

## The Holistic Approach in Petroleum Exploration

ZUHAR ZAHIR TUAN HARITH

Beicip Technology Solution  
Email: Zahir.harith@gmail.com

The current practice of exploration is highly data driven. Geological concepts become localized in order to suit the small scale seismic and well data. More often than not, the regional geology is sidelined in order to suit the “individual” data. Without a detailed understanding of the region; especially in the South East Asia region that has complex tectonic, geological concepts can easily vary from one geologist to the other depending on their perspective and also on their interpretation of the data studied. The “trapping in local minima” phenomena becomes increasingly prominent during exploration scale studies whereby selective “simple” exploration regions are successfully explored while many less favourable areas would be “left out”.

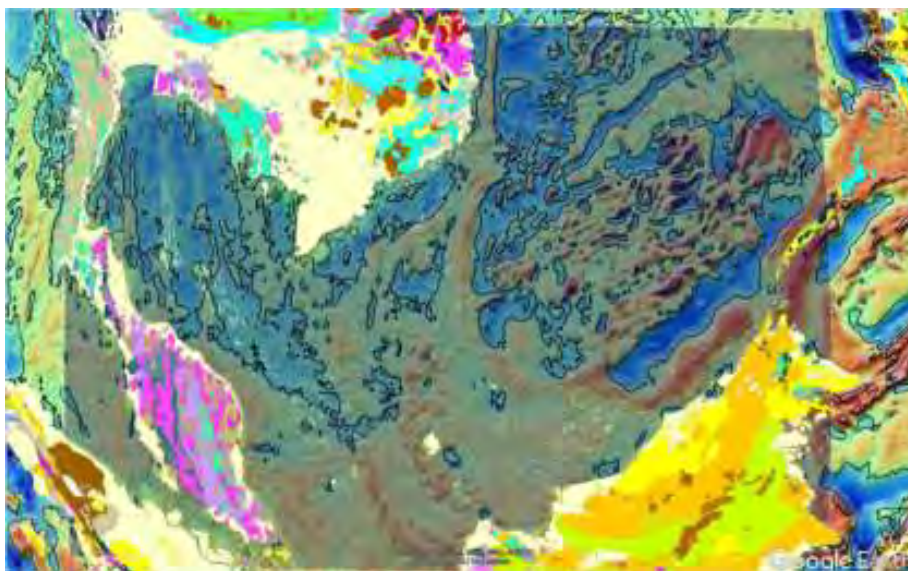
The sedimentary basins of Malaysia have diverse origins and occur in different tectonic settings representing almost all the stages of the Wilson cycle; from divergent (extensional), intraplate, to convergent margin settings. The Malay (and Penyu) basin are classified as intracontinental rifts that never made it to the oceanic stage. On the other side of Peninsular Malaysia, compressional deformation has resulted in the uplift of the Barisan volcanic arc and the formation of the retroarc foreland basin in the Straits of Melaka. On the other hand, tectonic origins of the sedimentary basins onshore and offshore Borneo are still subject to intense debate (especially between Robert Hall and Paul

Tapponnier) as they are still poorly understood. This makes it difficult to generalize the type of sedimentary basin, thus leading to the question whether these basins could be fully exploited if they are misunderstood.

Figure below shows a surface geology map of Malaysia (and some part of Thailand and Indonesia) overlaid the basement gravity map over South China Sea and the distribution of hydrocarbon fields in Malaysia and Gulf of Siam. Interestingly the hydrocarbon trends in all three basins in Malaysia is behaving differently. Even the trend in Malay Basin as compared to Patani Basin in Gulf of Siam.

The success of any exploration campaign hinges mainly on how well the “global” petroleum system is understood especially regarding petroleum system processes such as generation, migration, accumulation and trapping. The “local minima mindset” limits and constrains the ability to fully picture the geological history surrounding these basins leaving many opportunities besides conventional simple anticline and fault bounded structures to be unexploited despite having proven active petroleum systems.

Even though more than hundreds of researches have been conducted in the region, the question remains is how well do we know our basin. The continued efforts to study the area proves that the current understanding of the region is still insufficient.



Gravity map of South East Asia overlain with the geological maps of Peninsular Malaysia, Sabah and Sarawak.