

Incipient Pulverization at Shallow Burial Depths Along the San Jacinto Fault, Southern California

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Abstract

We studied the fault zone architecture and searched for evidence of shallow damage production in sandstones along the Clark strand of the San Jacinto Fault in Rock House Canyon, western Salton Trough, California. Here, the fault juxtaposes tonalite on the northeast against the Bautista sandstone on the southwest. The fault core and associated damage zone is visible at two separate fault exposures that have experienced total burial depths of ~70 m and ~120m, respectively. Physical damage in the lower exposure resembles incipient pulverization in the sandstone “wallrock”, and exhibits a preferred crack orientation that is perpendicular to the fault, which in turn suggests the occurrence of significant *in situ* brittle deformation at this very shallow burial depth. The upper exposure at 70 m burial depth displays very little evidence of fragmentation of sand grains outside of the fault core; together, these observations suggest that the onset of pulverization occurs between about 70 and 120 m depth. Elemental and bulk mass redistributions, along with changes in observed clay mineralogy, indicate the occurrence of chemical changes resulting from fluid flow at both locations. Based on our observations and analysis of the data, we conclude that the observed physical damage and fluid related alterations are likely the result of stresses produced by dynamic rupture.