

BASIN MODELING OF MALAY BASIN EASTERN FLANK FOR PREDICTION OF SOURCE ROCK POTENTIAL

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The offshore eastern flank of Malay Basin is considered a challenging phenomenon for petroleum exploration in the synrift plays. The large amount of quality data from Petronas provides an opportunity to reduce the uncertainty in geological risks to exploration success in these deep plays. The application of basin modeling technique such as PetroMod in petroleum exploration giving us the ability to illustrate petroleum generation history of potential source rocks in our study area. The 1-D basin modeling was carried out on 12 calibration wells in the eastern flank of Malay Basin with an objective to investigate the presence of mature source rock and hydrocarbon charging in the study area. The red-dotted box in Figure 1 shows the location of the study area where the structural setting is severely affected by the tectonic evolution of the basin.

Temperature data for calibration of present-day temperatures in the wells were obtained from the log header and the data were generally of good quality. Those data were corrected using published methods, and results were generally consistent and reasonable. Most of the wells drilled in this block have penetrated the K and L groups and a few wells have penetrated the basement. Models were constructed within the PetroMod software program in the standard ways. The stratigraphy within each well was constructed as burial history by using the top formation depth and age. The deposition of all the stratigraphy in this area is based on the Regional Malay Basin Stratigraphic Chart (Figure 2).

Two source rocks were considered in this study: the Group L-Shale deposited during synrift episodes are widely interpreted

as offshore lacustrine and the Group I that was deposited in the fluvial-deltaic environments (Madon et al., 1999). Hydrocarbon generation in Group L-Shale source rocks was modeled using Pepper and Corvi (1995) _{TI(C)}, which should be appropriate for these source rocks. The Group L-Shale source rock was generated at 12.5Ma and significant oil generation was initiated at around 10.5Ma. The expulsion of large amounts of oil began at about the same time of the oil generation. This has allowed the oil to be trapped in the entire formation group (Epic Study, 1994).

Based on the geological concept, the Group-L source rock are onlapping at the half graben and is believed to be charging the basement laterally. This onlapping attribute can be observed in the seismic section. For the clastic part, most probably the Group K-Shale source rock will charge the K reservoir which is a stratigraphic play type i.e braided stream. In summary, from the perspective of total hydrocarbon generation and expulsion, L-Shale is a potential source rock in this area since most of the wells are discovered within oil zone in the basement play. Figure 3 demonstrated a depositional model of Malay Basin eastern flank with fluvial lacustrine source rocks distributions (Internal Report, 2010).

REFERENCES

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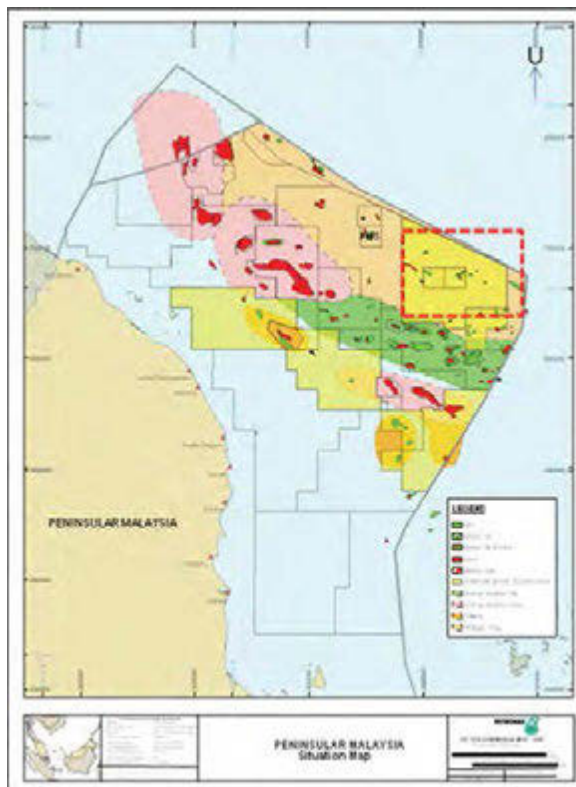


Figure 1: The location of study area in Malay Basin is signified by the red-dotted line. The oil and gas fields are illustrated in green and red colors, respectively (Maddon et al., 1999).

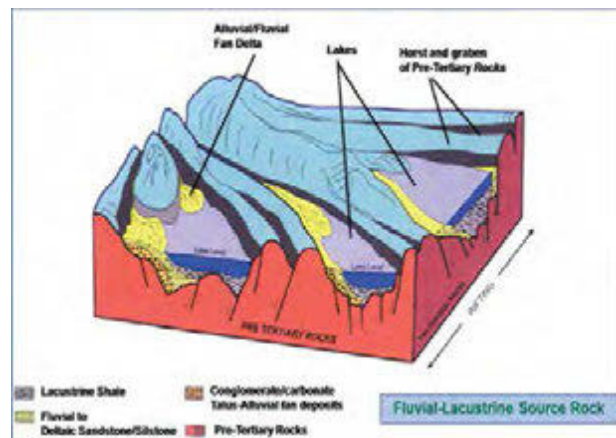


Figure 3: Depositional model for the East flank of Malay Basin displaying the fluvial-lacustrine source rock (Internal Report, 2010).

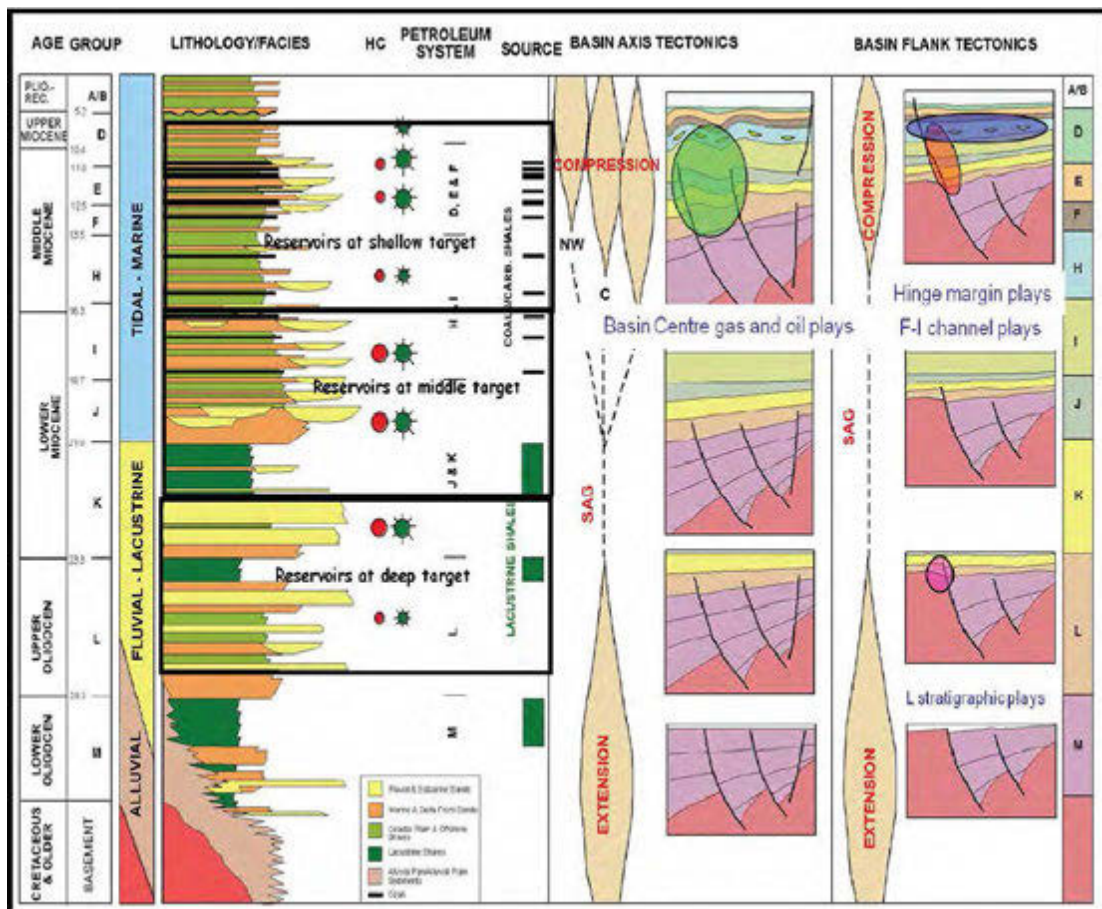


Figure 2: The regional stratigraphic chart of Malay Basin with tectonic events through geological time (EPIC, 1994).