

Early-stage orogenesis in the Timor Sea region, northwest Australia

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Abstract: Neogene collision between the Australian and Eurasia/Pacific plates was coeval with the growth of major depocentres in the Timor Sea. Seismic cross-sections across these troughs identify a characteristic architecture: all three lie inboard of diffuse horst-like structural highs and all mimic older depressions in the top-Permian and upper-Jurassic surfaces. Distortion of pre-tectonic (Aptian–Oligo-Miocene) sequences indicates apparent trough subsidence was coupled to uplift of outboard highs. Rudimentary cross-section restoration identifies negligible strike-normal length change. We interpret apparent Neogene subsidence to reflect amplification of basement topography. This was not accommodated by discrete structural inversion. Rather, landward-propagation of contractional strain caused continuous vertical amplification of basement topography. At shallow levels, normal faulting accommodated flexure and thin-skinned collapse of detached sedimentary cover, permitting it to shed away from structural highs and pond in adjacent troughs. We infer that shortening of the North West Shelf accommodated oblique convergence between Australia and the Eurasia/Pacific Arc and speculate that the transcurrent component of this deformation was partitioned well outboard. Neogene modification is interpreted to reflect the earliest stages of collisional orogenesis.