

Assessment of Trap Formation and Hydrocarbon Charge Timing in the Deepwater Fold-and-Thrust Belt, Offshore Sabah, NW Borneo

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Abstract

A project integrating regional structural restoration and petroleum systems modelling analysis is presented, with the main objective to assess the dynamics of structural trap formation and hydrocarbon charge timing within the deepwater fold-and-thrust belt offshore NW Sabah, Malaysia.

Petroleum exploration has proven successful in many Tertiary deltas around the world. Of those, the Baram delta, offshore NW Borneo, is a petroleum province with many oil and gas fields found along the shelf of Borneo in the South China Sea. Political borders divide this petroleum province, which spans from the Sarawak basin offshore Malaysia, through Brunei Darussalam waters, and to NW Sabah in the Baram-Balabac Basin, Malaysia.

The Baram-Balabac Basin is a 43,000 km² offshore basin with Tertiary marine beds, generally greater than 8 km in thickness and in some places greater than 10 km (Tiratsoo, 1984; Lambiase et al., 2003).

Within the Baram-Balabac Basin, the large accumulation of primarily deltaic and associated deposits has led to gravity loading and thin-skinned deformation. The deepwater expression of this deformation is a set of toe thrusts known as the NW Sabah deepwater fold-and-thrust belt (King et al., 2010).

Recent exploration wells and newly developed fields in this fold-and-thrust belt confirm the existence of a working petroleum system. However, the interplay among the structural evolution of the deepwater fold-and-thrust belt, sedimentary and depositional processes, and the maturation and migration of hydrocarbons is complex (Ingram et al., 2004). As such, a detailed investigation of the main petroleum systems elements and processes in the context of the structural evolution through geological time must be conducted.