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Genetic of joint system Mengkarang metapellite: implication to characteristic deformation on the Muara Karing Geopark Merangin, Jambi

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Abstrak. *Present day tectonics of the Sumatera are characterized by strike slip fault regime which fault segmented, specially Siulak segment to associated of structure orientation on the Muara Karing surrounding. Muara Karing is one of drainage pattern which river system downstream to Batang Merangin on the Geopark Merangin. Mengkarang Formation is the oldest formation which compiler of geology Sarolangun-Bangko, attain the Permian. Typical location which lithology metasediment on the bed rock stream. The existence of joint system on the bed rock have been indicated tectonic deformation, then needful of good knowledge of joint system, which is identified process such as measured object and stage of valid analysis could be geological hystory on the Muara Karing. Measured joint structure was the statistical methods have been applied to metapellite Mengkarang outcrop on the bed rock stream Muara Karing and then combine to structural orientation on geological map. Measured on object joint structure were comprise of determining orientation, measured of strike/dip joint plane such as shear joint and extention joint, dimension, and quantity of joint. The result measured on 150 joint datas sistematic on metapellite (ductile deformation) Mengkarang Formation, identified as shear joint 100 set and extention joint 50 set, then to obtain generally 3 sets joint orientation, which are north northeastern-south southwestern, east northeatern-west westsouthern (shear joint) and northeastern-southwestern (extention joint). Cross cutting relathionship have been indicated of extention joint older then shear joint. Analyzed to statistical joint datas have been obtain tectonic deformation on shear joint effect of regime compressional N 223OE, whereas extention joint were effect of regime compressional N 44OE. Based on analyzed joint on metapellite Mengkarang Muara Karing extend of implication tectonic deformation Mengkarang Formation. Furthermore tectonic deformation on Mengkarang which compressional regime northeastern-southwestern to interpreted have been effect of active tectonic Oligo-Miocene, similarly tectonic regime deformation Sumatera Island as rotational stress to applied of simple shear.*
Keyword: *genectic joint, Muara Karing, Merangin, tectonic deformation.*

INTRODUCTION

Sumatera have been subducted of active margin which of Hindia Oceanic to Eurasian Plate during Cenozoic (Oligocene-Miocene) the expected have been caused rotate of Sumatera Island, Hall (1997, 2002, 2014). Deformation of Sumatera Island on beginning which orientation east – west would be become northwestern – southeastern, Hamilton (1979) and Hall (1997) during Oligo-Miocene, Sidi (2000) within Barber (2005). Subducted process have been effect to variety of setting geology system tectonic, comprise of Sumateran subduction system, Mentawai Fault System, and Sumateran Fault System or Sumateran Fault Zone, Natadwijaja (2017) and Murauka et al. (2010). Reconstruction of 19 fault segment of Sumateran Fault Zona were active fault, Natadwijaja (2017) and Hall (2002). One of fault segmen associated Geopark Marangin Region (Muara Karing River) was Siulak segment or Siulak Fault.

Research area on the Muara Karing River especially on Geopark Merangin is national geopark in Jambi Province (Figure 1). Uniqueness of Geopark Marangin which existence of Flora Fossil aged of Permian (± 250 *Ma*). Flora Fossil on metapellite Mengkarang Formation, Suwarna et al (1992). Mengkarang Formation have gived name of Zwierzycki (1935) within Oktariadi and Suhendar (2014) and into the bargain Mengkarang Formation is very unique which form similarly inversed "U" curve to indicated of tectonic process controll of the oldest formation in Jambi (Prasetio et al., 2017).

Evidence of tectonic activity an area commonly structural geology have been recorded on the surface lithology, Ragan (2009). Suwarna et al. (1992), the existence of structural geology on Muara Karing River were sufficient gived of evidence (Figure 2). Muara Karing is one of drainage pattern to downstream Batang Marangin River which metasediment lithology (metapellite) on bedrock stream Muara Karing associated joint system refer to type of drainage pattern, Suwarna et al (1992) and Howard (1967). The existence of structural system on the becrock stream to indicated of tectonic deformation, that needed further analyze related. Comprehension joint sistematic have been producted to regime tectonic could be useful for to understanding deformation geohystory, Davis (1984). This research to emphasise on joints analyze on metapellite Mengkarang Formation have been using statistic method and combine to structure orientation on regional geological map, that can contribution to interpretate deformation of Muara Karing Geology.

REGIONAL GEOLOGY

Tectonic evolution in Sumatera have dominated existence Hindian Plate and Eurasian Plate, Hamilton (1979). This deformation would be cause strike slip fault of Sumateran Fault System in the beginning Early Tertiery, Hamilton (1979), Hall (2002), and Natadwijaja (2017). Sumatera Island have approximately 6 physiography zone comprise of

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Slight Hills and Wavy Land, Barisan Range, Sumateran Fault (Semangko Fault), Tigapuluh Hill, Outer Arc, and Sunda Shelf, Van Bemmelen (1939) and Tobler (1917) within Van Bemmelen (1949). Muara Karing is half Slight Hills and Barisan Range.

Figure 1. location map of research area on the Muara Karing, Marangin Regency

Suwarna et al. (1992) Muara Karing belonging to Mengkarang Formation which lithology of metasediment (metapellite) aged of Perm, the oldest formation in Jambi (Figure 2), this formation comprise of alternating of sandstone, siltstone, claystone, shalestone, tuff, and conglomerate, generally have been sheared, silicified, and metamorphisme and implied of limestone and coal. Mengkarang Formation have been land sedimentation to shallow marine, mud, low regime energy, near to magmatic/island arc. Distributed on Muara Karing River, Merangin, Ketiduran, and Titi Meranti half of Merangin Regecy, Jambi.

Structural geology commonly jonting, folding, and faulting which orietation of northwestern – southeatern and west-westeastern – east-southeastern. Characteristic fault have dextral strike slip, reverse fault on metasediment in Mengkarang Formation, Peneta Formation, Intrusion Pra-Tertiery. Folding locally on Telukwang Formation which dip slightly. Joint system the existence of metasediment adn intrusion Pra-Tertiery, Suwarna et al. (1992).

METHODOLOGY

Joint is structural geology that cracked/fissure plane without displacement on rock brittle and ductile deformation, Ragan (2009) and Collette (1974). Sistematic joints have made by tectonic stress, that sistematic joint elements could be interpretated of tectonic regime, Bull (2009) and McClay (1987). Joint system were simplified to recognizable, comprise of smooth surface plane, distance tread of joints, an orientation, related joint each other. This system would be release joints and extention joint, Ragan (2009). Joints commonly used to interpretation of tectonic regime stress, cause consistency on the research extensive area. Conscientiousness is very needed for processing data (joints), uncertainty on joints analyze of tectonic interpretation: unknow age formation, simple to reactifation, have not strain, and any probability mechanisme, Davis (1984). Sistematic joints have detectable on the research area Muara Karing River which metapellite ductile-brittle deformaton.

The present research was determined using two approach, which were measured to object identified and analyzed. Measured joints on metapellite Mengkarang Formation. Joints on metapellite have systematic, that simple detectable

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which shear joint (cross cutting joint/double joints) and extention joint (cross to shear joint). Measured of joints on metapellite have represetatived joints systematic to approximately 100 set shear joints and 100 set extention joints. Result of joints masured would be analyzed on streographic (streonet) which Dips application (software) and there have been using geological structural techniques to analyze and calculate these indices tectonic regime stress.

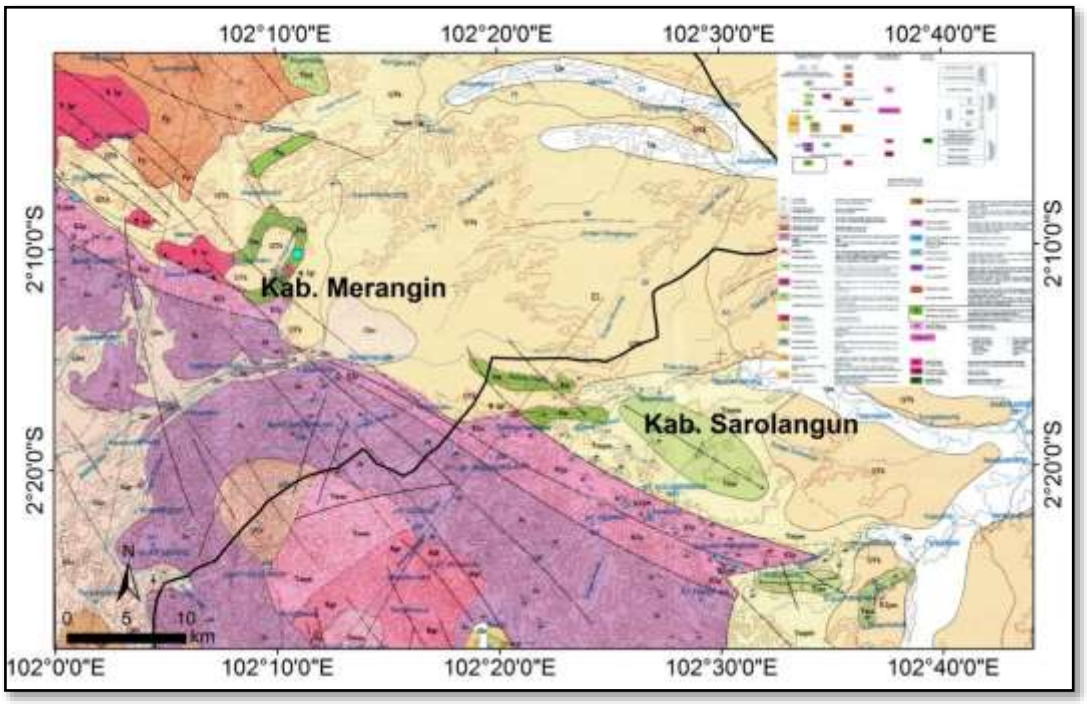

Figure 2. Research area on the Muara Karing river, it is half Mengkarang Formation. Regional geology, Bangko - Sarolangun sheet, modified from Suwarna, et al. (1992).

RESULT AND DISCUSSION

Measuring data in the field could be decreasing uncertainty, particularly to identified joints characteristic and ralathionship to cross cuttiong of joint plane. Metapellite Mengkarang Formation was focused research area, particularly Muara Karing River which extend on bedrock stream Muara Karing. Observation have been indicated 3 set joints comprise of orientation: shear joints (1) north-northeastern - south-southeastern, (2) east-northeastern - west-westsouthern, and extention joint (3) northwestern - southeastern (Figure 3a).

Shear joint on the set 1 and 2 have been refer to cracking plane dense, which dimension 0.2 – 0.5 m and distribution of joints were commonly break to extention joint. Joint set 3 (extention joint) have been indicated open cracking plane which approximately 0.1 - 0.5 cm, length dimension 1 - 2 m. Shear joint have been cutting extention joint (Figure 3b). Context between of shear joint and release joint have been indicated first phase extention joint and later shear joint.

Collecting joints data have done which process of sorting, 150 shear joint plane and 100 extention joint and later processing streographic analyze to shown on rossete diagram (Figure 4). Rossete diagram is representative, cause dip of joints plane relatively upright (70° – 84°) on extention joint whereas (66° – 80°). The existence shear and extention joint on metapellite which dip slight relativelly (12° – 28°) (See Figure 3). Contour diagram to show and assign information to exactly joints plane and regime stress/tectonic stree (Figure 5). The contour diagram to indicate that dip of joints plane were diffirent to dip of metapellite plane, that can be asessment all of joints plane have been still upright during joint formation and later rotate caused declivity dip layer of tectonic processes further.

Statistic analyze which rossete diagram and contour diagram have indicated first forming of extention joint which regime compression stress N 317° E, whereas extention joint forming of regime compression tectonic N 52° E and N 232° E (See Figure 3 and 4). Applicative to regional tectonic Muara Karing is half of Barisan Range and Sligthly Hills, refer to Van Bemmelen (1949). Regime extentional stress credibly origin tectonic stress Pra-Tertiery on the research area which extend area Jambi and surrounding, whereas regime compressional stress have been during Oligo-Miocene associated to forming of formation on Barisan Range and Tertiery sedimentation.

Setting tectonic regional Sumatera have been regime compression northwesten direction, whereas secondary regime compression tectonic east-northeastern and west-southwestern during rotation of Sumatera Island during Pra-Tertiery untill Tertiery Oligo-Miocene, that make of orientation island northwestern-southeastern present day tectonic setting. Tectonic compressional product to subducted of Australian Plate to Eurasian Plate to associated suture East Sumateran Block (Tapanuli Block) and Indochina Block, refer to Barber et al (2005).

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Figure 3. (a) Metapellite Mengkarang Formation on the research area, no 1 and 2 shear joint whereas 3 extention joint which 1) north-northeastern – south-southwestern 2) west-westsouthern – east-northeastern 3) northwestern - southeastern, (b) no. Joint refer to a, associated cross cutting between of shear joint to release joint.

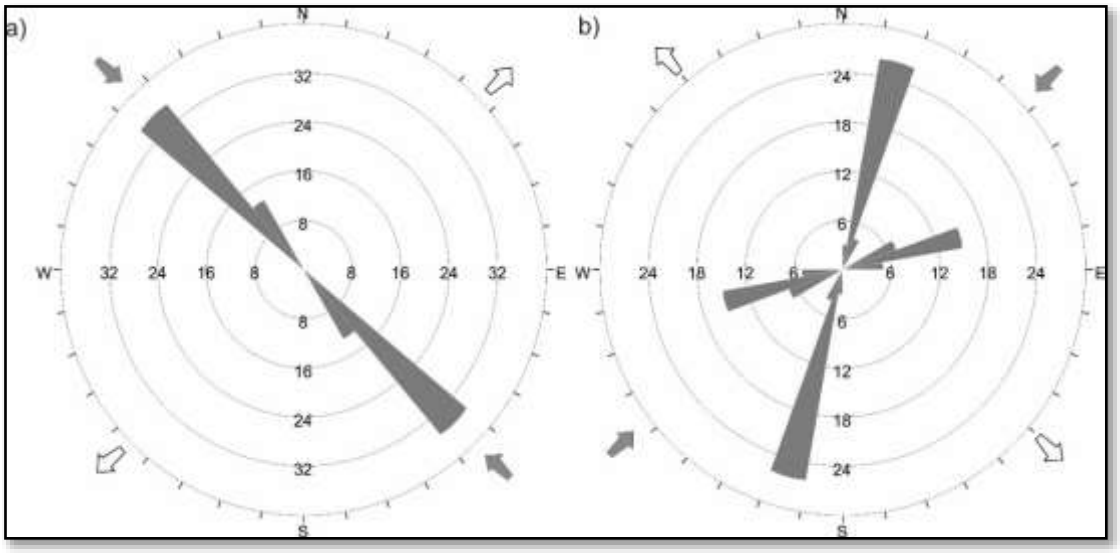

Figure 4. Rossete diagram (a) extention joint, (b) shear joint. Black arrow (compressional stress), white arrow (extentional stress)

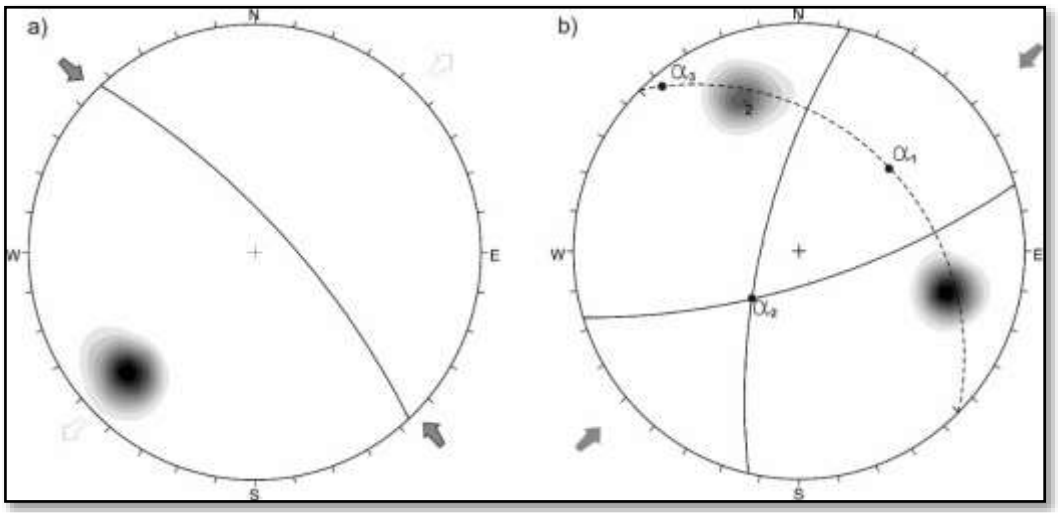

Figure 5. Contour diagram which equal area projection (a) extention joint, (b) shear joint. Black arrow (compressional stress), white arrow (extentional stress). Regime tectonic on Muara Karing to regional tectonic in the beginning

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extentional joint which compressional stress N 317° E and rotate regime stress and forming of shear joint which compressional stress N 52° E and N 232° E

CONCLUSION

Shear joint and extention joint on the metapellite Mengkarang Formation on Muara Karing River were credibly product of tectonic activity which the beginning extention joint which compressional stress N 317° E and further shear joint which compressional regime stress N 52° E and N 232° E, similarly to present day tectonic of Sumatera. Forming of joints have been impression by regional tectonic which extention joint have occured Pra-Tertiery and shear joint tectonic compression Tertiery.

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