

OROCLINES AND PALEOMAGNETISM IN BORNEO AND SOUTH-EAST ASIA

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Oroclinal bending of Borneo is interpreted to result from indentation and collision by the continental promontory of the Miri Zone–Central Luconia Province of northern Sundaland into southern Sundaland. The collision caused strong compression and uplift of the intervening Sibul Zone Upper Cretaceous–Eocene Rajang-Embaluh Group turbidite basin that was floored by oceanic crust of the Proto South China Sea. Timing of the collision is indicated by uplift of turbidite formations to be overlain by Upper Eocene–Lower Oligocene carbonates [Sebuku and Melinau Limestone] and intrusion of tin-mineralised granites into the turbidites at the south-east maximum inflexion of the orocline, a region of complicated juxtaposition of both shallow and deep water formations. The West Crocker Formation (Late Oligocene to Early Miocene) post-dates the uplift of the turbidite zone, but the Eocene Trusmadi Formation, at the foothills of Mount Kinabalu, was an integral part of the Rajang Group of the Sibul Zone into Sabah.

The oroclinal model, requiring clockwise rotation of the north-west limb, is given no support from the paleomagnetic data that instead demonstrate about 50° of Cenozoic anti-clockwise rotation. Unfortunately not a single outcrop of the strongly oroclinally bent Sibul Zone was measured for paleomagnetism in the north-west limb. Limited support was given for the required anti-clockwise rotation in the north-east limb. Previous syntheses emphasised anti-clockwise rotation, or stable non-rotation of the greater Borneo region (Murphy, 1998) as a coherent entity, without any internal deformation (e.g. Hall, 2002). Dick Murphy rejected the Tertiary paleomagnetic data for Borneo because a stable single entity did not agree with the active Tertiary tectonism that characterises the island. The single entity models have ignored the oroclinal shape defined by the areal geology of the island, known since early Dutch

publications [the tectonic zones of Van Bemmelen, (1949)]. “Orocline” was not then in the geological dictionary, and we had to wait for Warren Carey (1955) to coin the term and for Marshak (2004) to define orocline characteristics and origins.

The northern Thailand–Myanmar north–south-trending geology fabric results from indentation by a promontory of continental India at the Assam–Yunnan oroclinal syntaxis, resulting in paleomagnetically-determined clockwise rotation. The bend of Peninsular Malaysia and Sumatra, from north–south changing to west–east towards Borneo in the south, has remained difficult to model because of widespread remagnetisation. But this is now demonstrated to be part of the Borneo orocline

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