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# A single mechanism for Cenozoic extension in and around Indonesia

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Some of the most striking geological features of southeast Asia are the large Tertiary basins and major strike-slip faults on and around the Indochina peninsula. These features include sedimentary basins in almost every orientation intersected by strike-slip faults of different orientations. Previously, these structures have been explained by a variety of differing mechanisms. Here we use a single mechanism to explain the formation of all the major basins around the Indochina peninsula and the major strike-slip faults. This single mechanism is the collision of Indian plate with the Eurasian continent and the rotating stress regime created by this collision.

The rotating stress mechanism began during the Eocene when the Indian plate first contacted the Eurasian continent forming the Ranong fault in Thailand. As the stress field increased and propagated northward from the collision zone the stress field in Indochina rotated. Here the maximum compressive stress axes are nearly east-west and the maximum tension axes are north-south. This creates the Three Pagodas and Mae Ping faults. Further to the southeast the tension axes of the stress filed are still north-south but the compressive axes become vertical. This resulted in the opening of the Malay, West Natuna, Penyu, Con Son and Mekong basins in a north-south extensional regime. To the north, the Red River fault underwent left-lateral displacement; possibly opening or extending the basins in the Beibuyan Gulf. As the stress field continued to propagate northward from the collision zone the stress field in Indochina continued to rotate. As it rotated the maximum compressive stress axes becomes northwest-southeast and basin inversion occurred. First in the West Natuna basin and then as the stress field continued rotation inversion occurred in the Malay basin. At the same time the maximum tension axes became nearly east-west initiating or reactivating extension in the Thai basins from the Pattani trough through the intermontane basins of northern Thailand. At the same time the direction of motion on the Red River fault became right-lateral and the Bacbo or Yinggehai basin opened.

The first part of the rotating stress model is similar to that of Peltzer and Tapponnier (1988), however the rotation of the stress field is considerably faster than that implied by their model with left-lateral motion ending during the Early Oligocene and right-lateral motion responsible for extension in the Gulf of Tonkin.



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