

Paper 2

Causative mechanism of Tertiary basin development in northern Sunda Shelf region

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Tertiary basins in the northern Sunda Shelf region including the oceanic South China Sea Basin appear to be related by a common genetic process, but the causative mechanism of their development remains a contentious issue. Recent accumulation of geological and geophysical data are equivocal and have led to conflicting interpretations.

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A popular model that relates the origin of the basins to the sinistral strike-slip motion effected by a collision of India with Asia (extrusion tectonics) is untenable. Apart from the inherent weakness of the extrusion hypothesis itself, the strike-slip model fails to explain a variety of critical geological observations including (i) the timing of basin initiation, (ii) the orientation and triple junction distribution pattern of the basins, (iii) the temporal and spatial aspects of igneous activities, (iv) the direction of stretching incompatible with the sense of strike-slip motion, (v) the very wide area over which the basins developed, and (vi) the development of basins away from known strike-slip structures. The strike-slip motions, however, might have played modifying roles in some individual basins.

The above features as well as the available heat flow data and subsidence histories of some basins suggest a hot spot-related taphrogenic model that involves episodic uplift and rifting. Two distinct phases of basin development are discernible that are evidently linked to two thermal events (Cretaceous and late Tertiary) that are manifested by significant igneous activities. The relationships between igneous activities, uplift, rifting and subsidence histories are, however, subtle and complex, and do not readily fit into the standard characteristics of active or passive rifting models.
