INTEGRATED BIOSTRATIGRAPHIC AND SEQUENCE STRATIGRAPHIC FRAMEWORK: KEY TO SEDIMENTARY BASIN MODELING

MANCINI, E. A., PUCKETT, T. M. and PARCELL, W. C. The University of Alabama, Tuscaloosa, AL USA

Sedimentary basin modeling was performed for Mesozoic and Cenozoic strata in the Mississippi Interior Salt Basin, Gulf Coastal Plain of the United States. The establishment of a chronostratigraphic framework based on high resolution biostratigraphy and sequence stratigraphy is critical in reconstructing basin geohistory. The chronostratigraphy was established through the integration of ammonite, foraminiferal, calcareous nannoplankton, and palynomorph biozones with physical surfaces associated with unconformity-bounded units. Twenty-nine unconformity-bounded units were identified in Mesozoic and Cenozoic strata of the Mississippi Interior Salt Basin. Microfossils were also used for paleoecologic interpretations and paleowater depth determinations. Basin modeling indicates that tectonic subsidence rates were greatest during the Jurassic and decreased progressively from the Jurassic to the late Tertiary. Transgressive peaks were recorded for strata of Oxfordian, Turonian, Campanian and Priabonian ages. Greatest accommodation space was generated during the Jurassic and Early Cretaceous. Variation in sediment accumulation rate is related to lithology, unit thickness, and duration of deposition. Highest mean sediment accumulation rates were recorded for Late Jurassic and Early Cretaceous strata. Sediment supply in concert with tectonics and eustasy were the primary controls on sediment accumulation and cyclicity. Hydrocarbon maturity modeling indicates that effective petroleum source rocks include Upper Jurassic Smackover carbonate mudstones regionally, Lower Cretaceous shales potentially locally, and Upper Cretaceous shales locally in the Perry sub-basin area. Generation of oil from the Smackover commenced at 8,000 to 11,000 feet during the Early Cretaceous and continued into the Cenozoic.