CRUSTAL STRUCTURE ADJACENT TO THE SAN ANDREAS FAULT FROM CHOLAME VALLEY TO THE NORTHERN CARRIZO PLAIN, CENTRAL CALIFORNIA

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A synthesis of geologic and geophysical data places constraints on crustal structure adjacent to the San Andreas Fault (SAF) from Cholame Valley to the northern Carrizo Plain. Southwest of the SAF, Quaternary to Oligocene(?) sedimentary rocks up to 3 km thick overlie variably magnetic granitic basement of the Salinian block. The most prominent Neogene structure is the Red Hills Fault, a thrust ~10 km SW of the SAF that dips 30º NE and places granitic basement over Pliocene sedimentary rocks. It offsets the subhorizontal basement surface ~2.5 km vertically (NE-side up), equivalent to ~4 km of SAF-perpendicular shortening. No Quaternary deformation is mapped where it projects to the surface, and it appears to intersect the near-vertical SAF at a depth of only 4-6 km. It cannot move as a thrust without cutting the SAF, so we interpret it as an inactive fault within a crustal block that has been transported north along a strike-slip fault to its present location. Northeast of the SAF, post-Miocene deformation within 7-10 km of the SAF is accommodated by tight folds and steeply dipping faults that may merge with the SAF at depth. From Orchard Peak to the Pyramid Hills, several east-dipping thrusts verge SW and place Cretaceous Great Valley sequence over late Miocene to Pliocene sedimentary rocks. These faults may have been localized because Cretaceous strata here were already east-dipping prior to Pliocene shortening. On the west edge of the San Joaquin Valley, Pleistocene and older strata are deformed by the fault-cored Kettleman Hills anticline. There are two major magnetic anomalies (highs) NE of the SAF. The Palo Prieto high is adjacent to the SAF and extends for 30-40 km parallel to the SAF. No magnetic rocks crop out above this anomaly, but we model the top of it at a depth of ~2 km; the bottom is not resolved. The Great Valley anomaly extends for over 500 km along strike and we model the west edge of it beneath the Kettleman Hills. Our models indicate that the Palo Prieto and Great Valley anomaly sources are not connected at a depth shallower than ~15 km. We interpret them as different lithologies: the Palo Prieto source as partly serpentinized ultramafic rock, and the Great Valley source as basement of Sierran affinity. The non-magnetic basement between these bodies is most likely Franciscan thrust under the Great Valley Sequence.