NEW INSIGHTS INTO THE TECTONICS OF THE CENTRAL CALIFORNIA COAST RANGES FROM CROSS-SECTIONS BASED ON DIGITAL GEOLOGIC MAPPING AND POTENTIAL-FIELD GEOPHYSICS

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We have compiled a new digital geologic map of the central California Coast Ranges, covering the area from Monterey Bay southward to the Santa Ynez Mountains, and from the coast eastward to the San Andreas fault. This map synthesizes digital geologic maps of Monterey and San Luis Obispo Counties, the Santa Maria and Cuyama 30'X60' quadrangles, and other published geologic maps with a new, unified stratigraphic interpretation. We combined this map with oil-well, gravity, and aeromagnetic data to produce a series of crustal-scale cross-sections that offer new insights into the 3D structure of the Coast Ranges, including as follows:

1. In the subsurface beneath the San Antonio River valley, we model a northeast-dipping, blind, reverse (oblique?) fault as a southeast-trending continuation of the Jolon fault. Deformation and uplift of Pleistocene gravels in the hanging wall block suggests Quaternary slip along the Jolon fault, but further work is necessary to determine whether there has been Holocene activity and to establish a Quaternary slip rate.
2. Preliminary restoration of Miocene and younger Hosgri fault-parallel compression across the Santa Ynez River and Lion's Head faults yields about 4 km shortening (27% strain) along a line from Point Conception through Santa Rita Valley. This computation suggests that an apparent southward decrease in right-lateral offset on the Hosgri Fault, from about 90 km at Point Sal to zero at Point Arguello (see Langenheim et al., this session) was not accommodated by fault-parallel Coast Range shortening between the Santa Ynez River and Lions Head faults, and instead was accommodated by slip along yet-to-be-identified faults.
3. Gravity and aeromagnetic data along a line from Point San Luis through the Irish Hills demonstrate that the southwest-dipping Los Osos fault is a young reverse fault with modest (<1 km total) dip separation that has been superimposed on a older, larger, northeast-dipping basement normal fault.

We continue to develop widely spaced regional cross-sections spanning the central Coast Ranges together with closely spaced, detailed cross-sections in certain areas that exhibit key tectonic relationships. We are using these cross-sections to refine a preliminary 3D seismotectonic model of the central Coast Ranges (see Jachens et al., this session).