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Assessing seismic hazard with uncertain paleoseimic data

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Paleoseimic data consisting of the age of past rupturing events (or time intervals between events) in a fault segment can be used to estimate the seismic hazard posed by the fault. Because these data have many uncertainties, it is important to take them into account when calculating the potential hazard. We have developed a bootstrapping procedure to deal with uncertain paleoseimic data and have combined it with the probability distribution of the earthquake return-time derived from two cellular-automata single-fault models. The combined procedure works as a renewal model from which hazard rate and conditional probability distributions can be constructed in order to make quantitative predictions of earthquake return times. The procedure has been tested on paleoseimic data from two segments of the San Andreas Fault, California, and four segments of the Wasatch Fault, Utah. In all the tested cases, the resulting empirical distribution functions are well fitted, in the Kolmogorov-Smirnov sense, by the cellular-automata cumulative distribution functions.