

TESTING THE "SHAKEOUT" SCENARIO EARTHQUAKE IN SAN GORGONIO PASS: FACT OR FICTION?

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Models for the maximum possible earthquake on the southernmost San Andreas fault hinge upon interpreting the structural complexity and diffuse seismicity of the San Gorgonio Pass (SGP) region. The "ShakeOut" Scenario Earthquake envisions a fault system that can propagate through the Pass in complex but understandable ways and generate an ~M 7.8 earthquake that ruptures from the Salton Sea to the Mojave Desert. Another model argues that the complexity in SGP arrests through going ruptures and limits their size to less than a M 7.5 earthquake on either the Coachella Valley or the San Bernardino and Mojave segments, respectively. One test of these contrasting models is to examine the paleoseismology and geomorphology of the SGP fault zone, an east-west trending set of thrust and tear faults that carry slip through the compressive stepover between the strike-slip Coachella Valley and San Bernardino segments of the San Andreas fault system. Perhaps the most convincing evidence that supports through going rupture is the fact that stepovers between active fault traces in SGP never exceed 3 km, the threshold limit set by historic earthquakes for arresting rupture (Wesnowsky, 2008). However, a review of published data from SGP appears to support both models. For example, a study of one segment of the SGP fault zone shows evidence for at least two ruptures since ~AD 1300, consistent with paleoseismic records on the San Andreas fault outside the Pass region. In contrast, data from another SGP fault segment support only one rupture in the last 3000 yrs, far less frequent than one would expect for a through going ShakeOut Scenario Earthquake. The slip rate of the SGP fault zone is estimated to be ~50% slower than for the strike-slip San Andreas fault segments that feed into SGP and would seem to argue in favor of the Pass acting as a barrier to through going rupture. Yet SGP fault slip rates must be considered to be minimum estimates because they are determined from single fault traces and do not take into account the off-fault deformation that occurs in the region via folding, secondary faulting, and seismicity, etc. Clearly a more detailed study of the SGP fault zone, both at the surface and in the subsurface, is necessary to give a definitive ruling in favor or against the ShakeOut Scenario Earthquake.