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Submerged Shorelines of Pilgrim Banks and the Northern Channel Islands, Southern California Continental Borderland, as Vertical Tectonic Strain Markers

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Abstract

An understanding of the complex tectonic interactions at the boundary between the Transverse and Peninsular Range provinces of southern California is of vital importance to seismic hazard analysis for coastal cities in the region. Tectonic deformation resulting from processes at this boundary is well expressed within the southern California Borderland, with the added benefit of being relatively accessible and undisturbed. In order to illuminate some of the processes occurring at this boundary we have been investigating Late Pleistocene-Holocene submerged low-stand shorelines rimming the Northern Channel

Islands and submarine banks within the southern California Continental Borderland, for use as vertical strain markers. Using high-resolution multibeam mapping, direct submersible observations, and available seismic reflection profiles we are able to recognize distinct wave-cut platforms, paleo-seacliffs, and nearshore sedimentary facies characteristic of modern shorelines in the region. Using AMS 14C dating we have successfully dated numerous intertidal invertebrate shells, predominantly *Mytilus californianus*, from a number of these shorelines. Dates from a -120 m shoreline on Pilgrim Banks, when compared to eustatic sea-level curves, suggest a significant amount of vertical movement during the Holocene. Quantification of the magnitude of this vertical motion is continuing. In addition to vertical motions, the knowledge gained from the deformation of these shorelines by motion of strike-slip faults such as the Santa Cruz Island Fault will aid in constraining earthquake models for these active, seismogenic faults.

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