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Geological Development and Prospectivity of the eastern North Makassar Straits, Indonesia

The Makassar Straits, located on the south-eastern margin of Sundaland, between Kalimantan (Borneo) and Sulawesi, is an under-explored deepwater domain, adjacent to a world-scale Hydrocarbon Province (Kutai Basin, primarily deltaic and shelfal).

New deep-water MC2D seismic data, extending across the Makassar Straits from Kalimantan to Sulawesi, have enabled a more coherent geological interpretation to be constructed, revealing a number of new exploration opportunities.

Geological development of the Makassar Straits commenced during the Eocene in response to crustal extension propagating southwestwards from the Celebes Sea spreading centre. After initial opening of the Makassar Straits, early-phase Eocene horst and graben terrains were replaced by basinal sag sediments during the subsequent Oligocene to Miocene era. Following the Neogene uplift of Borneo and resultant massive outbuilding of the Mahakam Delta, considerable amounts of sediment were redeposited as turbidite facies in the North Makassar Basin.

During the Plio-Pleistocene, prior extensional settings in the Makassar Straits became compressional as successive Australoid fragments collided with the south-eastern corner of Sundaland. This recent collision not only assembled the island of Sulawesi into its current (ephemeral) K-shape but also formed the West Sulawesi Foldbelt which obscures the eastern part of the original Eocene rift in the Makassar Straits.

Much of the foldbelt extends into the deep-water domain where exploration is now facilitated by modern deepwater drilling and production techniques. The foldbelt is progressively consuming the Eocene Makassar Straits, and eventual closure will cause major changes to the oceanic circulation of cool water flowing from the Northern Pacific into the warmer Indian Ocean.

Traps within the foldbelt are mapped as compressional folds over a thin-skinned detachment within probably overpressured Late Eocene mudrocks. Marine sand reservoirs are postulated to be charged from both Paleogene and Neogene source rocks.