Geophysical Research Abstracts
Vol. 16, EGU2014-12568-1, 2014
EGU General Assembly 2014

Seismic hazard assessment in Central Asia using smoothed seismicity approaches

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Abstract
Central Asia has a long history of large to moderate frequent seismicity and is therefore considered one of the most seismically active regions with a high hazard level in the world. In the hazard map produced at global scale by GSHAP project in 1999(Giardini, 1999), Central Asia is characterized by peak ground accelerations with return period of 475 years as high as 4.8 m/s2. Therefore Central Asia was selected as a target area for EMCA project (Earthquake Model Central Asia), a regional project of GEM (Global Earthquake Model) for this area. In the framework of EMCA, a new generation of seismic hazard maps are foreseen in terms of macro-seismic intensity, in turn to be used to obtain seismic risk maps for the region. Therefore Intensity Prediction Equation (IPE) had been developed for the region based on the distribution of intensity data for different earthquakes occurred in Central Asia since the end of 19th century (Bindi et al. 2011). The same observed intensity distribution had been used to assess the seismic hazard following the site approach (Bindi et al. 2012).
In this study, we present the probabilistic seismic hazard assessment of Central Asia in terms of MSK-64 based on two kernel estimation methods. We consider the smoothed seismicity approaches of Frankel (1995), modified for considering the adaptive kernel proposed by Stock and Smith (2002), and of Woo (1996), modified for considering a grid of sites and estimating a separate bandwidth for each site. The activity rate maps are shown from Frankel approach showing the effects of fixed and adaptive kernel. The hazard is estimated for rock site condition based on 10% probability of exceedance in 50 years. Maximum intensity of about 9 is observed in the Hindukush region.