

PROBABILISTIC SEISMIC HAZARD ZONING IN IRAN: A STATE-OF-THE-ART ON THE STUDIES DURING FOUR DECADES

Mehdi ZARE

*Associate Prof., IIEES, Tehran, Iran
mzare@iiees.ac.ir*

Keywords: PSHA, Seismic Hazard, Iran, Seismotectonic Provinces

This is a state-of-the-art paper on the seismic hazard zoning studies performed in Iran since early 70's by 2013 (Figure-1). Reliable seismic hazard studies depend on having a robust earthquake catalog, and relevant attenuation model applied for the hazard analysis. The better input for hazard assessment results in more reliable the parameters and the seismic hazard assessments.

The first generation of seismic hazard maps are developed based on the deterministic approach maximum intensities (by Berberian 1977; in Karimiparidari et al., 2013) and then using the probabilistic approach, in 1984 Mohajer-Ashjai and Bozorgnia has published the 1st PGA zoning map for 475 years of Iran. This was the probabilistic hazard assessment for all over country. The 475 years return period hazard zoning map for the greater Tehran region was developed and published for PGA values by Berberian et al., 1985 (in Karimiparidari et al., 2013). The next generation of seismic hazard zoning studies was performed for Dam sites that were under construction during 1980's and 1990's in Iran. The Seismic hazard zoning map of Iran for "design earthquake" (so called 475 years of return period), is published in 1987 as an attachment to the Iranian Seismic Building code (Standard No. 2800). There are probabilistic assessment for maximum ground acceleration in 1999 and 2013 (Tavakoli and Ashitany, 1999; Karimiparidari et al., 2013; Figure 1). The specific seismic hazard zoning maps for greater cities and specific industrial sites are presented in the recent years; i.e. for Tehran greater area (Figure 2). The application of spectral attenuation laws resulted in the spectral hazard zoning maps (Zare, 2007; Hamzehloo, 2013; in Karimiparidari et al., 2013). These maps have been developed using region specific ground-motion prediction equations by considering various ground-motion parameters that involve spectral acceleration, displacement and peak ground-motion values. To develop region specific tools useful for mapping local site conditions based on Vs30 proxies, derived from the compilations of shallow geology and topography maps. There are on-going attempts to develop the probabilistic seismic intensity zoning map for the country. Other studies applies the neo-deterministic and strong motion modeling in the city of Tehran (Hamzehloo et al., 2010, Zafarani, 2013; in Karimiparidari et al., 2013).

The seismic hazard zoning maps in Iran are developed in the last 40 years. The trend of such zoning studies started by deterministic approaches and the continued by probabilistic approached and finally the spectral zoning maps. The future trend in hazard mapping seems to cover the intensity assessment and the neo-deterministic approaches; the development of site specific hazard analysis for Iran based on the detailed integrated the site characteristics database.

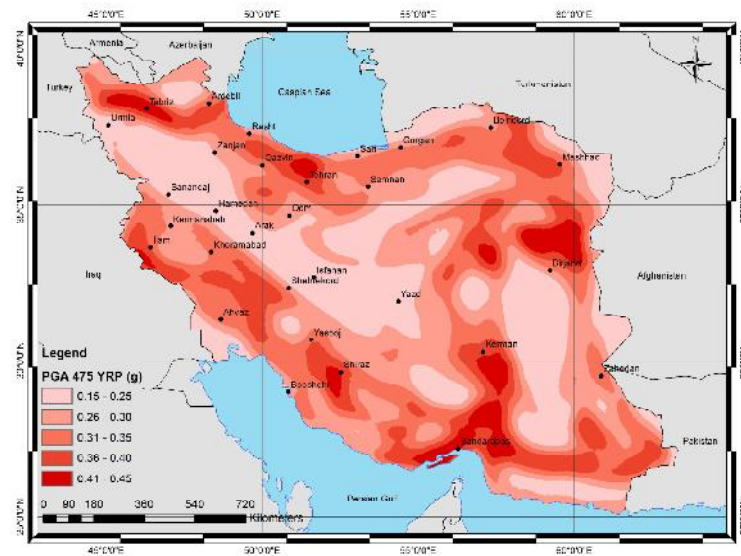


Figure 1. PSHA result for 475 years return period (Karimiparidari et al., 2013)

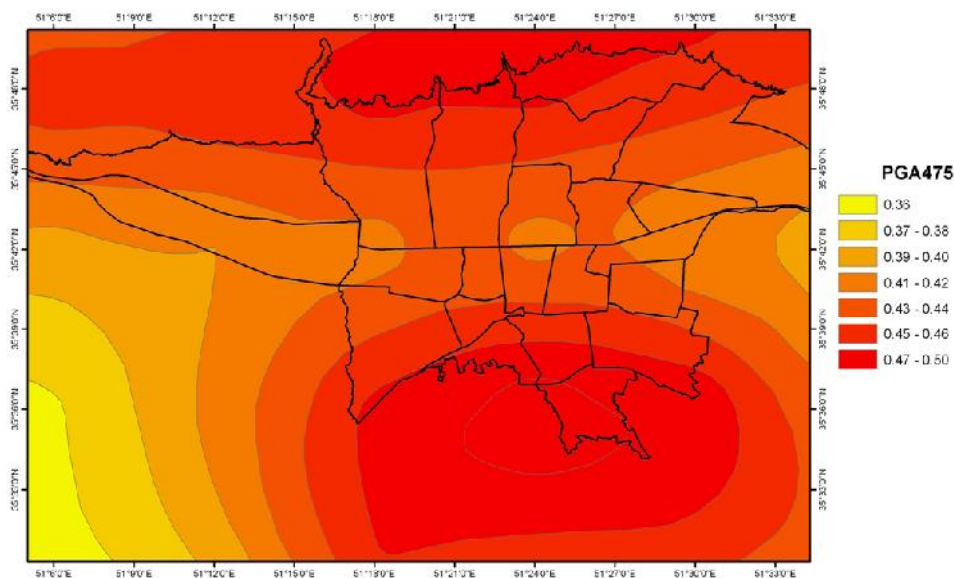


Figure 2. PSHA result for 475 years in the greater Tehran region

REFERENCES

- Karimiparidari S, Zare M, Memarian H and Kijko A (2013) Iranian Earthquakes; A Uniformed Catalog with Moment Magnitude, *Journal of Seismology*
- Tavakoli B and Ghafory-Ashtiany M (1999) Seismic Hazard Assessment of Iran, *Annali di Geofisica*, 42(6): 2013-2021
- Zaré M (2007) Spectral Demand Curves Based on the Selected Strong Motion Records in Iran, *Journal of Seismology and Earthquake Engineering (JSEE)*, 7(3): 111-123

