The onshore North Sarawak Basin: Stratigraphy, basin evolution and economic potential

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The onshore North Sarawak Basin (NSB) comprises of three thick unconformity-bounded lithostratigraphic units, each with its own sedimentological characteristics and structural style and history. The depocenters of these units successively shifted northwards. A trend towards a simpler structural style is also observed in the same direction.

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The oldest unit is the intensely folded Late Cretaceous-Middle Eocene shale-turbidite sandstone sequences forming the Rajang Group, now exposed as the arcuate Rajang Mountain range. Inliers of this Group outcrop to the north of the Rajang range in the Mulu-Temala Anticlinorium. Paleontological and sedimentological evidence suggest deposition occurred in a relatively deep marine setting. Basin inversion with concommittent folding and thrusting affected this unit in the Late(?) Eocene. Subsequent erosion of this unit allowed it to be the basement for the younger sequence.

The second unit is the Middle Tertiary succession which represents the infill of an alluvial valley and shelf initiated in Late Eocene times. Along the southern margin of this basin, massive shedding off the Rajang hinterland resulted in a relatively short phase of alluvial deposition followed by an extensive deltaic sedimentation and progradation. Thick proximal deltaic facies showing repetitive coarsening upwards, coal bearing sequence were formed, while the finer fractions were redistributed as muddy components on the shelf and near-shore sediments.

The earliest marine incursion occurred along this margin and subsequently spread southwards by Late Oligocene times. This basin is characterised by the development of broad shelf with tracts of shelf sands, carbonate shoals and reefs. The earliest carbonate bodies were developed unconformably on areas of up-lifted basement while the younger Miocene carbonates were formed on topographic highs composed of sand shoals and islands.

Sedimentation of he middle Tertiary succession were terminated in late Miocene by the onset or regional tectonic events that caused the inversion of the eastern and southern margins of the basin. A new depocenter created in the north saw the influx of coarser clastics of the Lambir, Beliat and Miri Formations. These thick sand-prone formations were deposited in coastal environments. The Lambir Formation represent the initiation of the Baram delta deposition. Northwards migration of the Baram delta led to the deposition of the Miri formation which were then unlifted in the Pliocene(?).