Paper 8

The Sarawak and Sabah Orogenies

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The Danau Sea, in which the Cretaceous through Upper Eocene turbiditic Rajang and Embaluh groups of Sarawak and northern Kalimantan and the generally shallower marine Selangkai Formation of north-central Kalimantan were deposited, was eliminated in Late Eocene time by the Sarawak Orogeny. The Rajang Group is predominantly composed of the Belaga Formation of the Sibu Zone but also forms extensive inliers within the Miri Zone known as he Kelalan and Mulu formations. The Rajang Group extends into Sabah as the Sapulut, Trusmadi and East Crocker formations. The Orogeny resulted in welding of the Schwaner Mountains of central Kalimantan onto the Nansha Block of the present South China Sea via the Luconia, Miri and Sibu zones. Igneous events, such as the Arip Volcanics, were associated with the orogeny. The South China Sea did not yet exist in Late Eocene time, so that the Sarawak Orogen was an integral part of the greater Sundaland landmass, which extended southwards to Java and eastwards to western Sulawesi, where its continuity was interrupted by the Eocene Celebes Sea marginal basin.

The Sarawak Orogeny is dated Upper Eocene by a spectacular unconformity between continental or shallow marine flat-lying strata and underlying steeply dipping Rajang Group turbidites, seen on the Tatau Horst, at Batu Gading and along the Lupar Line, where the base of the predominantly continental Ketungau Basin is now in fault contact with the pre-unconformity Rajang Group.

The Oligocene through Lower Miocene turbiditic West Crocker and Temburong formations were provenanced from the south from the eroding Rajang Group landmass of the Sarawak Orogen. The sedimentation pattern remains to be worked out but must include the contemporaneous sand dominated Meligan Formation of east Brunei, deposited in a delta plain and braided river environment, and the plant-rich Kelabit Formation of east Sarawak. The deep basin in which the West Crocker and Temburong formation turbidites were deposited must be related to the South China Sea marginal basin, which was spreading at exactly the same time. The West Crocker and Temburong formations were deformed and uplifted to form the Crocker Ranges in the Middle to Upper Miocene, dated by the Deep Regional to Shallow Regional unconformities of the coastal and offshore region of Sabah. This Sabah Orogeny was associated with igneous events at Mount Kinabalu and farther south at Long Laai in Kalimantan. The effects of the Sabah Orogeny are widespread, especially as far west as the southern Malay Basin and the West Natuna region. In the Pearl River basins, the tectonic event is known as Dongsha Movement. The Sabah Orogeny inversions created new mountainous landmasses which were rapidly cannibalized to give deltas such as the Baram, the fluvial system being directed into extant depocentres closely ahead of the tectonic fronts.