LARGE IMPACT STRUCTURE OFFSHORE SOUTHERN CALIFORNIA?

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Recently compiled bathymetric data including dense grids of conventional echo-soundings (NOS, 1999) and underway multi-beam bathymetry swaths (Goldfinger and others, 2000) have revealed a large sub-circular structure of about 29 km in diameter in the California Continental Borderland. This feature is centered about 70 km west of the San Diego County coastline just east of San Clemente Island, and so we refer to it as the San Clemente Structure. A domal uplift with a diameter of 7 km rising 530 m above the ocean floor occurs in the center of the structure. An annular depression, ranging in width from 5 km to just over 10 km, surrounds the central dome, and an anticlinal rim, roughly 5 km wide with an average height above the ocean floor of 300 m, encircles the depression. The average depth from the rim to depression floor is 110 m. Seismic data show the San Clemente Structure to deform the regional Catalina Schist basement (Bohannon and Geist, 1998). Deformation appears to wane with depth and distance from the structure. Seismic reflection profiles also suggest the structural elevations of these uplifts are greater than their topographic expression, and that the annular depression contains more than 400 meters of sedimentary fill (Vedder and others, 1974; Moore and Beyer, 1975; Bohannon and Geist, 1998). Our evaluation of the fill suggests it may exceed one kilometer (Fig. 1). Such large-scale circular features associated with intense deformation in a circular pattern can arise from endogenetic processes, in which some igneous, metamorphic, or tectonic activity may be involved; or exogenetic processes, involving meteoritic or cometary impact. This sub-circular structure may be a caldera, a schist diapir, or an impact structure. Present data does not allow discrimination between these hypotheses with any certainty, though gravity and magnetics data are inconsistent with a caldera. The dimensions of the structure are consistent with average values for impact structures, while the overall structure is broadly consistent with both the impact and diapir hypotheses.

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