Tin Exploration in Offshore of West Karimun-Kundur Island

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Introduction

Karimun-kundur islands are located in Riau archipelago as a part of a tin belt which extends from Myanmar in the north through Malaysia, Singkep, Bangka, and Belitung island in the southern end (Figure 1). The Karimun-kundur islands are also a part of granite island chain that emerged within the tin belt. The dating from the granite indicates Upper Triassic age and since then a lot of tectonic activities have taken place creating large variation of structural features which then influence the deposition of Quaternary tin deposit. The tectonism was intensively occurred in Pre-Tertiary time (Katili, 1980) which was predominated by compression due to subduction processes. This structuring later control the younger structures within the study area.

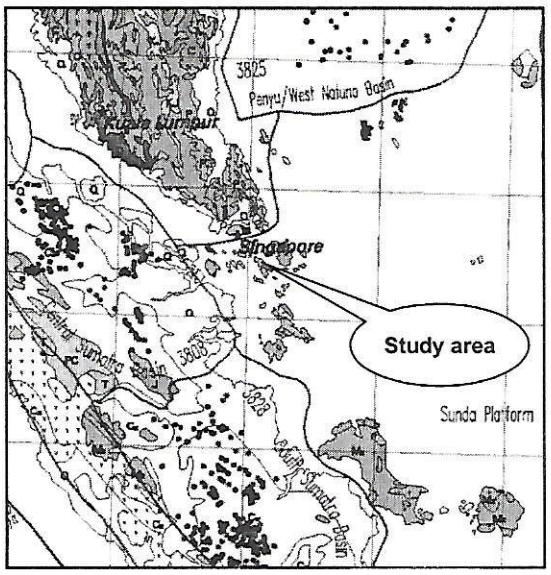


Fig 1: Location map of the study area

In western Kundur (Lalang island area), there are some small granite islands that act as the sedimentary source rock. Structural reconstruction of the pattern of these islands show plausible structural orientation which is also aligned with the bathymetry. The water depth tends to be deeper in the northern portion which indicates that the Lalang island area was previously a paleo high in the past.

Geophysical surveys had been undertaken within the study area, such as seismic reflection and magnetic. The seismic data quality was not satisfactory due to shallow surface condition, whereas the magnetic survey provided a better outcome. The most plausible interpretation of the magnetic dataset revealed that the basement was formed by granitoid and metasediments.

Exploration Methods

Based on those analyses above, it is predicted that the weathering and pattern of Quaternary deposits will most likely follow the structural pattern and form an alluvial-fluvial depositional systems. The exploration methods are then focused to pursue the mother rock through gravel-patch-hunting for the alluvial deposits and valley hunting for the fluvial sediments.
Normally, exploration drilling is initially conducted on a coarse grid, sort of 800 x 800 meters, and then followed up on the second phase with finer grid, 200 x 400 meters if warranted. For development purposes and reserve calculations, drilling grid of 100 x 100 meters or even 50 x 50 meters is definitely required.

Alluvial System

Alluvial deposits have been formed as residual deposits surrounding the Lalang island whereas the fluvial system runs northward from this source area. The exploration effort has been extended to a larger focus and revealed that the deposits in the northern area show a better grade of tin. However, the depth of the basement and the water-depth are also increasing northward.

The E-W structural feature in the northern part of Laut Kanipaan seems to be the controlling element of the tin deposits. Cross-section (Figure 2) shows that the tin in the middle layer (fluvial deposits) is characterized by sub-rounded to sub-angular fine to medium sands. Below this layer, the sediments are poorly sorted and vary between sand to clay in grain size. This layer is interpreted to be mass flow deposits (Moechtar, 1994). Further to the northern end (Laut P. Tambelas), drilling section shows transition deposits above the mass flow layer. The paleo coastline then is interpreted to be somewhere between Laut Kanipaan area to Laut P. Tambelas area.

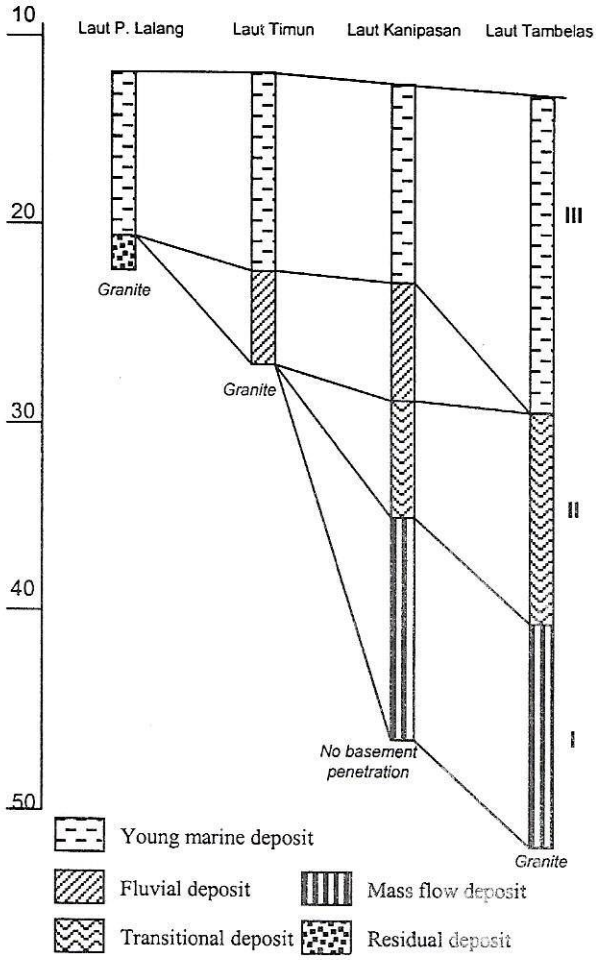


Fig 2: Cross-section showing facies correlation in Kundur offshore

Therefore the focus of the northern area is the mass flow layer through mother rock hunting and gravel patch hunting. The obstacle for this deposit is its localized distribution.
Southward of Kundur, the mass flow deposit is thin and has poor tin contents. This is explained by discrepancy of source rock which is more towards muscovite-biotite-leucratitic granite (Moechtar, 1994).

Recent study (Moechtar, 1999) resulted in a division of cycles within Quaternary (Figure 3). In offshore Kundur, dry to sub-humid condition was recorded by the development of mass flow deposits (Facies I). The presence of this deposit indicated tectonism had occurred prior to Quaternary and weakened during Quaternary. Sub-humid to humid allowed fluvial deposits to be developed. The water volume then increased

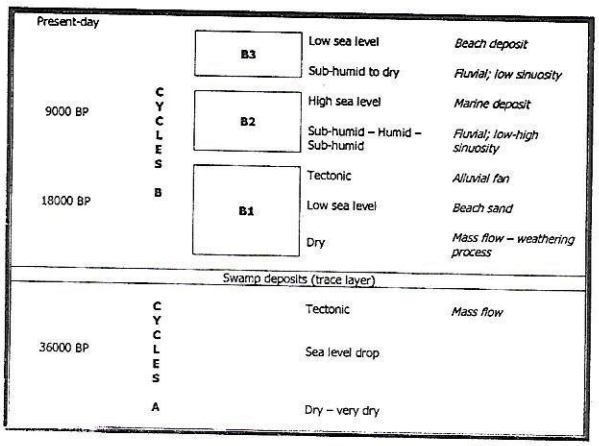


Fig 3: Division of cycles within Quaternary in relation with depositional environments

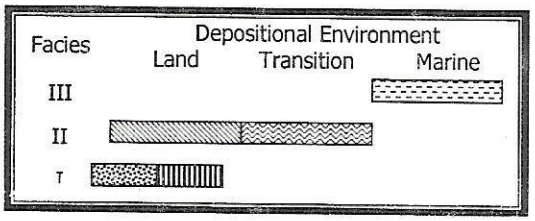


Fig 4: General facies distribution in Kundur offshore

(Facies II) and transitional deposits marked the maximum sea-level rise. The succession was then followed up with marine deposits (Facies III).

Closing

Although the character of Quaternary deposits within the study area has been very much understood, there are still rooms for refinement and breakthrough concepts. Detail analysis of the dynamic of Quaternary succession might lead to better understanding in delineating the present of tin deposits.

References

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