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New insights into the crustal architecture and tectonic evolution of the Eastern Gulf of Mexico.

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The Gulf of Mexico is an intraplate oceanic basin where rifting started in the Late Triassic, leading to drifting by Middle Jurassic and ensuing oceanic accretion, which ceased by the Early Cretaceous. Its tectonic evolution encompasses multiple rifting phases dominated by orthogonal extension, major strike-slip structures, transtensional basins, variable magmatism, and salt deposition. This complex tectonic history is captured in the rifted margins of the Gulf of Mexico, especially along the eastern part of the basin; where considerable debate remains regarding the crustal configuration and tectonic evolution.

This study presents new insights into the crustal types and an updated tectonic framework for the Florida margin. An integrated analysis of seismic, gravity, and magnetic data allows us to characterise the continental crust, which shows wide zones of hyperextension that we relate to pull-apart basins, magmatic underplating, seaward dipping reflection (SDR) packages, and a narrow zone of exhumed mantle. In addition, we identified NW-SE trending sinistral strike-slip faults altering the typical crustal configuration expected in a rifted margin.

Our results suggest the need for a new plate model of the Florida margin at the Eastern Gulf of Mexico that invokes the polyphase rifting, accounts for the Yucatan's block counter-clockwise rotation, explains the increase in magma supply, and captures the influence of strike-slip faults on the crustal boundaries and the magmatic budget.