

Provenance and Paleogeography of the Late Jurassic Norphlet Formation, Eastern Gulf of Mexico

Lovell, Thomas R.¹; Weislogel, Amy¹ (1) Department of Geological Sciences, University of Alabama, Tuscaloosa, AL.

Knowledge of reservoir distribution and quality in the offshore eastern Gulf of Mexico (EGOM) is essential for future economic development of hydrocarbon resources. Extensive exploration in the onshore EGOM provides abundant lithologic and geophysical data for Norphlet Fm. reservoir characterization. However, offshore regions of the EGOM are significantly less explored, and due to sparse lithologic data, predicting offshore EGOM Norphlet Fm. reservoir characteristics is merely speculative. A preliminary paleogeographic model of the late Jurassic Norphlet Fm. is projected into the offshore EGOM in order to predict reservoir distribution and quality. This model synthesizes provenance and facies analyses of data from wells in the onshore and state waters areas of Alabama and Florida, as well as federal waters areas. These analyses utilize detrital zircon U-Pb geochronology, thin-section petrography and petrology, and core and well log analysis.

U-Pb analyses of detrital zircons taken from Norphlet Fm. cores indicate major age populations between 350-500, 500-650, and 1000-1300 Ma. These are consistent with an Appalachian orogen sediment source. In addition, 540-580 Ma zircons support the potential of Pan-African Suwannee terrane sources. Modal analysis of detrital framework grains from thin-section petrography and petrology indicates sub-arkose, sub-litharenite, and lithic arkose sandstone composition. Compositional data plot within continental block, magmatic arc, and recycled orogen provenance fields in QFL and QmFLt diagrams. This implies sediment sourcing from the Appalachian structural front and uplifted fault blocks associated with the rifting of Pangea. Core descriptions yield facies interpretations, including: alluvial fan, wadi, eolian dune, interdune, and marine.

The integration of U-Pb ages and compositional data support rocks of the Appalachian orogen as the dominant source of Norphlet Fm. detritus. The resultant Norphlet Fm. preliminary paleogeographic model provides an interpretation of sediment transport into the EGOM, sourced within the Appalachian structural front as well as uplifted fault blocks of the Pan-African Suwannee terrane. Clastic sediment derived from the eastern Suwannee terrane suggests sand transport into more distal portions of the EGOM. Together, provenance and facies analyses suggest the possibility that Norphlet Fm. reservoir rocks are distributed in more distal regions of the EGOM than previously considered.