

Paper 10

Structural geology of the Neogene Maliau Basin, Sabah

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The Maliau Basin is one of a series of saucer-shaped basins found in Central and Southeast Sabah. These basins are depositional sites of ancient sedimentary rocks. The Maliau Basin is made up of about 7,500 metres thick sandstone and mudstone layers deposited in a deltaic-coastal environment, assigned the Kapilit Formation. The layer at the base of the basin consists mainly of mudstones reaching up to 2,000 metres thick. Near the rim of the basin, thick sandstone interbedded with thin mudstone and coal seam occur. Towards the centre of the basin a series of sandstone-dominated and mudstone-dominated sequences of various thicknesses occur. The deposition took place during the Middle Miocene epoch (10–15 million years ago). The basin sits on older sedimentary rocks (Tanjong Formation), also comprising of thick layers of sandstone and mudstone, with slight unconformity.

The orientation of bedding generally follows the semi-circular shape of the basin. The dip of bedding varies from 5 degrees to 40 degrees. The dip becomes gentler towards the rim of the basin. Based on the

convergence of dip direction, the geological centre of the Maliau Basin has been located near the Camel Trophy Field Station. Sub-vertical to vertical fractures of various scales, which usually occur perpendicular and parallel to the strike of bedding, show various orientations. Four fracture orientations predominate, NW-SE (extensional fractures), NE-SW (tensional fractures), NNW-SSE (left shear fractures) and WNW-ESE (right shear fractures). Fault occurrence is quite rare inside the basin. Outside the basin, minor normal faults trending E-W and NE-SW have been recorded. The presence of a sheared zone at the southeastern part of the Maliau Basin possibly indicates field evidence for the major Lonod Fault.

The gentle dip and the lack of faulting and folding within bedding suggests that the Maliau Basin sediments have undergone a relatively mild deformation compared to other rock units, such as the Labang Formation in the surrounding area. The concentric bedding strike pattern suggests that at least two main compression directions occurred here. Based on the orientation of major faults, such as the Lonod Fault, the fracture pattern and the slight tilt of the basin towards the Southeast, a NW-SE and NE-SW compression direction is interpreted. The NW-SE compression appears to be related to the closure of the Sulu Sea Basin whereas the NE-SW compression appears to be related to sinistral horizontal faults.