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Transgressive-Regressive (T-R) Cycles: Advancement in Sequence Stratigraphic Analysis of Continental and Coastal Plain Strata of U.S. Gulf of Mexico and Western Europe

Sequence stratigraphy represents a major advancement because it provides a means for correlation and mapping of strata through the recognition of sequences that are bounded by unconformities or correlative conformities. Although stratal architecture on passive continental margins is affected by changes in sea level, climate, tectonics and sediment supply, the stable nature of passive margins has led to the assumption that global sea level changes are the primary factors controlling stratal patterns. Therefore, current stratigraphic analysis is based chiefly on a model that utilizes depositional sequences that are controlled by eustasy. However, a sequence stratigraphy model based solely on eustasy has little application where applied to continental and coastal plain strata, which are deposited above sea level. The architecture of these strata is controlled by changes in stratigraphic base level, which in continental deposits functions independently from changes in eustasy. Factors affecting stratal patterns in continental deposits include tectonics, sediment supply, and climate. A need exists for a sequence stratigraphy model that incorporates these factors in addition to sea level and has application for correlating and mapping lithofacies associations in continental and coastal plain depositional systems. The concept of transgressive-regressive (T-R) cycles fulfills this need. T-R cycles have excellent utility for establishing a stratigraphic framework for stratal correlation and for reconstructing the geohistory of basins in Western Europe and the U.S. Gulf of Mexico areas. These cycles are recognized by a combination of factors including stratal geometries, nature of cycle boundaries, facies stacking patterns within cycles, and large-scale shifts in major facies belts.