TECTONIC STUDIES AND EARTHQUAKE RISK BASED ON TECTONIC MORPHOLOGY STUDIES IN SAVEH RECTANGLE

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INTRODUCTION

The Saveh area is located in the south foreland basin of the central Alborz (Alavi, 1996). Based on geological divisions of Iran, it consists of two zones, including Central Iran and the Urmia-Dokhtar Zone (Berberian and King, 1981), so that the assumed range is located in northwestern Iran and part of the Urmia-Dokhtar volcanic belt passes from its south (Berberian, 2014, 1976). Both zones, including structural-sedimentary and seismic zones, are important landforms of the Iran Plateau, consequently, this zone is a unique region. In this region, active and seismic faults form the boundary between the tectonic subsidence and the mountains of the region along the east-west to the northwest-southeast direction. The occurrence of destructive earthquakes in the past centuries, especially in the past few decades, indicates the seismicity and seismic potential of the faults in this area. Therefore, identifying and investigating faults in the area and assessing the seismic and morphological potential of the area, so using some of the geomorphic indices such as; Hypsometric Integral (Hi), Elongation Ratio (Re), Basin Shape (Bs), Drainage Asymmetry Factor (AF), Valley-to-Depth Width (Vf), Valley Floor Width-to-Height Ratio (Vc), Valley Cross-Section Ratio (V), Stream Length-Gradient Index (SL) Mountain Front Sinuosity (Smf), it is highly significant. The way forward of this study, entails seismic sources, identification and estimation of seismic parameters and involvement of historical earthquakes in analyses. Seismic variables are then estimated using Gutenberg-Richter and Kiko-Sellovel methods as well as Zmap program and attributed to seismic sources. The mentioned seismicity data were analyzed and calculated in order to provide the seismic acceleration map in Saveh area in EZ-Frisk software environment. The probabilistic method was used in order to estimate the maximum values of the ground-level movement parameters. Based on these studies, were prepared the active tectonic zoning map in the study area and acceleration earthquake map in the near-zero-period (PGA) for the return period of 475, 975, and 2475 years by using probabilistic method. Regarding these maps, the maximum acceleration is approximately 0.94 g and is related to the earthquake with a return period of 2475 years. For a return period of 975 years, the maximum acceleration values are nearly 0.69 g. In the return period of 475 years, the maximum earthquake acceleration is about 0.49 g, which they have a good compatible with the basins that demonstrate high activity.

MATERİALS AND METHODS

In this essay, morphological potential of the area, have been measured by using geomorphic indices In nine basins with the names of Shur paeini, Lar, Bidlu, Amirabad, Shur Balai, Eshtehard, Bouin Zahra, Arab and Khar Rud. Then, area tectonic seismic involving the identification of seismic sources (collected through tectonic and structural geology and field studies) and the study of historical and instrumental earthquakes were considered. Then, by preparing earthquakes to 2018 and updating them and removing the foreshocks and aftershocks by using Gardner & Knopoff method (Gardner & Knopoff, 1974), both earthquake density potential map and seismic-tectonic map in Saveh area were provided and plotted. The seismic parameters were estimated by Gutenberg-Richter method and the Kiko-Sellovel final distribution

with using Zmap software and was analyzed the data seismic rate. The earthquake return period in this area was also estimated using the Gutenberg-Richter method. Eventually, using Ez-Frisk software and probabilistic method, in the form of a neat mesh of points in the Saveh area, seismic acceleration zoning is performed based on different return periods.

RESULTS AND DISCUSSION

The active zoning of the Saveh area in which its nine basins, the morphological indices, measured and calculated, which has led to the setting of several tectonic classification for this area. So that the performance of active tectonic in this area range entails a range of activities from low to high. Part of Khar Rud basin in frontal part 1, the altitudes on the boundary between the three basins of Eshtehard, Shur Balaei and Amirabad in frontal 2 and 4, Lar basin in frontal part 6 and parts of the elevations between Bidlu and Amirabad basins in the foreheads 7 and 8 have the highest tectonic activity and are in the tectonic class 4 and highest degree of activity. Other areas along the mountain front are also active tectonic class 3 and inferior areas such as Khar rud, Boein Zahra, Shur Paeini and Shur Balaei are in tectonic class 1 and low activity. After performing the probabilistic earthquake risk analysis steps, earthquake acceleration zoning in the zero-second period PGA (Peak Ground Acceleration) is performed for the 475,975 and 2475 year return periods in Saveh area. For this purpose, the calculations of the previous sections are used as EZ-Frisk software input data in this section. In this section, a network of proper scattering points (5×5 km intervals) defined with more than 645 points in this zone and earthquake horizontal acceleration based on the mentioned attenuation equations was calculated for each of these points and the acceleration zoning maps was achieved.

CONCLUSİON

Preliminary studies of the tectonic seismicity of the Saveh area which located in a very important part of the Iran Plateau, have been carried out during this study. This area, despite the most dangerous seismic-tectonic elements of the Structural-Sedimentary zone of Central Iran, such as the Ipik Fault (which triggered major historical and instrumental events) and several other active and young seismic faults in terms of active tectonic and tectonic seismicity, it is one of the most dynamic and unstable areas, so that the performance of active tectonic in this area range entails a range of activities from low to high. Part of Khar Rud basin in frontal part 1, the altitudes on the boundary between the three basins of Eshtehard, Shur Balaei and Amirabad in frontal 2 and 4, Lar basin in frontal part 6 and parts of the elevations between Bidlu and Amirabad basins in the foreheads 7 and 8 have the highest tectonic activity and are in the tectonic class 4 and highest degree of activity. Other areas along the mountain front are also active tectonic class 3 and inferior areas such as Khar rud, Boein Zahra, shur paeini and shur balaei are in tectonic class 1 and low activity.

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