



The evaluation of seismic risk analysis in Eskişehir (Turkey) on the basis of Gutenberg-Richter and Gumbel Methods

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Eskişehir with a population over 500.000 is an industrial city in the central Turkey. The greatest part of the settlement in the city is located on alluvium. Three earthquake sources have potential to affect the city; the North Anatolian Fault Zone (NAFZ) at north, the Kütahya Fault Zone (KFZ) at southwest and the Eskişehir Fault Zone (EFZ) which passes throughout the city, trending E-W direction. The largest earthquake (M_s : 6.4) on EFZ was occurred in 1956.

The seismic risk analysis of the study area was performed with the use of Gutenberg-Richter and Gumbel Methods in this study. Earthquakes within a 100-km radius circle for 100-year period was statistically evaluated for the Eskişehir Centrum. Computations and magnitudes were homogenized to the surface magnitude (M_s), and the earthquakes with a magnitude equal or greater than 4.0 ($M_s \geq 4.0$) were considered, to have a uniform and homogeneous parameter for comparison of the size of earthquakes in the process of seismic hazard.

The Gutenberg-Richter Method considers all the earthquakes occurred in the past, however the Gumbel Method considers the largest earthquake occurred in each year. In the case of lack of data for any year, magnitude is taken as 4.0.

The earthquake magnitudes for 100- and 50-year periods calculated from the Gutenberg-Richter method are 6.5 and 6.2 and those from the Gumbel method are 6.7 and 6.2. The return period (T_d) and probability of exceedance (R %) for the largest earthquake with a magnitude of 6.4 which has been occurred in the study area are found from the Gutenberg-Richter Method as 76 years and 1.323% and those from the

Gumbel Method are 67 years and 1.507%. It is concluded that the values calculated from both models are consistent.