## ABSTRACT

The systematic research on geology and the planktic foraminiferal biostratigraphy which is the first kind in the region, was carried in the onshore area of the Northwest Borneo Basin, Sarawak, with a coverage of 6420 $km^2$. Detailed geological mapping with a scale of 1: 10,000 was carried out along the traversed route in the area; described outcrops in detailed and also collected mudstone samples for the planktic foraminiferal analysis; in attempt to establish a formal stratigraphic unit based on lithology and planktic foraminiferal biostratigraphy. In the present investigation, the old tectonic concept of the geosyncline depositional model are being replaced with the current tectonic concept of the plate subduction and migration to describe and interpret the geology of the area.

The State of Sarawak and the adjoining areas of the Northwest Kalimantan had undergone various stages of deformation since Cretaceous and this resulted in the development of several tectonostratigraphic units namely; i) Pre-Cretaceous Borneo Basement, ii) Early Cretaceous Mélange, iii) Folded Rajang Group, iv) Isolated Basin, v) Neogene Peripheral Basin and vi) Luconia Block. Each unit is having its own deformation style and sedimentation history. The tectonic scenario is dominated by the development of the Early Cretaceous and Paleogene accretionary prisms in response to the broadly south directed subduction of the oceanic lithosphere in Early Cretaceous and continued in Late Eocene. During the Late Eocene, there was a regional deformation and uplift, is termed as the Sarawak Orogeny; major faults such as Lupar, Sebangkoi and Mersing were developed during that time. The study area, the Northwest Borneo Basin is a part of the Neogene Peripheral Basin was developed after the Sarawak Orogeny, formed when the eroded sediments of Southwest Sarawak block were deposited along its northwestern periphery.

Liechti et al (1960), attempted to establish a proper stratigraphic unit in Northwest Borneo Basin even though there was no proper stratigraphic guide. As the result the lithostratigraphic unit established is confused with biostratigraphic and geochronologic unit, with an interfingering boundary with other units, have created a controversial issue of the geology of NW Sarawak. Besides, there was no descriptions for the formal type section, type locality, type boundary and total thickness of the lithostratigraphic unit. Therefore the nomenclature is considered informal with respect to the provisions stipulated by the International Subcommission of Stratigraphic Classification (ISSC), 1994. The present study, is therefore aimed at describing a lithostratigraphic unit that is totally based on the lithologies, physical characters and the stratigraphic positions of the sediments. As the result of the present investigation; the formal lithostratigraphic units established are: Suai, Sibuti, Lambir and Miri Formations. The geological boundaries between Suai and Sibuti is fault contact,

Sibuti and Lambir is a disconformably contact whereas the contact between Lambir and Miri is also interpreted as a fault contact. Suai Formation comprises mainly regionally metamorphosed bounded shale and shaly alternation; Sibuti comprises mainly mudstone and shaly alternations; Lambir comprises mainly sandy alternation and Miri Formation comprises of sandy alternation. Suai Formation is being the oldest, occurs at the lower stratigraphic level. The Suai Formation is successively overlied by the Sibuti, Lambir and Miri Formations.

One of the main thrusts of this study is also to analyse the planktic foraminiferal content of the established lithostratigraphic units of Suai, Sibuti, Lambir and Miri Formations. Fossiliferous mudstone samples were collected and analysed for the planktic foraminifers. The previous works on the planktic foraminifers from the Sibuti Formation by Banda (1994 and 1995) were also incorporated into the present work. A total of 42 species belong to 10 genera of planktic foraminifers were recovered from the Sibuti, Suai and Lambir Formations. Based on the planktic foraminiferal analysis of the first and the last appearance of the species, there are three zones established namely: i) *Globigerina binaiensis,* ii) *Globigerinoides sicanus* and iii) *Orbulina suturalis-Globorotalia (Turborotalia) peripheronda* Partial-range Zones. The Suai Formation is within the *Globigerina binaiensis* Zone is early Early Miocene in age, the Sibuti Formation is within the *Globigerinoides sicanus* Zone is Mid Early Miocene in age and whereas the Lambir Formation is *Orbulina suturalis-Globorotalia (Turborotalia) peripheronda* Partial-range Zone is early Mid Miocene in age. There is no zone assigned for the Miri Formation since it is barren of planktic foraminifer, however the age assigned by Liechti et al (1960) based on benthic foraminifers is Mid Miocene to Pliocene is still adopted in this report. This unit, based on the stratigraphic position, made a fault contact with the underlying the Lambir Formation.

As the result of this study, the lithostratigraphic units in the Northwest Borneo Basin are properly dated to have been deposited during Early to Mid Miocene, and also correlated with other unit with the region and also other regions in the world. Based on the faunal distribution, lithology and tectonic, the sediment of the Northwest Borneo Basin was deposited in lagoonal basin during early Early Miocene, however during late Early Miocene the environment was a shallow sea open sea with a carbonate build up. During the Middle Miocene-Pliocene, the environment of deposition was changing to a shallower sea and a deltaic environment. The basin was inverted during the Late Miocene-Pliocene Orogeny.

**Keywords:**

Biostratigraphy, geology, geotectonic framework, lithostratigraphy, planktic foraminifers, Malaysia, Northwest Borneo Basin, Sarawak