

Structural framework and hydrocarbon potential of the Southern Sandakan Basin, Eastern Sabah, Malaysia

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The Sandakan Basin is the largest and southernmost of the three basins in the southwest Sulu Sea. The basin covers more than 40000 km², mostly offshore, and possesses up to 6–8 km of mainly Lower Miocene to Recent sediments.

The Sandakan Basin has a complex Tertiary tectonic history including several episodes of subduction and volcanic arc formation, probable obduction in onshore areas of Sabah, punctuated compression and transpression, and periods of extension and growth faulting.

The Southern Sandakan Basin can be divided into three diverse structural provinces separated by major tectonic dislocations. There is evidence from structural orientations in the three provinces of at least 45° of counterclockwise rotation of this area since the Oligocene. A stable but episodic north-northwest to south-southeast oriented compression appears to have been active during this rotation.

Deltaic sedimentation with outer-shelf reef growth dominated the Upper Neogene, and ubiquitous reservoirs and intraformational seals characterise this interval. Source rocks are dominantly terrestrial, and are similar to those in the Baram and Mahakam deltas elsewhere in Borneo. They are believed to be both oil and gas prone. There are at least three source kitchens in the basin, the largest and most prospective lying some 50 km

east-northeast of Sandakan.

Hydrocarbon exploration has been confined to 15 wells. Gas, condensate and light oil flowed from two wells in the southern sector. Two other wells in this sector could not be tested due to problems with overpressuring, but seismic evidence suggests that at least one of the two was located in a large hydrocarbon accumulation. A further three or four wells has oil and/or gas/condensate shows. Poor seismic data quality at the time of drilling (predominantly 1970 to 1975) resulted in at least 10 of the 15 wells being invalid tests. Modern seismic data reveals a host of new structural play types, and indicates the potential for downflank or more optimally located updip wells in compartmentalised structures which have already been drilled. Other plays include large stratigraphic features basinward of the Upper Miocene delta fronts.

Strong affinities in stratigraphic and structural style are observed between the Baram Delta and Sandakan Basin, particularly in the presence of structures at the intersection of growth faults and folds, where most Baram Delta oil fields are located. This, and the fact that the equivalent late Miocene section which is oil productive throughout Borneo is yet to be tested in a valid trap, suggests that the Sandakan Basin could become a significant hydrocarbon producing province.

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