

Aspects of the Structural and Stratigraphic Evolution of the Phu Khanh Basin, Offshore Central Vietnam, South China Sea

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The Phu Khanh Basin formed through three distinct rift-phases and a period of regional syn- and postrift subsidence. Initial rifting, related to the slap-pull from the subduction of the proto-South China Sea underneath Borneo, occurred during Late Cretaceous(?) – Paleogene. During mid-Oligocene left-lateral wrenching commenced in the coast-parallel, basin-transecting East Vietnam Boundary Fault Zone, forced by the southeastwards extrusion of Indochina. This induced inversion, regional uplift and erosion in the basin and heralded the second rift-phase. Left-lateral strike-slip faulting caused a 10 – 20 km wide, through-going rift-basin and smaller, scattered rift-structures to form during Late Oligocene, which led to the deposition of lacustrine and alluvial sediments more than 1,5 sec (TWT) thick in places. Moderate right-lateral wrenching brought an end to the second rift phase close to the Oligocene – Miocene boundary and caused varying transpressional and transtensional structures to form. The right-lateral rifting peaked during Early Miocene but lasted approximately to the end of Middle Miocene and caused uplift in the southern half of the study area, but subsidence in the northern half, where transgression and deposition of widespread carbonates occurred during the earliest Miocene. Thermal subsidence caused a gradual southward transgression, allowing siliciclastic, marine deposition to dominate the remaining part of Miocene, apart from geographically restricted fluvial, lacustrine and carbonate-buildup deposition. This led to the initial formation of a prograding shelf-slope during Early Miocene in the northeastern part of the basin, which propagated southwards during the remaining part of Miocene. A significant increase in sedimentation and subsidence rates took place around the Middle – Late Miocene boundary probably reflecting the eastwards tilting of central Vietnam.