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PREDICTION SEISMIC PARAMETERS OF THE SOUTHWESTERN TURKEY USING DATA FROM INSTRUMENTAL EARTHQUAKE CATALOGUE

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ABSTRACT

The seismic hazard, which inevitably occurs with the occurrence of earthquakes, stands out as a phenomenon that needs to be analyzed in order to predict future earthquakes. The Global Seismic Hazard Assessment Program (GSHAP), where more than 500 scientists participated, prepared a worldwide seismic hazard map as name The Global Seismic Hazard Map (GSHM). GSHM indicates two main earthquake zones namely Circum-Pacific Seismic Belt and Alpine-Himalayan Orogenic Belt. Turkey is situated in the Alpine-Himalayan Orogenic Belt and exposed to varied levels of seismic hazard from moderate to high according to the Hazard Map. Southwestern Turkey has complex geological structures including the Lycian nappe, the autochthonous Menderes Massif and Bey Dag platform, metasediments and an ophiolitic melange unit. The study includes seven cities (Antalya, Burdur, Isparta, Denizli, Afyon, Uşak, Muğla) with a north boundary by Kütahya and Manisa cities, west boundary by Aydın city and Agean Sea, east boundary by Konya city and south boundary by Mediterreanean Sea. Normal faults and fracture systems at the centered zone of the study area are trending through the NE-SW direction which is a result of the NE-SW compressional forces, and NW-SE tensional forces. The previous hazard map of Turkey, which is nullified from 2019, indicated the study zone mostly at first-degree and slightly at second-degree. The study area is mostly over 0.2 PGA (average 0.32 PGA) according to the New Turkey Earthquake Regions Map. In this study, the Turkish earthquake catalogue data is used for analysing the seismic parameters of the zones. The study area is modelled by a circle with a radius of 220 km centered in Bucak (Burdur) and divide into five (I-V) seismic source zones considering intensity of earthquake data and seismotectonic structure of the zones. The magnitude recurrence parameters are analyzed based on the Gutenberg-Richter relation. The recurrence parameters a and b vary in the range of 3.27 – 4.26, and 0.73 – 0.90 respectively. The probability of occurrence of an earthquake with magnitude greater 5.5 for the study area is 100% in future 50 years and 72% with magnitude greater 7.0 for the seismic source zone I (Fethiye-Burdur).

Keywords: Earthquake Catalogue, Hazard, Seismic Parameters, Seismicity, Southwestern Turkey.