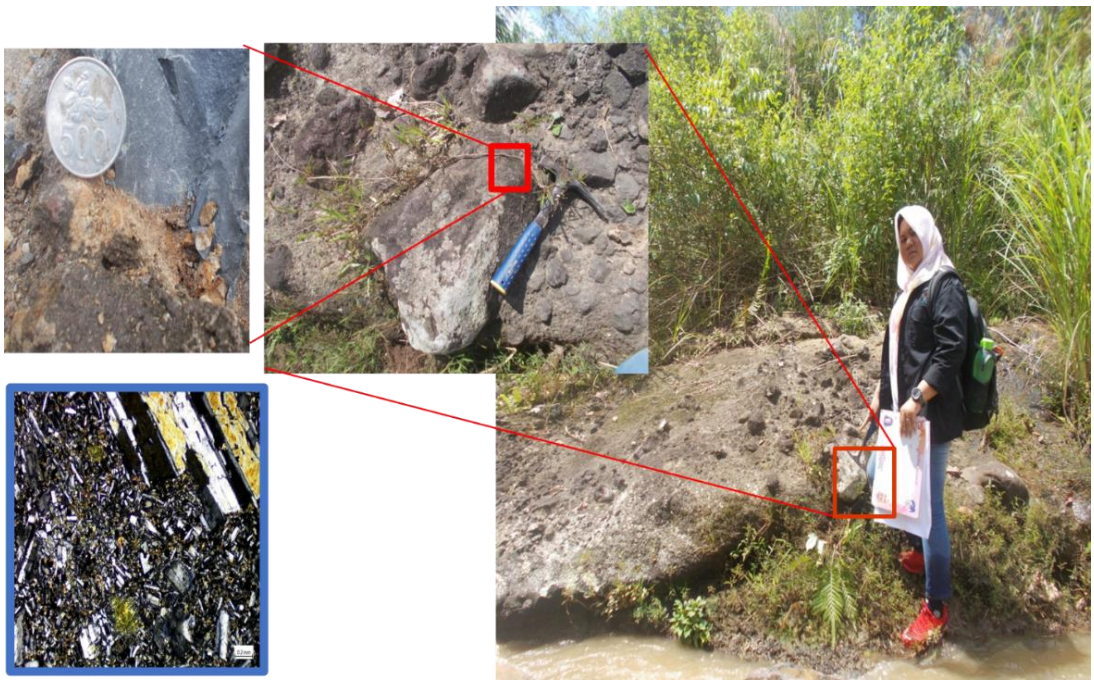
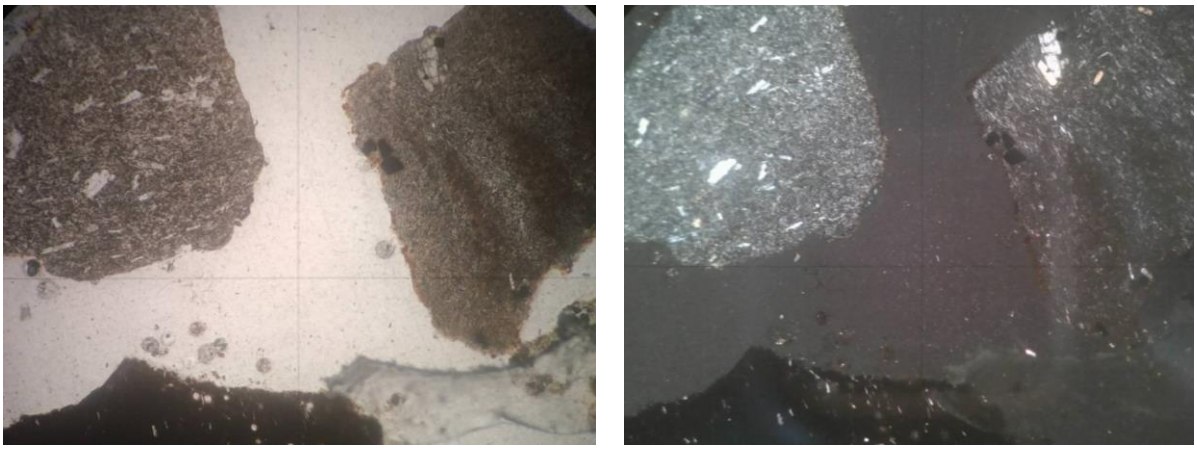


Figure 4. Old Pyroclastic Flow Fragmen Andesite of Andesite Breccia

Based on petrographic analysis of rock fragments, thin sections of parallel nicol and cross nicol show that these are andesite fragments. In thin section the rock shows a porphyritic texture as shown in Figure 4. The degree of hypocrystalline crystallization, euhedral-anhedral crystal form, inequigranular packing, hypidiomorphic inter-crystal relationships, consisting of altered plagioclase and pyroxene phenocrysts with a ground mass of microcrystalline plagioclase, opaque minerals and altered glass and The secondary mineral is chlorite which is yellowish in color.

Based on petrographic analysis of the rock matrix, thin sections of parallel nicol and cross nicol show that the matrix filling this lithology is lithic tuff. In a thin section the rock shows a clastic texture, the grain size of the tuff ash is shown in Figure 5, subrounded shape, open packing, moderate sorting, the components consist of rock fragments and weathered volcanic glass embedded in a matrix of volcanic glass and cement in the form of iron oxide cement. Rock fragments, gray in color, trachytic texture, composed of plagioclase and opaque minerals, possibly volcanic rock fragments such as andesite or basalt, clustered, measuring up to 2 mm.



(a) (b)

***Figure 5**. Old Pyroclastic Flow Matriks of Andesite Breccia (a) ppl (b) xpl*

Masurai Young Pyroclastic Flow

Young pyroclastics flow are characterized by breccia pumice with pyroclastic fragments in the form of pumice and lithic. The embedded pumice fragments were 0.1cm - 15cm in size with a fine-medium tuf as a matrics. Fragments lithic found in the form of basalt and andesite measuring in <5cm. There is no graded pattern, either in size or color of the pumice, which can explain that this pumice breccia is a product of pyroclastic flows. based on microscopic observations there is a special texture in the form of vitroviric with fragments in the form of volcanic glass. (Fig.6)

***Figure 6**. Young Pyroclastic Flow Pumice Breccia*

Based on the petrographic analysis of the rock seen in Figure 6, the thin section which has a colorless to brown absorption color has a massive structure with a coarse tuff grain size texture and poor sorting with a vitrophyric texture where there are phenocrysts with a ground mass consisting of glass mass and having fragments in the form of lithics. with sizes 1 - 2.5mm. Lithic fragments have a flow-specific texture.

Masurai Fall Pyroclastic

Pyroclastic fall are characterized by a breccia pumice with massive structure and graded bedding with embedded pumice fragments measuring 0.5 cm - 7 cm with a matrics of ash and lithic sized < 1 cm. Based on microscopic observations, this character has a special vitroviric texture. based on grain composition that is Vitric Tuff. (Fig.7)

Microscopically, thin sections of rock samples obtained from the observation location show that the rocks are Vitrik Tuff and Crystal Tuff. The names of these rocks are based on Schmid's (1981) classification which is differentiated based on grain composition.

***Figure 7**. Masurai Fall Pyroclastic Lapilistone*

CONCLUSIONS AND RECOMMENDATION

The characteristics and distribution of pyroclastic deposits of Mount Masurai consist of three (3) units: Masurai Old Pyroclastic Flow (andesitic breccia and laharic breccia lithology with varying sizes and ungraded structure); Masurai Young Pyroclastic Flow (Pumice breccia with pyroclastic fragments in the form of lithic and pumice with dominant pumice); and Masurai Pyroclastic Fall (lapilli stone and tuff). For academics, further research is needed to determine the absolute age of the Masurai pyroclastic deposits, which would improve the eruption column data of Mount Masurai.

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