Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SSS01-07 Room:102B Time:May 24 15:45-16:00

Comparing USGS national seismic hazard maps with DYFI intensity observations

MAK, Sum[1*] ; SCHORLEMMER, Danijel[1]

[1]GFZ-Potsdam

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 three sets of somewhat independent data, namely 1) the USGS "Did You Feel It?" (DYFI) intensity reports, 2) ShakeMap gridded ground motions, and 3) instrumental ground motion records extracted from ShakeMap stations. The first two were not strictly observations but models calibrated by observations. The third was true observation but the amount of data is limited.

Our results indicated that for California, the predicted and observed hazards are very comparable. Discrepancy lied generally on the safe side (i.e., predicted hazard not lower than the observed one). The three sets of data gave consistent results, implying robustness. The consistency also encourages the use of DYFI and ShakeMap 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 larger than the predicted in CEUS, implying a possible underpredicted hazard.

The primary value of this study is to demonstrate the usefulness of DYFI and ShakeMap data, originally designed for community communication instead of scientific analysis, for the purpose of hazard verification. The large discrepancy between the observed and predicted gorund-motion exceedance in CEUS implied that either the ground motions were not described correctly by DYFI and ShakeMap for the region, or the hazard was actually underestimated. Induced seismicity could be the cause of this underestimation.

Keywords: Earthquake Hazard, Prediction, Validation