Gravity and Magnetic Mapping and Modeling of the Crustal and Uppermost Mantle across Gulf of Mexico from Coast to Coast (N–S and E–W)

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ABSTRACT

Since structures due to Paleozoic and Mesozoic tectonic events are a key to understanding the structure and evolution of the Gulf of Mexico, we have undertaken an integrated analysis of a broad range of geological and geophysical data to construct two models (N–S and E–W) based on the integration of gravity and magnetic data, drilling results, and available deep seismic data. We also took advantage of the numerous regional data sets and models that have been published in recent years. A starting point for the N–S model was the interpretation of Avendonk et al. (2015) that the rifted continental crust extends offshore for ~250 km before the oceanic crust of the Gulf of Mexico is encountered. To create our N–S model across the entire Gulf of Mexico, the GUMBO 2 model was extended all the way from southern Louisiana to Yuccatan in our analysis. Likewise, our E–W model extended from eastern Mexico eastward to Florida and was assisted by the GUMBO 4 model. These new models and regional gravity and magnetic mapping demonstrate that the lithospheric structure of the Gulf of Mexico is extremely complex and that we still have a great deal to learn about its structure and evolution.

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