

Are the Wellman Ranch and Hog Lake Sites Portions of a Dismembered Positive Flower Structure along the San Jacinto Fault, SE California?: Implications for the Age of the Bautista Formation and Stress Loading During Earthquake Ruptures

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ABSTRACT

I propose a detailed field and laboratory study of the Pleistocene Bautista Formation and the Mesozoic Burnt Valley Complex at two sites, separated by ~19 km along the San Jacinto Fault, southern California. At the Wellman Ranch site, these two units are juxtaposed along a northeast verging thrust fault, while at the Hog Lake site juxtaposition is along a southwest verging thrust fault. Removal of ~19 km of separation suggests an original positive flower structure. Previous work indicates that the fault zone architecture at the Wellman Ranch site is asymmetric with most damage occurring within a ~15 m zone within the Burnt Valley Complex. In contrast, within the Bautista, damage is characterized by local pulverization of individual quartz grains. During the long term history of the San Jacinto Fault, in situ fragmentation within the Bautista likely reflects stress loading during numerous earthquakes. My objective is to assess if the asymmetry of damage at the Wellman Ranch site, including porosity development, is mirrored by the asymmetry of damage at the Hog Lake site. If my objective is met, then it would support the idea that the flower structure was displaced by ~19 km. Given a published 12.1 (+3.4/-2.6) mm/year slip rate and ~19 km of dextral displacement, the over thrusting of the Burnt Valley Complex likely occurred between about 1.2 and 2 Ma. If this interpretation is correct, then the Bautista within the study area is likely older than the middle Pleistocene (0.78 to 0.13 Ma).