

Development of Tertiary Basins of SE Asia from the South China Sea to the Andaman Sea region ; a comparative view on structure and timing

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Basins of SE Asia have developed since the end of Cretaceous times to the detriment of a Mesozoic andean arc which surrounded Sundaland. The arc was broader in the Eastern part along the Pacific Subduction Zone including the South China Sea (SCS), than in the Western part along the Sumatra Subduction Zone (Myanmar, Andaman Sea (AS), Malay Peninsula). By the end of the Upper Cretaceous, this arc died out and a widespread rifting with astonishing resemblances started in the whole Sundaland. We compare and discuss the basins similarities and differences in structure and timing between the two sides.

A relaxation stage is evidenced in Western Sunda, represented by poorly exposed Late Cretaceous red beds filling the pre-existing morphostructures without clear fault-controlled basins. These deposits are also observed on seismic data offshore in the Gulf of Thailand and AS). On the opposite side along the Chinese margin, thick molasse-type deposits of Late Cretaceous age are on the contrary well expressed offshore and restricted to narrow valleys, indicating that stretching had already begun. There, the Paleogene is marked by strong extension with large crustal blocks rotated by often counter-regional normal faults creating half grabens. Crust was extended and extremely thinned particularly around the SCS. Basins reached the spreading stage in the Celebes Sea, the North Makassar basin and the SCS. On the western side, this period corresponds to narrow deep grabens (e.g. Mergui basins and part of western Malacca) with continental deposits, meaning that the stretching was localized. There, thinning of the crust took place during the Oligocene up to the Middle Miocene where large basins develop mostly to the outer edges of the Yenshanian Arc. Extension resumed in the Pliocene with the opening of the Andaman basin in an even more external position. To the eastern side the uppermost Miocene and the Pliocene were marked mostly by a deepening of the margins and the SCS ocean floor whereas the uplift of Borneo controlled the sedimentation and the gravity tectonics.

Similarities between the two sides include reactivation of margin morphostructures, and an evolution of the location of the rifting developing away from the margin with the ubiquitous occurrence of low angle counter-regional normal faults. Differences seems to be mostly the extent of the extension with basins reaching ocean floor spreading only in the eastern side. Another fact is the discrepancy in time of both sides. In the East, a short stretching stage being Late Cretaceous/Paleogene, and a long-lived thinning from Eocene to Late Miocene, prior to a sag phase. In the Western side the stretching, thinning and sag are Eocene, Oligocene and Miocene respectively. We attribute these variations to the difference of behavior of the subduction which remained a free edge to the East and South of Sundaland, and on the contrary was severely influenced by the path of India during the Tertiary.