

Monterey Formation Overview and Context for New Research

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Abstract

The Miocene Monterey Formation of California provides a potentially unsurpassed archive of Neogene paleoclimatic and paleo-oceanographic evolution as its deposition spans the Miocene Climatic Optimum and the Miocene Climatic transition. It is an important reservoir of organic carbon, potentially large enough to have influenced the global transition from greenhouse to icehouse conditions, as well as being the major source rock for petroleum in California. Highly biosiliceous, it is the best studied of the world's Neogene diatomaceous deposits that developed along oceanic upwelling margins in the Miocene. It accumulated in numerous new and rejuvenated sedimentary basins that developed with the transition from convergent to transform geometry along the Pacific-North American plate margin. The bathymetry of these basins intercepted open-ocean oxygen minimum zones or created restricted, silled basins that helped preserve organic matter and minimized bioturbation and degradation of a detailed sedimentary record. Although the member-scale compositional lithostratigraphic succession is similar between basins – reflecting the climatic/oceanographic stages of the Miocene – local bathymetric gradients and local exposure to deep bottom-scouring currents, created large lateral variation in environment, sediment thickness and composition. These lateral variations are critical controls of reservoir and source-rock properties, and also provide challenges and opportunities for generating quantitative histories of biogeochemical fluxes and paleo-oceanographic conditions.