Paper 15

Tectonics of the Sarawak Basin

H.D. TJIA

Petronas Research & Scientific Service Sdn. Bhd.
Lot 1026 PKNS Industrial Estate
54200 Hulu Kelang

Patterns and orientations of folds and fractures exhibited by the top surfaces of Cycle I through Cycle VI sequences define certain tectonic domains that also reflect changes in tectonic stress regimes during the Tertiary development of the Sarawak Basin. Overprinted structural pattern are especially noticeable in the Luconia and Balingian provinces. The offshore tectonic domains and their boundaries show certain relationships with tectonic domains onshore Sarawak and Brunei. Fold wavelengths in pre-Setap formations range between 3 to 5 km, which contrast sharply to those of post-Setap folds. The latter are mainly very broad synclines and elongated basins. These disharmonic deformation styles were facilitated by the ductile Setap shales. From NE Sarawak over Brunei-Lawas into the Klias peninsular, the structures change strike across distinct regional lineaments, known as the Belait zone, Jerudong Line and Tangoa Line (new name). Drag structures indicate that left-lateral fault slip along these lineaments persisted well into post-Setap time. Raised Plio-Pleistocene planation surfaces indicate regional tilting from the land towards the South China Sea. As result of Quaternary regional tilting, the trend of more recent hydrocarbon migrations would have been towards land. Some of the hydrocarbons now exploited from the coastal areas of Miri, Baram and Brunei may have been sourced by kitchens located offshore.

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The known hydrocarbon occurrences of the basin are Tatau Province = horst-and-graben structures in basement as well as in overlying sediments; Luconia Platform = carbonate buildups over a stable microcontinent; Balingian and Tinjar provinces = a foreland basin of collisional fold belts that probably derived its detritus from the Asian continent; Baram Delta = a prograding sedimentary sequence comprising detritus from Borneo and/or the Reed Bank microcontinent.

Multiple deformations as experienced by the Sarawak Basin may have enhanced or developed closures and structural traps, caused repeated migration of HC, accelerated maturation by deeper burial, and developed suitable environments for depositional and preservation of source matter. On the other hand, those deformations may have had negative effects by causing deterioration/destruction of traps, leakage through new or reactivated fracture zones, tightening or pores, developing overpressures, and vertical crustal movements that brought source material to levels where maturation became impeded or where overcooking could occur.