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Geology and play types of Malay Basin western margin

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Basin development in offshore areas east of Peninsular Malaysia by crustal extension began in Late Eocene due to a number of structural mechanisms triggered by the collision of Indian indenter against South Asia towards the west, that propagated extrusion tectonics of Indo-China (Tapponier *et al.*, 1982 and 1986) and clockwise rotation of SE Asia (Daly *et al.*, 1992).

West of the Malay archipelago included from north to south the Pattani Basin (and numerous Thai Cenozoic intermontane basins), Pilong sub-basin, Malay Basin centre, Southeastern Malay Basin and Angsi-Duyong sub-basin and, further to the south is the Penyu sub-basin. These are characterised by dominantly N-S faulting in the north (over Patani Basin and various intermontane basins and Pilong sub-basin), and provinces of early E-W trending grabens and overlying Middle to Late Miocene E-W trending compressional anticlines. There are various evidences to suggest the presence of deep seated reverse faults that provide suggestions of

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crustal wrenching. The study area in the western flank of the Malay Basin has been divided into Northwestern Platform, Kelantan ramp, Terengganu ramp, and Tenggol Arch.

Based on interpretation of 1993 deep regional seismic lines, it is found that the asymmetry of the basin found across the basin centre is not present towards the north and this has implications on the migration of the hydrocarbon towards the western flank. The presence of seismic amplitudes and seismic packages suggesting sand development has supported the possibility of plumbing towards both side of the basin margin.

During Oligocene-Miocene times, the inter-play between sea-level changes and structural subsidence is an important element along the steep western hinge line. Across the hingeline, there are geometric packages akin to slopefans with prograding complexes (lowstand) and transgressive systems tracts, although the packages were deposited largely within continental setting with restricted marine influences. As a result of the so-called yo-yo tectonism, the Middle Miocene sequences occurring more along the western ramp areas were deposited within an overall transgressive system tract which possibly also contain several layers of lowstand wedges. Additionally, the overall transgressive Middle Miocene sequences is important in providing regional seal overlying stratigraphic pinchout plays.

While a number of oil fields have been discovered on the eastern flank in traps formed by N-S basement-controlled faults, graben controlling faults and stratigraphic plays, the western flank appear to be noticeably lacking in the N-S faults. Traps are however found as drapes over topography formed by lowstand stratigraphic sands close to the basin margin, drapes over horsts blocks close to half grabens and over older synrifts (Northwest Platform and Tenggol Arch respectively). Fault traps are related to older basement faulting (Kelantan ramp), or younger strike-slip inversions near the grabens. Sedimentary traps are related to stratigraphic pinchouts (Terengganu ramp) and lowstand wedges (Kelantan ramp). Deeper prospects are present across the basin hinge but are highly dependant on poroperm, organic maturity and high pressure.