

EXTENSION, SEDIMENTATION AND MODIFICATION OF THE GREATER GULF OF MEXICO BASIN, AND THE PLACE OF THE EAST TEXAS BASIN WITHIN IT

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The Northern Gulf of Mexico Basin is a complex set of Mesozoic-Cenozoic passive margin basins distinctive for the role of salt-related structuring. The basin formed by two phases of extension: Phase I (Norian-Calloviaian, 225-162 Ma) extended continental crust over 200km in a NW-SE direction as North America 'pulled out' of Pangea; Phase II (Oxfordian-Valanginian) created new oceanic crust during a 420 counterclockwise rotation of Yucatan.

Phase I extension has formed the basic structural grain of the northern margins of the basin, including the East Texas - Sabine Uplift area. Northwest-oriented intracontinental transform zones form the northeastern margin of the basin complex, and separate zones within the basin. Stretching left blocks of thick crust surrounded by regions of thin, highly extended crust. The thick-crust blocks became the later 'arches' or 'uplifts' characteristic of the northeastern and western sectors of the Gulf of Mexico Basin. The intervening basins, along with the main Texas-Louisiana-Campeche Basin, probably sank below sea level, may have accumulated Jurassic presalt sediments, and then were covered with salt up to 2km thick during the initial contact of the basin with the world ocean.

The East Texas salt basin is a linear NE-trending trough, which once contained thick salt that has now gone into pillows and diapirs. The geometry is quite different from North Louisiana; it may have formed in the lee of the Sabine block as it was pulled relative southeastward. Later modifications include thermal doming in the Cretaceous and Laramide-induced arching in the Eocene.

The major Jurassic source rocks of the Gulf basins are at the base of the postrift subsidence, and are matured by further subsidence. Later Cretaceous source rocks (Eagle Ford) are mostly immature in East Texas but mature on the margins of the main Gulf of Mexico basin. The younger Cenozoic shelf-margin succession yields gas and some oil formed during outbuilding of the shelf margin by Cenozoic deltaic progradation.