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ANALYZING THE SEISMICITY OF THE AEGEAN EXTENSION REGION (WEST TURKEY)

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The extension Aegean region is seismically one of the most active regions in the world. During history many large, intermediate and micro-earthquakes have occurred in this region (34°N–43°N, 20°E–30°E). To understand the tectonic characteristics of the region, in this study the seismicity parameters (b- values, a- values, Magnitude of completeness (Mc)) of this region were calculated. For the aim, two event categories were constructed. The first catalog from 1900 to 28 July 2019 includes only large and intermediate earthquakes with magnitudes greater than M ≥ 5 occurred in this region (Figure 1-a). Before this period, station coverage for this region was not good to correctly calculate earthquake parameters. Therefore, earthquakes with magnitudes less than M ≥ 2 in the catalog were excluded. As a result of this, only large and intermediate earthquakes for this period were selected. Another catalog from 2012 to 28 July 2019 includes all earthquakes with greater than ML ≥ 2 occurred in this region (Figure 1-b). The constructed seismic event catalogs within the periods were recorded by seismic stations that are operated by Boğaziçi University Kandilli Observatory and Earthquake Research Institute (KOERI) and Disaster and Emergency Management Authority Presidential of Earthquake Department (AFAD). To improve the determining seismic parameters of the study area, the earthquake catalogs from KOERI and AFAD were initially combined. Then, declustering method was applied to discriminate real (natural) seismic events from artificial (unnatural) events.

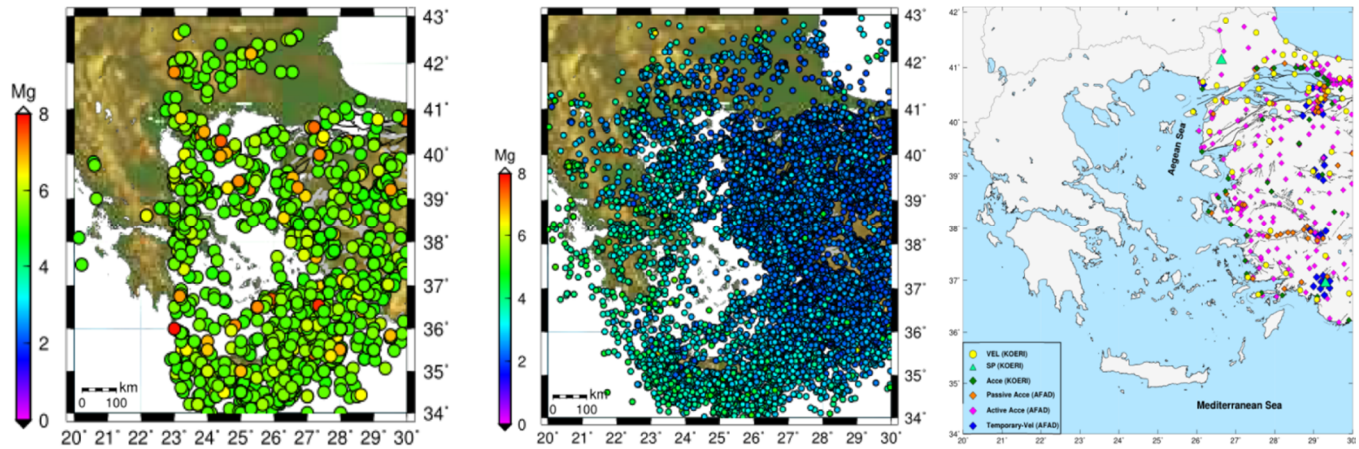

Figure 1. (a) From 1900 to 28 July 2019, distribution of seismic events with ML ≥ 5. (b) From 2012 to 28 July 2019, distribution of seismic events with ML ≥ 2. (c) Distribution of seismic stations.

To calculate seismic parameters, ZMAP software (WIEMER, 2001) was used. Before using the software, to ensure dataset integrity, by using formula: ML=(0.9897*Md)+0.0978 (R2 =0.8955; Cohesion coefficient), the complete data set was converted to the local magnitude (ML) (Kalafat, 2016). The Gutenberg–Richter relation (Gutenberg and Richter, 1944) is widely used to empirically define significant relations in seismic hazard analysis. To define the frequency of occurrence of earthquakes as a function of magnitude, this equation: log10 N = a – bM is generally used. In this equation, N denotes the cumulative number of earthquakes with magnitude greater than M. The a-value and the b-value are

assumed to be constants in this relation. For the first catalog, Mc (Magnitude of Completeness), b-value, a value and annual from the declustered data's analyses are 5.3, 1.13-/+0.05, 8.812 and 6.738, respectively. For the second catalog, Mc (Magnitude of Completeness), b-value, a value and annual from the declustered data's analyses are 2, 0.76-/+0.05 and 5.995 and 5, 127, respectively.

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