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Seismicity of the Izmir Fault Based On Historical Earthquakes

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Izmir and its surroundings are located in the Western Anatolian Extensional Province. Because it is located in a seismically active region, it is under the effect of many earthquakes with various intensity since historical periods. However, it is not known which fault caused these earthquakes occurred in Izmir city. Within the scope of this study, an integrated historical earthquake catalog has been prepared for Izmir city using over 15 earthquake catalogs. The earthquakes that may have been produced in historical period by Izmir Fault which pass through in the Izmir city have been revealed and earthquake potential of Izmir Fault has been interpreted.

Because of being important trade and settlement center since ancient times for many civilizations, so many earthquakes affecting Izmir city have been mostly recorded. The earthquake catalogs data indicate that more than 100 earthquakes affecting Izmir and its surroundings have occurred during the historical period. About 10 of them with intensity VIII and over directly caused great destruction in the Izmir city. For this reason, it is thought that these earthquakes originated from the Izmir Fault passing through Izmir settlement area.

Izmir fault, which is approximately 40 km long, is an active normal fault which consists of two segments with E-W extension. Historical earthquake records provide evidence that some of the destructive earthquakes occurred in Izmir city are originated by the normal fault with an E-W directional movement. Especially, 178 and 1688 A.D. earthquakes destroyed almost all of the Izmir city. It is mentioned that these earthquakes created surface rupture and caused vertical displacements. According to the geological data in historical records, these two earthquakes have probably been produced directly by the Izmir Fault. Besides these, catalog information shows that the destructions occurred by 688, 1040, 1654 and 1778 A.D. earthquakes are intensified in the impact area of Izmir Fault. Therefore, although not yet certain, it can be said that these earthquakes may been originated from Izmir Fault.

Consequently, a comprehensive earthquake catalog has been prepared for Izmir and its surroundings by compiling by historical records. Although the earthquake catalog we prepared support that the Izmir Fault move more than once in the historical period and produce destructive earthquakes in Izmir area and, the earthquakes can not be matched with Izmir Fault. For this purpose, paleoseismological studies supported by age data will be carried out on the Izmir Fault segments for the first time and it will be revealed which historical earthquakes are caused by the Izmir Fault segments according to the age data to be obtained. Thus, an earthquake recurrence period for Izmir Fault will be determined. This will also provide significant contributions to estimate earthquakes that the Izmir Fault can produce in the future and to make earthquake hazard assessments in Izmir city. This study is supported by TUBITAK –CAYDAG Project No: 117Y190.

Key words: Izmir Fault, historical earthquakes, paleoseismology