

Structural Inheritance and Mesozoic Rafting, Eastern Shallow-Water Sureste Basin, Gulf of Mexico

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Abstract

The deformation history of the Sureste Basin includes: Middle-Late Mesozoic NW-directed extension from rifting and gravity sliding during drift, NE-directed Chiapanecan Cenozoic contraction (caused NW-SE trending folds), and Middle Miocene to present NW-directed extension/transension of the Catemaco gravity slide. Seismic mapping established the linkage between base-salt faults and later deformation, and unraveled the post-salt timing of rafting. Campeche autochthonous salt filled a subsiding Jurassic rift basin. The original salt thickness controlled the structural style of the eastern Sureste Basin during extension and resulted in the formation of reactive triangular salt rollers (in footwalls of extensional faults). Supra-salt extension occurred from the Oxfordian to the middle-late Cretaceous. The eastern edge of the Sureste salt basin thins towards a basement horst located on the east-side of a NW-SE rift fault (transfer zone). Supra-salt tear faults developed in roughly the same location during later Mesozoic post-salt extension. These tear faults influenced the stratigraphic filling of supra-salt basins. Late Mesozoic supra-salt extension has two sets of faults with different initiation ages (both trend NW-SE but with opposite dips and sole into autochthonous salt or the equivalent weld); their footwalls have salt rollers that merge with the autochthonous detachment. Faults of the first phase dip basinward and have a slight curvature. Kimmeridgian/Tithonian growth occur in the hanging walls of these faults. The 2nd phase faults have landward dips, listric shapes, and offset the 1st fault phase. The 2nd phase of faulting has middle-Upper Cretaceous hanging wall growth. Extreme extension of phase 2 faulting in the northern part of the eastern Sureste Basin led to the development of Mesozoic rafts (adjacent footwall and hanging wall blocks are separated and not in contact). Tear faults were reactivated by NE-directed Cenozoic Chiapanecan contraction, and right-lateral strike-slip movement during NW-directed Catemaco gravity sliding. Extensional tear faults correspond with the eastern limit of Middle Miocene Chiapanecan thin-skin contraction. NW-SE oriented anticlines and thrusts lie to the west of the tear faults. The area to the east lacks pronounced thin-skin Chiapanecan folds. Onshore uplift from subduction of the Cocos plate led to tilting of the margin and NW-directed Catemaco gravity sliding. Strike-slip displacement along the eastern limit of the gravity slide reactivated the Mesozoic tear faults. The tear fault corresponds with the eastern limit of the Comacalco and Macuspana extensional gaps.