Geophysical Research Abstracts
Vol. 18, EGU2016-17401, 2016
EGU General Assembly 2016

Comparing USGS national seismic hazard maps with internet-based macroseismic intensity observations

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Verifying a nationwide seismic hazard assessment using data collected after the assessment has been made (i.e. prospective data) is a direct consistency check of the assessment. We directly compared the predicted rate of ground motion exceedance by the four available versions of the USGS national seismic hazard map (NSHMP, 1996, 2002, 2008, 2014) with the actual observed rate during 2000-2013. The data were prospective to the two earlier versions of NSHMP. We used two sets of somewhat independent data, namely 1) the USGS "Did You Feel It?" (DYFI) intensity reports, 2) instrumental ground motion records extracted from ShakeMap stations. Although both are observed data, they come in different degrees of accuracy.

Our results indicated that for California, the predicted and observed hazards were very comparable. The two sets of data gave consistent results, implying robustness. The consistency also encourages the use of DYFI data for hazard verification in the Central and Eastern US (CEUS), where instrumental records are lacking. The result showed that the observed ground-motion exceedance was also consistent with the predicted in CEUS.

The primary value of this study is to demonstrate the usefulness of DYFI data, originally designed for community communication instead of scientific analysis, for the purpose of hazard verification.