
Comparison of Regional, Total Tectonic Subsidence Variations in the Eastern Gulf of Mexico Produced during Two-Stage, Mesozoic Basin Opening

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ABSTRACT

Most workers now agree that the Gulf of Mexico opened in two phases: (1) an earlier phase of northwest-southeast-directed, widespread, asymmetrical continental rifting during the Triassic and early Jurassic age (190–170 Ma) that thinned areas of the northern Gulf of Mexico and led to an overlying sag basin that filled with salt of 163–161 age; and (2) a later phase of north-south-directed extension of late Jurassic age (161–154 Ma) leading to an area of oceanic crust underlying the deepwater Gulf of Mexico and split the salt-filled sag basin into two halves: the Louann salt in the U.S. Gulf of Mexico and the Campeche salt in the Mexican Gulf of Mexico. Identification of rift features associated with the earlier rift phase in the Gulf of Mexico has always been challenging because the younger rift event has overprinted and translated older rift features and seismic data seldom image the rifts now buried beneath thick, carbonate passive margins. In this presentation, we calculate the total tectonic subsidence (TTS) variations along three, southwest-northeast well and seismic transects across the conjugate rift and passive margins of eastern Florida and the Yucatan Peninsula. Less TTS is observed along a more confined zone of the eastern and northern Yucatan margin than the more extended and wider, east Florida margin. This observation supports the idea of Yucatan as a less extended and higher-standing, upper plate margin and Florida as a more extended and wider, lower plate margin. We also have calculated TTS variations using seismic and well transects in a northwest-to-southeast direction parallel to the Yucatan and Florida rifted and passive margins in order to assess the contribution of the earlier Triassic–early Jurassic Gulf of Mexico opening phase.

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