PETROLOGICAL SIGNIFICANCE OF THE BASALT EXPOSED IN THE SOUTH OF YWATHAYAR VILLAGE, SAGAING TOWNSHIP

Zaw Win*

Abstract

The present study area is situated in Sagaing Township, Sagaing Region. This area is bounded by on the east by the Ayeyarwaddy River and on the west by the Shwebo-Monywa plain. The study area is bounded between N latitude 21° 57´ 30" to 21° 9´ 00" and E longitude 95° 57´ 15" to 96° 1´ 30", in one inch topographic maps of 84 $N/_{16}$ and 84 $O/_{13}$. This area is situated within the Central Cenozoic Belt. It is the part of the Mogok Metamorphic Belt. In the research area, small body of basaltic rock is lying between N latitude 22° 1´ 44.9", E longitude 95° 58´ 30.1". Rupture of the continental lithosphere by strike-slip-related (Sagaing Fault) transtensional deformation might have caused decompressional partial melting of the possible of deep seated crustal and generating alkali basalts (olivine basalt) in this region.

Introduction

Location, Size and Accessibility

The present study area is situated in Sagaing Township, Sagaing Division. This area is bounded by on the east by the Ayeyarwaddy river and on the west by the Shwebo-Monywa plain. The study area, lying between N latitude 21° 57´ 30" to 21° 9´ 00" and E longitude 95° 57´ 15" to 96° 1´ 30", is bounded by vertical grids 44 to 51 and horizontal grids 63 to 85 in one inch topographic maps of 84 $N/_{16}$ and 84 $O/_{13}$. This area is about 21.52 kilometers long and 6.896 kilometers width and covering of 148.4 square kilometers. Because of ease of communication, this region is easily accessible by car and by water throughout the year. The location map of the study area is shown in figure (1).

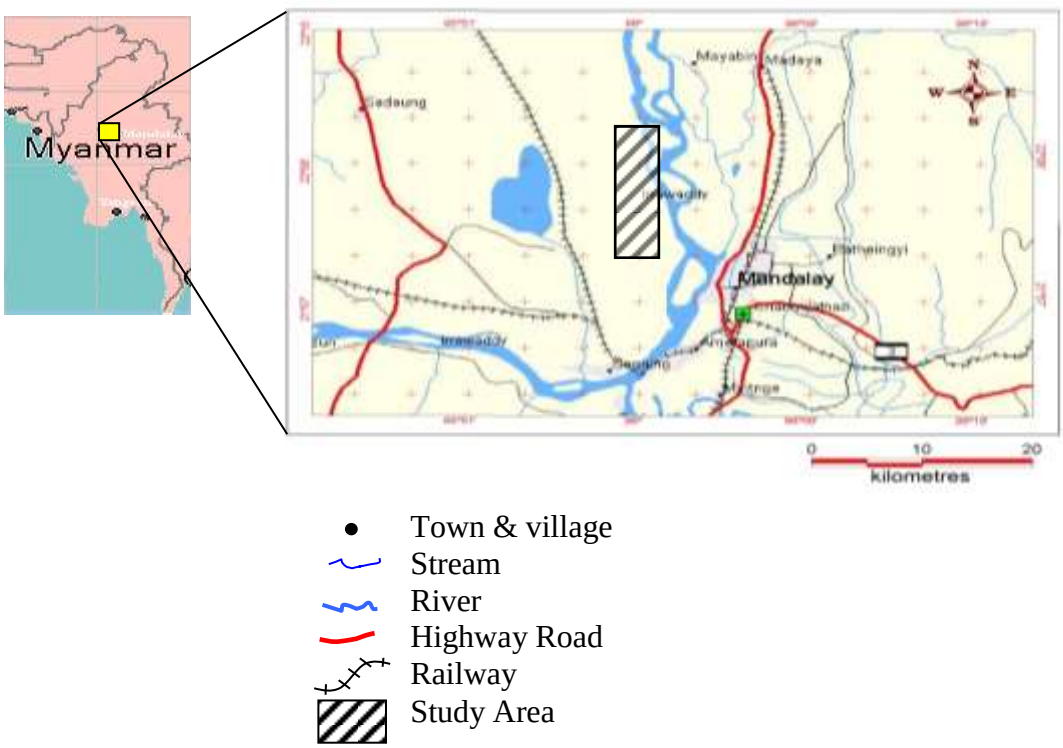

Fig. (1) Location Map of the Study area

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Physiograpghy and Nature of Exposure

The present studying of the Ywathayar-Taungyin area, lies approximately midway between the south-flowing Ayeyawaddy River to the east and to the west includes the Shwebo-Monywa plain. The most obvious topographic features of the area are parallel running the Minwun range in the west and the Sagaing ridge in the east of the study area. These two ridges are separated by the well-known Sagaing Fault which looks like the channel or valley trending the north south direction. Sagaing Range is one of the prominent topographic features in the study area that occupies the central part of the study area, and shows ridge and valley nature, trending N-S direction.

The western part of the study area includes the northern continuations of the Minwun range showing the rolling hills and low lying area in the western part of the study area. The Minwun range in the study area is not prominent topographic features and shows the low-lying nature.

The study area is covered by moderately sparse vegetation of thorn-scrubs and bushes at Minwun range. The research area is a tropical climate and little rain fall. In the western part of the study area, intermittent streams flow from the central part to westward direction, and to the Ye Myet Inn.

The metamorphic units of the Sagaing range are cropped out at the highest mountain range of the study area especially in the central part of the study area. In the Minwun range, the chlorite schist, actinolite schist and garnet muscovite schist unit occurs as the rolling hill and low-lying form. Some highly brecciated limestone blocks, trending the NE-SW direction, scatter throughout the whole length of the Minwun range.

The igneous rocks of the serpeninite occur along the fault line at the south of Yega Inn and north-east of the Taungyin village. Small body of basalt exposed at the ½ mile north of the Ywathayar village.

Purpose of the study

The principle purposes of the present geological investigation include:

1. To construct the detailed geological map of the area,
2. To study the lithology and stratigraphy of the rock units exposed in the area,
3. To describe the petrography of the rock units of basaltic dyke,

STRATIGRAPHY OF THE STUDY AREA

General Geology

Geotectonically, the present study area lies in the Central Cenozoic Belt of Myanmar. The general geology of this region is not simple to define a complete sequence. The Minwun and the Sagaing metamorphics are occupied by two contrasting lithologic assemblages. The Sagaing is characterized by its calcareous and pelitic classes of metamorphics and the Minwun metamorphic rocks contain basic and pelitic metamorphics with substantial outcrop of clastic and fault transported limestone blocks. The former are found in the region east of the Sagaing fault while the latter are exposed in the west of the fault.

A mappable sized serpentinite body has been observed at the western bank of Yega Lake. Recently, a little of basalt has been found near the Ywathayar village.

The geological age of the metamorphic units are considered as most probably Mesozoic and Lower Paleozoic for the Minwun and the Sagaing metamorphics, respectively (Fig. 2 and Table 1).

Description and distribution of rock sequences

In the study area, rock units contain metamorphics, sedimentary and igneous. The metamorphics are gneiss, marble, calc-silicate, mylonitized limestone, amphibolite and schist

and those of sedimentary include sandstone, siltstone, mudstone, shale and limestone. Then, igneous include serpentinite and basalt. Thirteen major rock units which generally becomes younger eastward (unit 1-4) along the Sagaing ridge and the ten units become younger westward (unit 5-14) along the Minwun range have been recognized.

Table(1) Stratigraphic succession of the Sagaing - Minwun area
Sedimentary and Metamorphic Rocks

	Alluvium		Recent
		Unconformity	
14	Pleistocene Gravel		Pleistocene
13	Irrawaddy Formation		Pliocene
12	Kyaukta Formation		Upper Miocene
		Unconformity	
11	Chlorite Schist	Minwun Metamorphic	Triassic?
10	Actinolite Schist		
9	Ganet muscovite/ biotite Schist		
8	Amphibotite		
7	Serpentinite		
6	Mylonitized Limestone		
5	Basalt		Pliocene
		Unconformity	
4	Banded hornblende gneiss/ Biotite gneiss/ Leucogneiss	Sagaing Metamorphics	Ordovician?
3	Phlogopite - diopside – forsterite/ Phlogopite - diopside marbles		
2	White marble		
1	Calcsilicates		

Metamorphic rocks

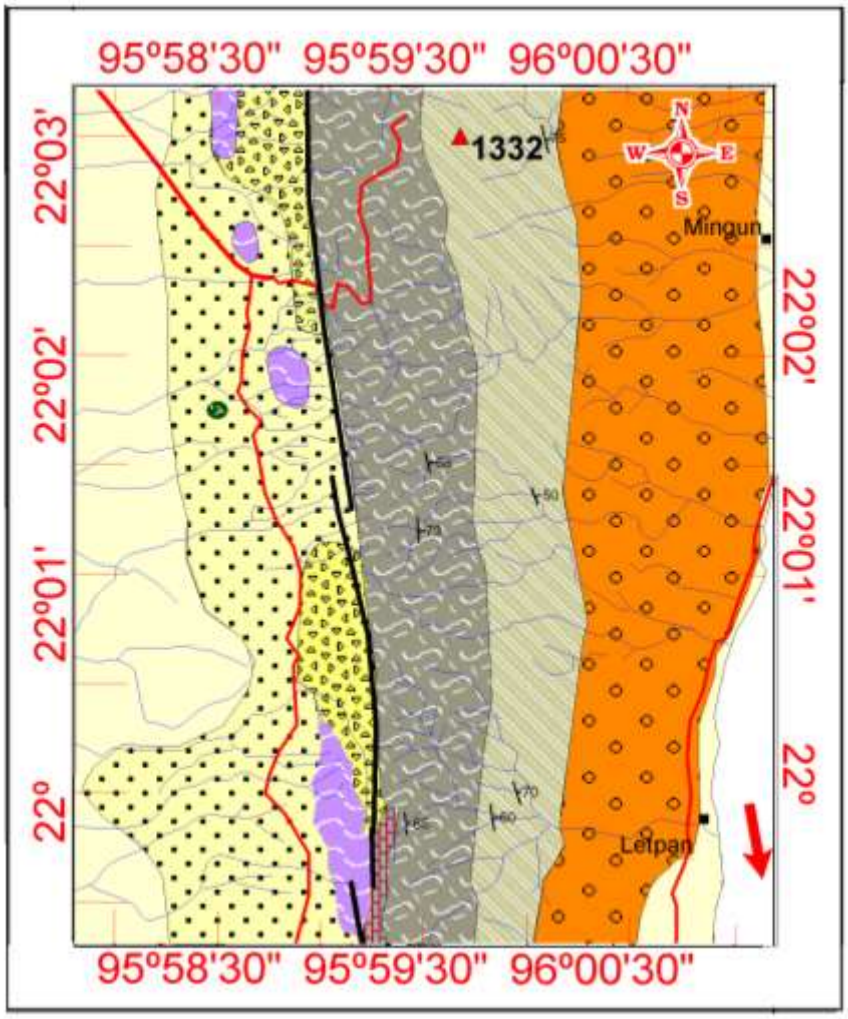
Metamorphic rocks of the study area are described under the names:

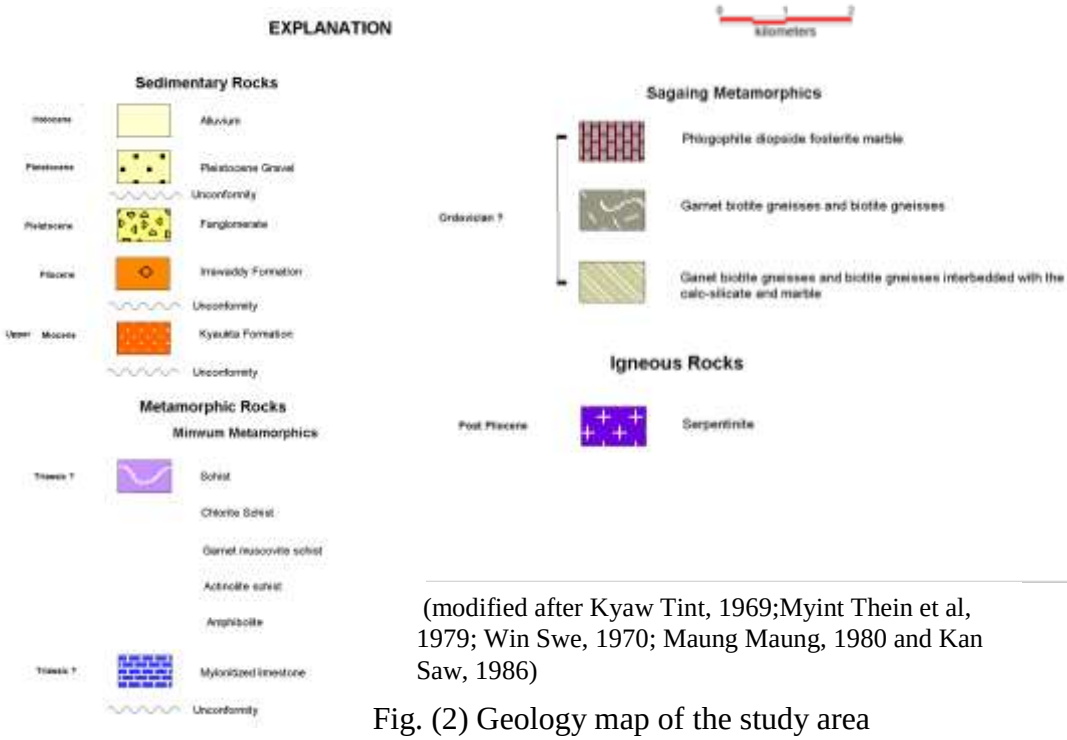
(1) Sagaing metamorphics which are located on the E of the Sagaing fault, and

(2) Minwun metamorphics which occupy the region W of the Sagaing fault.

The main rock types comprising the Sagaing metamorophics are gneiss, calcsilicate rocks and various of marble. The major rock types in the Minwun metamorphics are schist and mylonitized limestone.

PETROLOGICAL SIGNIFICANCE OF THE BASALT EXPOSED IN YWATHAYAR TAUNGYIN AREA





(modified after Kyaw Tint, 1969;Myint Thein et al, 1979; Win Swe, 1970; Maung Maung, 1980 and Kan Saw, 1986)

Fig. (2) Geology map of the study area

Igneous rocks

In this area, igneous rocks include serpentinite and basalt.

Serpentinite

A small body of serpentinite has been observed at the south western bank of the Yega Lake. The common serpentine minerals in this rock are antigorite and chrysotile. In outcrop, the serpentinite is in contact with chlorite schists in the southern end and with sandstone of the Kyaukta Formation in other parts. Serpentinite veins network form a well-defined mesh structure in hand specimens.

Basalt

A small body of basalt is exposed at the north of the Ywatharyar village. This outcrop is located at her western bank of the Sagaing fault and on the Minwun range. On weathered surface, basalt is buff colour and light grey colour on fresh surface. This rock is fine-grained, hard and compact (Fig. 3 and 4).

Fig.(3) Photograph showing the basalt overlies the actinolite schist at the ½ mile north of the Ywathayar village (looking west) (N latitude 22º 1´ 44.9" and E longitudes 95º 58´ 30.1")

Microscopic Study

The essential minerals are plagioclase feldspar and volcanic glass. The groundmass is mainly composed of nearly dark colour volcanic glass and plagioclase microlites. Intersertal texture is common. The main constituent mineral of plagioclase feldspar shows trachytic and pilotaxitic textures. Plagioclase microlites are prismatic and have composition within labradorite range. The size of the feldspar of the groundmass is medium and it shows penetrated twin. Feldspars are euhedral to subhedral outline which set in the hypocrystalline. A lot of calcite veinlets are common (Fig. 5 and 6).

Fig. (5) Microphotograph showing the calcite vein cut across the groundmass of basalt (Under XN)

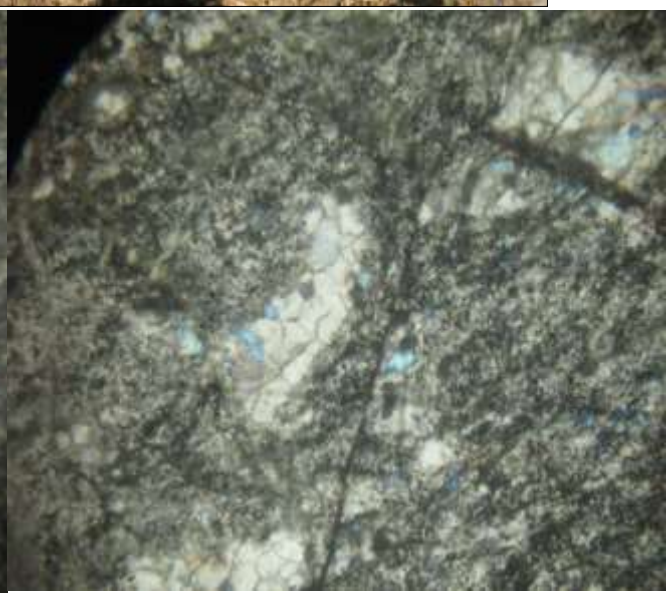


Fig. (6) Microphotograph showing the feldspar laths and calcite minerals in the basalt (Under XN)

TECTONIC CONTROLS OF MAGMATISM

The well known Sagaing Strike-slip fault separates the region into two, namely, the Shan-Tanintharyi massif to the east and the Central Myanmar Basin to the west. The study area has been separated from those of the Central Myanmar Basin.

The setting and origin of the alkalic basalt are also rather unusual. Concerning this, there are other well-known examples of Quaternary volcanics emplaced along major strike-slip faults in oblique convergence settings.

The case of basalts (and probably also of the Tigyaing and Yezin alkali basalt flows also located along the Sagaing fault) is different because they are obviously not of subduction related affinity, but is more likely to have derived from the melting of deep enriched mantle. We suggest that these alkali intraplate lavas could result from the melting of deep mantle affected by a high thermal regime followed by their rapid uprise along the Sagaing fault and associated structures.

At the north of the study area, the Singu lava (vesicular basalts) and Tagaung-Twinge area in Thabeikkyin Township, the basaltic lavas are firstly assumed to be oceanic in origin. This assumption is provided by the occurrence of predominate pillow basalts and

sedimentary association. Most basalts are closely associated with the deep-sea sediments of pelagites and graywakes.

Rupture of the continental lithosphere by strike-slip-related (Sagaing Fault) transtensional deformation might have caused decompressional partial melting of the possible of deep seated crustal and generating alkali basalts (olivine basalt) in this region.

Conclusion

The present study area is situated in Sagaing Township, Sagaing Division. This area is lying between N latitude 21° 57´ 30" to 21° 9´ 00" and E longitude 95° 57´ 15" to 96° 1´ 30", is bounded by vertical grids 44 to 51 and horizontal grids 63 to 85 in one inch topographic maps of 84 $N/_{16}$ and 84 $O/_{13}$.. A small body of basalt is exposed at the north of the Ywatharyar village. This outcrop is located at her western bank of the Sagaing fault and on the Minwun range. Rupture of the continental lithosphere by strike-slip-related (Sagaing Fault) transtensional deformation might have caused decompressional partial melting of the possible of deep seated crustal and generating alkali basalts (olivine basalt) in this region.

Acknowledgements

I wish to express my sincere gratitude to valuable criticism, Rector Dr. Maung Maung Naing; Pro-rector of Dr. Si Si Khin and Dr. Tint Moe Thu Zar, Yanadabon University. I am deeply indebted to Professor and Head of Department of Geology, U Hla Moe in Yadanabon University, for his kind permission and advice to carry out this research work.

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