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A 2000-year Record of Great Earthquakes on the Southern San Andreas Fault and a Forecast for the Future

by

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ABSTRACT

Tens of geologists working over the past 30 years have been unraveling a >2000 year paleoearthquake record of the southern San Andreas fault and recent discoveries have increased concern about the hazard facing southern California. For example, new findings in the Carrizo Plain indicate that the average recurrence for large earthquakes may be <100 years, not 250-300 years as previously believed. Fault-system wide, the data show an average recurrence of <100 years or <200 years, to the north and south of Cajon Pass, respectively. The most recent San Andreas earthquakes (MREs) in these regions happened in 1857 (M 7.8 Fort Tejon) and ~1680 (M >7.5 Indio?). The time since the MRE is therefore >50% the average recurrence, a realization that has led many to consider the southern California section of the San Andreas fault overdue for a large earthquake. Another alarming result has emerged from the southernmost part of the fault where the paleoearthquake record permits the correlation of earthquakes across the Coachella Valley and Mojave regions, an along strike distance of over 300 km. Modelers have shown that a Salton Sea to Palmdale earthquake would generate areas of intense shaking lasting up to 4 minutes in southern California basins (including the southern San Joaquin Valley). The impact of this geologic field data, and the ominous forecast that the fault may be overdue, has led a host of federal, state, and local agencies to forge a diverse collaboration to take proactive measures that can mitigate the impact of this event. Recently millions of southern Californians participated in an earthquake drill - 'The Great Southern California Shakeout' - to help prepare for the inevitable M 7.5 or larger earthquake on the southern San Andreas fault. When, not if, this massive earthquake occurs it has the potential to be the most devastating (and expensive) natural disaster ever.