

**SEDIMENTARY FACIES AND PROVENANCE OF
EOCENE CLASTIC STRATA OF AKYIBAN-KYIN
AREA IN TILIN TOWNSHIP, MAGWAY REGION**

PhD DISSERTATION

KYAW KHAING

**DEPARTMENT OF GEOLOGY
UNIVERSITY OF YANGON
MYANMAR**

MARCH 2020

ABSTRACT

The present study mainly focuses on the sedimentary facies and provenance of Paleocene-Eocene clastic strata exposed in the Akyiban-Kyin area. The study area is situated at 16 km east of Tilin, Magwe region. It is located between Latitudes $21^{\circ} 36'$ N and $21^{\circ} 44'$ N and Longitudes $94^{\circ} 09'$ E and $94^{\circ} 17'$ E in UTM-No 2194-02 and 2194-06. It lies at the northernmost part of the Minbu Basin. Five lithostratigraphic units such as the Kabaw Formation (Cretaceous), Paunggyi Formation (Early Eocene), Laungshe Formation (Early Eocene), Tilin Formation (Early Eocene) and Tabyin Formations (Middle Eocene) are present. However, the present study mainly emphasized on the sedimentary facies and provenance of three lithostratigraphic units such as Paunggyi, Laungshe and Tilin Formations. According to the petrographic study and geochemical classification of sandstone pointed that most of the Paleocene-Eocene sandstone are litharenite. According to the QFL, QmFLt, QpLvLsm and LmLvLs triangular diagrams, this sandstone were derived from the recycled orogeny, transitional recycled and quartzose recycled provenance, Magmatic Arc, Mix Magmatic Arc. According to the geochemical analysis on the Paleocene-Eocene sandstones, the sediments of Paunggyi sandstone derived from intermediate and mafic igneous origin and Laungshe sandstone represent mafic igneous origin. They were derived from active continental margin. Tilin sandstone is quartzose sedimentary origin and derived from active continental margin. The chemical index of alteration and chemical index of weathering indicate that the Paunggyi sandstone displays very low degree of chemical weathering, Laungshe sandstone reveals extreme chemical weathering and Tilin sandstone shows the moderate chemical weathering as indicated by A-CN-K diagram. By the sedimentary facies analysis, twenty-three lithofacies can be identified from outcrop observations in the Akyiban-Kyin area. The four lithofacies associations such as prodelta association, delta front association, delta top association and fluvial association are encountered based on the lithofacies assemblages and their characteristics. According to their diagnostic feature and sedimentary structures, the depositional environment of Paleocene sediments is fluvio-deltaic environment and Eocene sediments are shallow marine deltaic environment. Based on the depositional environments, four large cycles are found in the Paleocene-Eocene sequence of the study area. In the Cycle I, Lowstand System Tract consists of coarsening and thickening upward deposition of fluvial sediment. The Cycle I is terminated by the deposition of very thin- to thin bedded in the delta

top environment. So, sea-level gently rise and fall in the study area. In the depositional pattern of Cycle II, the Regressive System Tracts are thicker than transgressive system tract. So, sea-level suddenly rise and slowly fall in this cycle. In the Cycle III, the sea-level gently rise and fall according to the symmetrical pattern of system tracts. The controlling factor of the sedimentation of the Cycle III is the eustatic sea-level. In the Cycle IV, transgressive sediments are composed of thick- to very thick- bedded sandstone. So, the sediment supply is too high at the deposition time of Cycle IV. The sediment supply supported to the shifting of the coast line during the time of Paleocene-Eocene.

CONTENTS

CHAPTER	PAGES
ABSTRACT	i
ACKNOWLEDGEMENTS	iii
LIST OF FIGURES	
LISTS OF TABLES	
I INTRODUCTION	1
1.1 Location, Size and Accessibility	1
1.2 Pysiography	1
1.3 Previous works	3
1.4 Purpose of Study	4
1.5 Method of Study	4
1.6 Regional Geologic Setting	5
II GENERAL GEOLOGY	9
2.1 Introduction	9
2.2 Description of Stratigraphic Units	9
2.2.1 Paunggyi Formation	9
2.2.2 Laungshe Formation	15
2.2.3 Tilin Formation	18
2.3 Geological Structures	20
2.3.1 Description of Faults	22
2.3.2 Cross Fault	22
2.3.3 Description of Folds	22

CHAPTER	PAGES
III SEDIMENTOLOGY AND GEOCHEMISTRY	24
3.1 Petrography	24
3.2 Methods of study	24
3.3 Petrography of the rock units	26
3.3.1 Paunggyi Formation	26
3.3.2 Laungshe Formation	30
3.3.3 Tilin Formation	34
3.4 Provenance Study	38
3.5 Geochemistry	41
3.6 Geochemical Classification of Sandstones	41
3.7 Source Rock Lithology and Tectonic Provenance	48
3.8 Geochemical Weathering of Source Area	51
IV SEDIMENTARY FACIES ANALYSIS	58
4.1 Introduction	58
4.2 Description and Interpretation of lithofacies of Paunggyi Formation	58
4.3. Description and Interpretation of lithofacies of Laungshe Formation	67
4.4 Description and Interpretation of lithofacies of Tilin Formation	74
4.5 Facies Associations	87
4.5.1 Prodelta facies association	87

CHAPTER	PAGES
4.5.2 Delta front facies association	88
4.5.3 Delta top facies association	88
4.5.4 Fluvial facies association	89
4.6 Sedimentological Evolution	89
V SEQUENCE STRATIGRAPHY	92
5.1 Introduction	92
5.2 Background Theory	93
5.3 Sequence Stratigraphic Implication	96
5.3.1 Maximum Flooding Surface (MFS)	97
5.3.2 Maximum Regressive Surface (MRS)	97
5.3.3 Lowstand System Tract (LST)	98
5.3.4 Transgressive System Tract (TST)	98
5.3.5 Highstand System Tract (HST)	99
5.3.6 Regressive System Tract (RST)	99
5.4 Interpretation of Sequences and Dynamic Sedimentation	100
IV SUMMARY AND CONCLUSION	109
REFERENCES	112