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GRAVITY-DEFINED NARROW SUBBASINS ALONG THE MARGINS OF THE LOS ANGELES BASIN, CALIFORNIA

A synthesis of gravity, geologic, and physical property data leads to new insights on secondary structures in the Los Angeles Basin (LAB). Prominent gravity gradients, reflecting reverse faults that juxtapose dense pre-Cenozoic basement rock and low-density sedimentary fill, clearly identify boundaries of the LAB defined by the Santa Monica-Hollywood-Raymond and Palos Verdes fault systems. Although mapped regional faults and local active fault strands generally follow these steep gravity gradients, in places the geophysically-defined range front faults bounding the LAB deviate from the mapped faults. Enhancing short-wavelength, shallow-source gravity anomalies clearly shows narrow gravity lows reflecting increased sediment thickness lying between the defined range front faults and intrabasin arches. Inversion models used to define the geometry of these narrow subbasins (widths up to about 2 km) indicate that the associated ~ 5 mGal gravity anomalies reflect an additional 0.5 to 1.5 km of near-surface, low-density sediments. Our preliminary interpretation is that the subbasins represent flexural basins or basement monoclines loaded by thrusting along the margins of the LAB. Although our basin models are consistent with an origin related to flexure, basin thickening related to strike-slip faulting or to a back limb of a thrust fault cannot be discounted. The existence of the proposed flexural basins raises questions on their implications for seismic hazards and oil potential.