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THE MONTEREY FORMATION OF COASTAL ORANGE COUNTY, CALIFORNIA: PRELIMINARY SEDIMENTOLOGIC AND DIAGENETIC FINDINGS

The Los Angeles Basin is a famously prolific petroleum-producing province and the Miocene Monterey Formation is the likely source of much of its oil. Only one portion of extensive Monterey outcrops in the southwestern basin – the Newport Back Bay (NBB) section – has been extensively studied, and that was primarily for its biostratigraphic and paleoceanographic record. Remarkably little has been published on the fundamental sedimentology of the Monterey in the San Joaquin Hills of coastal Orange County. We have begun a stratigraphic, lithologic, geochemical, and diagenetic investigation of the Monterey between Newport and Laguna Beach. In addition to characteristic Monterey lithologies (diatomite, siliceous shale, dolostone, porcelanite, and chert), local facies include abundant turbidites, leaf- and twig-bearing shale, and large (1-5m diameter) wood-nucleated dolomitic concretions, suggesting a relatively proximal depositional environment. The study area also contains distinct canyon-fill facies of intraformational conglomerate and massive sandstone. Total Organic Carbon ranges from <1% to >5%. Much of the formation is contorted and cut by low-angle, sometimes bedding-parallel, faults. At present, we are unable to unequivocally distinguish synsedimentary from postdepositional deformation at all scales.

Increased burial from NBB to the south end of Crystal Cove State Park (CC) is indicated by the silica phase of fine-grained rocks. The NBB area consists mostly of opal-A phase diatomaceous lithologies. Increased diagenesis to the south is shown by a transition to opal-CT around Corona Del Mar and to diagenetic quartz in the coastal CC area. Different diagenetic grade at the top of the Monterey section in NBB and CC indicates at least 600m greater burial at CC than at NBB before uplift.

Future study will further investigate lateral and vertical facies variation, the timing of deformation, and employ additional methods to determine maximum burial depth. We are also studying the diagenesis of common schist-bearing sandstone beds.