

Driving Forces and Regional Effects of Cenozoic Tectonic Inversion Across the South China Sea Region

Dorobek, Steve ¹ (1) EPT, BP America, Houston, TX.

Classic examples of tectonic inversion are found across the South China Sea region, particularly across the Indonesian back-arc and Sunda Shelf and as far north as Beibu Wan Basin, offshore northern Vietnam/south China. Inversion was accomplished when regional intra-plate contraction caused reverse displacement on Paleogene, former rift-related fault systems. Inversion occurred mainly from late Oligocene to late Miocene time, although some regional faults are still being reactivated. Significantly, most inversion (contraction) occurred almost simultaneously over the entire region and during a relatively brief amount of time (5-10 Myr). Inversion across the South China Sea was also coeval with inversion and contraction across the Indonesian back-arc region and a change in inversion style across the Northwest Shelf of Australia, all of which suggest a causal link.

The regional timing and styles of inversion and related deformation indicate that intra-plate stresses were transferred across the Indonesian back-arc and northward across the Sunda Shelf. Stronger mechanical coupling along the Indonesian subduction fault and collision between the leading edge of Australian continental crust and the eastern Indonesian archipelago explain the timing of regional contraction and inversion. The short amount of time that transpired after Paleogene rifting meant that the extended continental lithosphere was weak and inversion could occur rapidly, but yet was still strong enough to transmit compressive intra-plate stresses over a broad region. Following inversion, very little differential subsidence occurred across the Sunda Shelf, which suggests that the formerly stretched lower lithosphere may have been tectonically rethickened during inversion, thereby nearly restoring the lithosphere to its pre-rift condition.