

Kinematics of Jurassic Rifting and Oceanic Spreading between the Continental Blocks of Western Florida and the Yucatan Peninsula

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ABSTRACT

Unanswered questions for the opening of the southeastern Gulf of Mexico (GOM) in the areas of southwestern Florida, the northeastern Yucatan Peninsula, and Cuba include: (1) Did this area experience two phases of Triassic-Jurassic rift-related normal faulting as seen in other areas of the GOM and how did each phase contribute to the present-day, narrow zone of thinned continental crust separating the 40-km-thick continental Florida block from the 6-km-thick GOM oceanic crust: Phase 1 (northwest-southeast continental rifting from 174 to 166 Ma) and Phase 2 (north-south oceanic spreading from 163 to 137 Ma); (2) Was Phase 2 oceanic spreading synchronous with the rest of the GOM or is Phase 2 oceanic crust formed as a result of southeast-directed ridge propagation?; and (3) Was this part of the GOM margin volcanic or non-volcanic?; and (4) Does this area include salt deposition and remobilization? Using three gravity transects and 40,000 km² of seismic data from this area, our answers to these questions include: (1) Gravity models show similar profiles along the length of the Florida margin with an area of continental thinning 50 km wide with an overlying section of 7.5 km of sedimentary rocks; two trends of normal faults are present in the area but the northwest set of normal faults dominates; the marginal rift zone tapers from 100 km in the northeastern GOM to 50 km in this area; we see no evidence for mantle exhumation across this 50 km-wide zone of rifting; we can precisely map the edges of the V-shaped area of oceanic crust that is elevated relative to the flanking, continental crust; (2) correlation of age picks from DSDP leg 77 site 537 in the Straits of Florida indicate a syn-rift phase extending into the earliest Cretaceous (145–141 Ma) consistent with the idea of SE propagation of the spreading ridge; (3) we recognize no volcanic rocks or SDRs in this area supportive of a non-volcanic rift margin from this area to the University of Texas GUMBO refraction line in the northeastern GOM; and (4) we recognize isolated salt bodies from the Straits of Florida to as north as the Tampa Arch; the salt is discontinuous, range in thickness from 1 to 6 km, and show limited diapirism likely as the result of decreasing overburden from south to north along this margin.