A View of the Genetic Development of Gulf of Mexico Petroleum Systems

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ABSTRACT

The development of petroleum systems in the Gulf of Mexico links explicitly to regional tectonics and the establishment of regional drainage systems. Prior to the extensional opening of the Gulf of Mexico, the Permian-Triassic documents the post-collisional collapse of the Ouachita-Appalachian orogen. As the Gulf of Mexico begins to open in the Jurassic, the deposition of critical petroleum system elements begins: salt (Callovian) and Smackover source (Oxfordian). Towards the end of the Jurassic, the Cordilleran collisions that characterize the western U.S. and Mexico begin to generate and fill large foreland basins—the Tertiary exhumation of these will provide the sediment load to drive charge in the Gulf of Mexico. A locally important Albo-Aptian source and the regionally extensive marine mid-Cretaceous source(s) are deposited after the Gulf of Mexico has fully opened. With these source rocks in place, the progression of the Cordillera begins to drive sediment load and maturation of these sources. Initially drainage from the exhuming Western Interior of the U.S. injects large sediment thicknesses into South Texas driving paleogene petroleum systems in that area. The Eocene Wilcox delta produces the youngest source system in the Gulf of Mexico. The subsequent shift of sediment to the present-day Mississippi drives Miocene and younger charge in the central Gulf of Mexico. The ongoing advance of the Cordilleran front exhumes many onshore Mexico basins limiting petroleum systems to a narrow fringe around the Gulf of Mexico. The motion of Cuba around the Yucatan drove Chiapas deformation in the Miocene and derived sediment loads the Upper Jurassic strata in the offshore Gulf of Mexico.