Using Sequence Stratigraphy to Refine Estimates of Sediment-Component Accumulation Rates in the Monterey Formation

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Abstract

A primary aspect of sequence stratigraphy is dividing strata into genetically related packages. Traditional biostratigraphic analyses, integrated with paleomagnetic and isotope chronostratigraphy, generally provides million-year (sequence-scale) resolution that has been the standard for most Monterey studies. Thus, most estimates of sediment-component accumulation have been limited to longer duration periods, generally coinciding with biostratigraphic stages or depositional sequences. Recent advances utilizing U-Pb techniques and geochemical correlation of ash beds, however, offer an opportunity for high-resolution chronostratigraphy (0.1 M.Y.) and improved estimates of sediment-component accumulation rates. This will ultimately enhance our delineation of depositional systems of the Monterey.

When integrated with an improved understanding of deposition and diagenesis, high-resolution chronostratigraphy offers the potential to resolve sub-Milankovitch events and component accumulation in specific Monterey Formation stratigraphic intervals. For example, repetitive parasequence-scale lithofacies stacking, recognized in several Monterey outcrops, have been postulated to represent Milankovitch-driven cyclicity. The interpreted parasequences are typically bounded by dolomite beds, interpreted as authigenic deposits that represent slowing or pauses of sedimentation. Sediments deposited between the dolomite beds are typically thin-bedded and heterogeneous, predominantly biogenic-silica-rich porcelanite and chert, interbedded with clay-rich mudstone and siliceous mudstone. Organic matter tends to be concentrated in the mud-rich beds and bedsets. Verification of the frequency of these parasequence-scale units would provide new constraints on estimates of component accumulation rates (biogenic silica, detritus, and organic matter) as well as the mass of sediment contributed by authigenic processes (dolomite and phosphate).