

Communicating Foreshock and Aftershock Hazard through Time-dependent Hazard Maps

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Whenever earthquake shaking is felt by the public, there is an immediate need for information. Because the fear of earthquakes is fueled by uncertainty, one of the most common concerns of the public and press are: What will come next? Will this earthquake be followed by a bigger one? Will there be aftershocks? Seismologists have addressed this need for information through simple probabilistic statements such as, "There is a 5% chance that a larger event will occur within the next week" or "We expect about 60 of $M > 3$ aftershocks in the next 24 hours." Such hazard assessments are based on formulations of time-dependent foreshock and aftershock rates such as Jones (1985) and Reasenberg and Jones (1989). The latter combines the Gutenberg-Richter and Omori laws into a time-dependent probabilistic expression of earthquake rate. We have implemented a map-based approach on the World Wide Web to communicate aftershock and foreshock hazard to the public. By combining the Reasenberg and Jones model with hazard-mapping techniques, including detailed mapping of spatial and temporal variations of seismicity within aftershock zones, we compute probabilistic time-dependent hazard maps. These maps portray the probability of experiencing intensity MMI VI shaking in the next 24 hours. This probability is combined with the time-independent hazard obtained from the USGS national hazard maps. Maps are available on the Internet and updated every 15 minutes. The maps have been implemented in a community modeling environment that will facilitate supplements to the hazard maps such as computing risk or damage potential. We have developed these maps with different user communities in mind: the general public, the press, emergency services, insurance agencies, and scientists. In this presentation, we outline our method and the underlying philosophy of communicating time-dependent hazard.