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The Ranong and Khlong Marui Faults, Peninsular Thailand: polyphase deformation along two intra-plate strike-slip shear zones

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The Khlong Marui Fault (KMF) and Ranong Fault (RF) are major NNE trending strike-slip structures which dissect Peninsular Thailand. They crop out for 220 km and 420 km respectively, and lie immediately south of the NW trending Three Pagodas and Mae Ping Faults, thought to be linked to Himalayan escape tectonics. A history of strike-slip motion, inversion and overprinting from mid-crustal depths to shallow levels is preserved, presenting a well exposed record of the evolution of major intra-plate strike-slip shear zones.

Both the KMF and RF are defined by elongate cores of metamorphic rocks with dextral shear fabrics, bound by brittle sinistral strands. The cores are composed of amphibolite facies mylonites, migmatites and syn-kinematic granitoids, which define a broad, mid crustal ductile strike-slip shear zone. Active during the Upper Cretaceous – Palaeocene, this deformation cannot have been initiated by Himalayan orogenesis, as has previously been assumed. It may instead have formed as a result of transfer of strain into the overriding plate during subduction of an active Tethyan oceanic transform zone.

During the Eocene to Oligocene, the region experienced brittle sinistral strike-slip shear accommodated largely by reactivation of the existing strike-slip fabrics. These faults were localised into the two fault zones exposed at the present day. Transpression-induced positive flower structures exhumed slivers of the old shear zone along the central part of each fault, which are now exposed in contact with unmeta-

morphosed country rock.

At their northern tips, the faults appear to splay and die out, and do not continue offshore. A west dipping low angle detachment fault exposes a metamorphic core complex at the northern end of the RF, which may accommodate residual strain not dissipated elsewhere. Extensive Tertiary rift basins in the Gulf of Thailand to the east, and the Andaman Sea to the west of the peninsula were active at the same time as sinistral strike-slip motion on the KMF and RF. Their E-W extension is also compatible with the strike-slip kinematics, suggesting an intimate link between these events. However, there is little evidence that the faults significantly penetrate, or control the basins. Instead, they may have acted as accommodation structures between the extending regions.

Dextral brittle strike-slip faults which formed at a shallow level obliquely overprint all the older structures along the fault zones, and may be related to Early Miocene inversion in the basins. This study shows that understanding the evolution of intraplate strike-slip fault zones can provide insight into regional-scale events, from plate tectonics to orogenesis and basin formation.