



Crustal structure of the northern Gulf of Mexico from potential fields and seismic refraction

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A recent seismic refraction program in the northern offshore Gulf of Mexico (US waters) has greatly enhanced understanding of the crustal structure of this previously poorly-known region. These data are the first to show how crustal thickness varies across this area. Interpretations of crustal types derived from the refraction data have helped to delineate regions of oceanic and extended continental crust, as well as regions of crustal thickening probably associated with synrift volcanism. Onshore, however, there is still a lack of refraction data so understanding of crustal structure and therefore extension history is poorly constrained. Potential field modeling can help address this issue. It is well known that gravity modeling by itself can yield many different interpretations of density distributions and hence crustal structure. Combined with refraction data these interpretations can be much better constrained. In this study crustal structure for the onshore northern Gulf of Mexico is derived from the offshore refraction data combined with regional gravity and magnetic data. The lack of observed rift faulting in deep seismic reflection data in the region has long been a puzzle, as the several hundreds of kilometers of extension implied by plate reconstructions should have resulted in extensive faulting. The potential field data does suggest the existence of deep grabens parallel to the coast, associated with large magnetic anomalies that may indicate a partly magmatic margin in agreement with some published interpretations. These new interpretations help to build a model of crustal evolution of the Gulf of Mexico.