

# The Triggers and Evolution of Mesozoic Salt-Related Deformation in the Gulf of Mexico

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## Abstract

The Middle Jurassic Louann and Campeche salts of the Gulf of Mexico were deposited as an originally contiguous salt basin separated by oceanic spreading. There was likely ongoing salt movement during deposition, and suprasalt deformation began effectively as soon as younger sediment was deposited. The trigger in most parts of the conjugate margins was gravity gliding due to the basinward tilt of the top salt caused by differential thermal subsidence. However, in the eastern Gulf of Mexico, where the onset of spreading postdated burial of the salt, ongoing crustal extension and mantle exhumation beneath the salt in the outer trough was matched by more proximal thin-skinned extension of Upper Jurassic strata, with decoupling provided by the salt layer.

The dominant gravity gliding was accompanied by proximal extension and distal contraction. The extension was accommodated mostly by basin-ward-dipping listric growth faults. Still, counter-regional extensional faults formed where/when loading by Upper Jurassic carbonate platforms locally flattened or even reversed the tilt on the top salt. Short-wavelength folds, thrust faults, and nappe emplacement over the oceanic crust recorded the contraction.

The margins were highly curved, mostly with concave-to-the-basin geometries but locally with convex shapes. Consequently, deformation was non-uniaxial, resulting in complex map patterns of early structures. One of the easiest places to see the Mesozoic deformation is the northeastern GoM, but the patterns are nevertheless enigmatic. The earliest suprasalt features comprise swarms of thrust faults and folds that trend NE–SW, i.e., orthogonal to the margin, that may have formed due to crowding during convergent movement. The Cretaceous was marked by an irregular pattern of highs and minibasins, the latter filled with expulsion-rollover and turtle structures that resemble dome-and-basin structures, another manifestation of convergent shortening. Around the Gulf of Mexico, the distribution and nature of Mesozoic salt structures strongly influenced all subsequent deformation.