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GEOLOGIC STRUCTURE OF THE SAN PEDRO SHELF REGION, SOUTHERN CALIFORNIA

An integrated interpretation of marine seismic-reflection and aeromagnetic data as well as multibeam bathymetry shows the complex Pleistocene history of rocks beneath the San Pedro shelf, west of Los Angeles. Prominent structures include the nearshore Wilmington graben, the Palos Verdes Fault Zone, and numerous faults below the west part of the shelf and slope. For subsurface depths less than 2 km, the Palos Verdes Fault Zone can be divided into three segments. Under the shelf, the northwest segment includes several fault strands that dip steeply west. Under the slope, the middle fault segment comprises several normal faults, most of which dip east. Near Lasuen Knoll, the southeast fault segment, includes thrust and reverse faults, many of which dip east. Apparently fresh seafloor scarps along the Palos Verdes Fault zone near the base of this knoll indicate recent fault movement. Possible wavecut terraces and sediment core samples that contain fossils of Quaternary outer-shelf fauna indicate that this knoll was subaerial and has rapidly subsided several hundred meters. Models of aeromagnetic data measured over the west San Pedro shelf indicate a large magnetic rock body that is probably middle Miocene basalt. Sedimentary rocks over the basalt are tightly folded, whereas folds in sedimentary rocks east of the basalt have much longer wavelengths. This difference probably resulted because the basalt was more competent during deformation than the sedimentary rocks.