TIME-DEPENDENT PROBABILISTIC SEISMIC HAZARD MAPS FOR ALASKA

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We are currently revising the probabilistic seismic hazard maps of Alaska and the Aleutians. In addition to preparing time-independent hazard maps, we are also preparing experimental maps including time-dependent earthquake probability estimates. We are investigating various methods to implement time-dependent probability density functions including log-normal and Brownian Passage Time. These methods depend on knowing the time of the last earthquake, knowledge of the earthquake recurrence interval and its variability, and the assumption that the last earthquake reset the slip deficit. We are actively investigating the applicability of these assumptions to the Alaska/Aleutian region as well as the sensitivity to default assumptions. We are also investigating the significance of both elastic and viscoelastic stress transfer on source and target faults as a means for influencing the time-dependent probabilities. We find that time-dependent probabilities can lead to significant reductions in probability on some faults while increasing others by more than a factor of two. This can dramatically change the resulting seismic hazard maps relative to time-independent seismic hazard maps. Elastic stress transfer can have a large but relatively short lived effect on the probabilities while time-dependent phenomena such as post-seismic afterslip and viscoelastic deformation can have larger and more long-lasting effect on earthquake probabilities.