Liu, M., Bird, D. E., and Mann, P., 2020, Distribution and thickness of crustal types of the Greater Gulf of Mexico region based on constrained 3D gravity inversion (abstract): Eos, Transactions, American Geophysical Union, Fall Meeting Supplement, v. 101, NS008-06.

Mesozoic continental rifting and oceanic spreading between North America and Yucatan block has produced the present-day basin geometry of the Gulf of Mexico (GOM). The objective of this study is to investigate the crustal structure and the distribution of crustal types, the history of rifting and seafloor-spreading, and the role of pre-existing crustal fabric on this evolution. We used open-file, free-air gravity data with 178 seismic refraction stations from published sources to constrain a regional 3D gravity model. The gravity model includes three surfaces: 1) stations (land topography and sea surface); 2) topography and bathymetry; 3) top of the crystalline crust (basement); and 4) Moho. The density depth relation for the sedimentary layer was estimated from 16 deep, exploration wells. The Moho inversion was constrained using the seismic refraction data and density inversions of the crustal and upper mantle layers. Main results included: 1) our final model RMS misfit between calculated and the observed gravity data was 0.2 mgal; 2) the inversion results indicate that the late Jurassic oceanic crust underlying the deep GOM ranges from 4-10 km in thickness; 3) we used this thickness for oceanic crust to derive a new continent-ocean boundary; 4) we calculated stretch factors of 0 to 7 by assuming crustal thicknesses greater than 35 km remained undeformed during continental rifting; and 5) the Greater GOM area was divided into four different zones based on the inversion results: A) undeformed continental crust with a stretch factor of 1 and crust thicker than 35 km to the northwest of the Marathon Ouachita orogenic belt; B) Less deformed continental crust with a stretch factor between 2 and 3 with a thickness between 20 and 35 km beneath the onshore areas that border the GOM; C) thinned continental crust in a narrower zone further outboard with a thickness between 10-20 km and stretch factor between 3-5; and D) late Jurassic, oceanic crust that is less than 10 km thick.