

ESTIMATING EARTHQUAKE POTENTIAL FROM FAULTS.

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Traditional methods for estimating earthquake potential from faults involve some form of the characteristic earthquake hypothesis. The size of characteristic earthquakes is estimated from fault length or past earthquakes, and their frequency is estimated from the slip rates on faults. These methods, as they have been applied in California and elsewhere, have been found to overestimate the rate of characteristic earthquakes, compared to the historic catalog. Possible reasons could include neglect of aseismic slip, temporal variations in earthquake rate, or underestimates of the size of the earthquakes responsible for fault slip. Evidence from theoretical mechanics and from earthquake catalogs point to the last explanation. Implications include the fact that future earthquakes will be larger than, but less frequent than, predicted by most accepted models. These models can be made consistent with earthquake records by assuming a power-law distribution of earthquake size, with an upper size limit considerably larger than generally given by regressions of magnitude on length.