

The Tectonic History of the Gulf of Mexico – A Comprehensive Review to Chart New Directions

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The Gulf of Mexico (GOM) is an economically important basin, whose origins and evolution during the Mesozoic are obscured by thick sediments. Nonetheless, a concerted effort to summarize the state of knowledge regarding the GOM's formation has not been conducted in over 30 years. In that effort, culminating in a major volume as part of the Decade of North American Geology, scientists in academia and industry worked together to summarize the nature of the crust, the timing of opening, and the nature and distribution of early sedimentary fill. Since then, numerous publications have brought new data and ideas to the forefront. This presentation describes a new academia-industry effort to review public domain data, high-grade viable hypotheses, and identify future directions for scientific research into how the GOM was formed.

We break down advances in GOM opening research into three major categories: data and observations, resultant interpretations, and relevant models. Because there are no models suggesting seafloor spreading younger than 135 Ma, we focus only on rocks of this age or older. Old and new datasets suitable for underpinning basin evolution are highlighted. We summarize interpretations from the published literature on the structure, composition, and history of specific areas in the GOM, and identify controversies. We review regional plate tectonic models that tie interpretations of crustal type, kinematics of rifting and opening, and early rift fill together to outline the GOM opening and early evolution. Finally, we discuss ambiguities in available data that allow multiple alternative models to continue to persist, and the kinds of data that still need to be collected if we are to resolve the new basin opening controversies that have emerged in the last few decades.