

Grouping Regional Source Rocks from the Gulf of Mexico and Circum-Atlantic Conjugate Margins According to their Tectonic Phase

Paul Mann¹

¹Department of Earth and Atmospheric Sciences, University of Houston, Science & Research Bldg. 1, Rm. 312, Houston, Texas

ABSTRACT

The Mesozoic breakup of Pangea provides the tectonic framework for understanding regional source deposition in the Gulf of Mexico and circum-Atlantic. The richest treasure trove of source rocks is found in the oldest Triassic and Jurassic rift basins and their overlying passive margins in the Gulf of Mexico and central Atlantic conjugate margins of the eastern USA and northwest Africa. The Gulf of Mexico experienced a more complex history of two rifting phases with an intervening sag phase. In the Gulf of Mexico first phase rifting occurred from Triassic to Middle Jurassic (200–160 Ma) and resumed with continued rifting and oceanic crust formation of the deep Gulf of Mexico during the Late Jurassic (160–152 Ma). The second rift phase is associated with the Tithonian-Oxfordian source rock interval deposited within the sag phase that subsided above the older, Triassic-Jurassic rifted continental crust. Mature sources of the oceanic anoxic event 2 (OAE2) of Turonian age are also present around the passive margins of the Gulf of Mexico. Mature Eocene and Miocene sources in the Gulf of Mexico are more challenging to relate to specific tectonic or oceanographic events of the passive margin period. In the Equatorial Atlantic with the rifting of a Late Jurassic rifting event of North America and a fused Africa–South America and overlying passive margin was followed by Aptian, oblique separation of Africa and South America followed by its own passive margin. Mature sources related to OAE2 (Cenomanian-Turonian) are present in the overlying and conjugate, passive margins. In the South Atlantic, rifting includes older, pre-rift sources of Permian and Late Jurassic age in southernmost South America—but its most productive sources are lacustrine deposits within continental rifts of Neocomian-Barremian age as the South Atlantic rift system and oceanic basin opened from south to north. Both OAE1 of Aptian-Albian age and OAE2 of Cenomanian-Turonian age were deposited during the period of the early passive margin that postdates the early rift, lake phase. The changing plate setting of source rocks is illustrated by a plate animation with known source rocks appearing at their type of formation.

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