

A comparison of USGS National Seismic Hazard Maps with observed ground motions

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People's confidence to scientific models accumulates through continuously validating the models's predictions by observations. We compared the seismic hazard forecasts of the four published versions of USGS National Seismic Hazard Maps with the observed ground motions since 2000, which are largely prospective to the models. We verified that the observed seismic hazards computed from macroseismic intensity records were comparable to those from instrumental records. This provides a usable source of data for model testing for the Central and Eastern United States, where instrumental records are almost nonexistent. The observed hazards were found to be generally consistent with the forecasted ones for peak ground acceleration. The forecasted hazards for spectral acceleration at 1 s for California appeared to be conservative. Recent versions of the model were often in better agreement with the observations. Small earthquakes, as expected, were found to have insignificant impact on spectral acceleration at 1 s. Induced earthquakes showed an obvious impact to seismic hazard for short return periods, while that for long return periods was less clear. We examined the sufficiency of data amount by computing the statistical power of tests.

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