

The Mechanics of Progressive Deformation in Crustal Plates - A  
Working Model for Southeast Asia

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*A model explaining the mechanics of Tertiary deformation of the Southeast Asian crustal plates is presented which links Wrench Tectonics and Plate Tectonics. The model realigns the roles of subduction, rifting and shearing in crustal deformation integrating them to form a dynamic and progressive system driven by a single continuous force.*

\* Presented by T.S. Ng.

The Southeast Asian crustal complex overlies the Pacific Plate at the intersection of the Pacific, Eurasian and Austral/Indian Crustal Plates. Relative plate movements at this intersection have resulted in a high angle of convergence between the Pacific and Eurasian Plates and a low angle of convergence between the Pacific and Austral/Indian Plates.

The Eurasian Plate in acting as buttress has resisted westward movement of the Southeast Asian and Pacific Plates. Subsequent shortening against this boundary has been accommodated largely by subduction of the oceanic Pacific Plate.

Deformation of the Southeast Asian Plate along the Pacific Plate's southern boundary presents a more complex structural situation. Deformation has occurred in progressive stages, each successive stage over-printing the former. Decoupling has occurred between each stage. The overall results have been:

- (a) east-west crustal shortening by compressional folding, thrusting, strike-slip faulting and buckling of the Southeast Asian Plates in response to a west directed horizontal principal stress.
- (b) vertical crustal thickening by basin development and mountain building, and
- (c) north-south crustal expansion by Island Arc formation.

Initially, east-west shortening and fragmentation of the Early Tertiary Southeast Asian crustal plate was accommodated progressively by folding, thrusting and strike-slip faulting. This resulted in the plate being broken by a series of west trending sub-parallel Shear Systems. Continued shortening and endloading of the plate from the east successively buckled the elongate, decoupled, inter-shear fragments away as Island Arcs from adjacent fragments to override the impinging Pacific Plate. Behind these arcs expansion and rotation (primary rotation) was accommodated by rifting and short offset transform faults. The formation of multiple arc complexes by repetitive buckling of crustal fragments not only increased the width of the region of deformation but further rotated (secondary rotation) the older complexes.

The crustal deformation of Southeast Asia, in terms of this new working model, is displayed in a Tectonic Map of the region.

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