

## STATISTICAL ANALYSIS OF THE INTEREVENT-TIME AND DISTANCE DISTRIBUTION OF LARGE EARTHQUAKES IN IRAN

Seyed Naser HASHEMI

*Assistant Professor, School of Earth Sciences, Damghan University, Damghan, Iran  
 hashemi@du.ac.ir*

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Most of the seismic energy (or tectonic loading) accumulated in lithosphere of active regions is released through the occurrence of large earthquakes. Hence, the study of the spatial and temporal pattern of these occurrences is very important for revealing the seismotectonic nature of these regions. Over the past decades, the statistics of the waiting times between consecutive earthquakes (so-called interevent-times) have become the focus of research (e.g., Molchan, 2005; Hainzl et al., 2006; Talbi et al., 2013). Statistical analysis of interevent-times of earthquakes allows the derivation of useful information that can allow the development of earthquake forecasting strategies (Talbi et al., 2013). A number of different distributions have been proposed to account for interevent-time variability, including exponential, lognormal, gamma, and Weibull distributions (Zoller & Hainzl, 2007).

In this research, the interevent-time distribution, migration distance, and directional pattern of the occurrence of successive earthquakes in Iran, with different magnitude thresholds ( $M \geq 4.5$ ,  $M \geq 5.0$ , and  $M \geq 5.5$ ), have been investigated. Additionally, the statistical correlation between interevent-time value and magnitude of earthquakes was carried out. Data catalog used in this analysis spans the years 1976-2018, containing 2781 earthquakes with  $M \geq 4.5$ , extracted from USGS database. Figure 1 shows the epicentral distribution of earthquakes ( $M \geq 5.0$ ) occurred in Iran, and also tie lines showing the directional and distance pattern of the occurrences of these successive earthquakes. Figure 2 clearly presents the histograms indicating the frequency distribution of interevent-time, migration distance, and directional trend of successive large ( $M \geq 5.0$ ) earthquakes of Iran (shown in Figure 1).

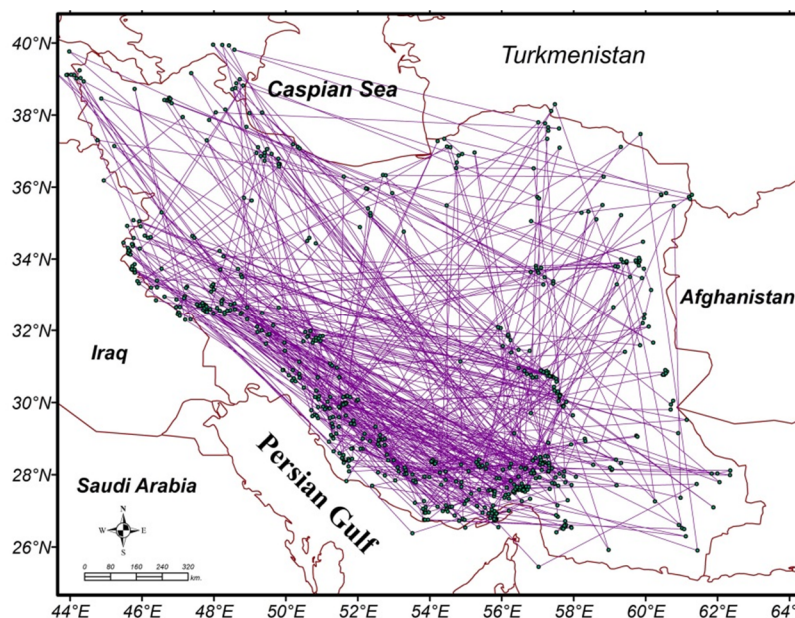


Figure 1. Map showing the migration pattern of successive large ( $M \geq 5.0$ ) earthquakes in Iran during 1976-2018.

Results obtained in this study indicate that the interevent-time distribution of earthquakes in Iran (Figure 2-a) can be fitted quite well by the gamma distribution. Furthermore, the directional analysis of the migrating trends of successive events occurred in this region indicates that a meaningful correlation between this directional pattern and the dominant trends of the active faults in Iran, can be observed (Figure 2-c). The statistical analysis and modeling of the interevent-time and distance distribution of events demonstrates that most of the paired successive earthquakes of this region occurred on the active segments of known fault systems. In addition, the bivariate correlation analysis of the magnitude, interevent-time and migrating distance of successive large earthquakes were carried out in this study, and the results obtained were interpreted in relation to the tectonic setting and active fault pattern of the region.

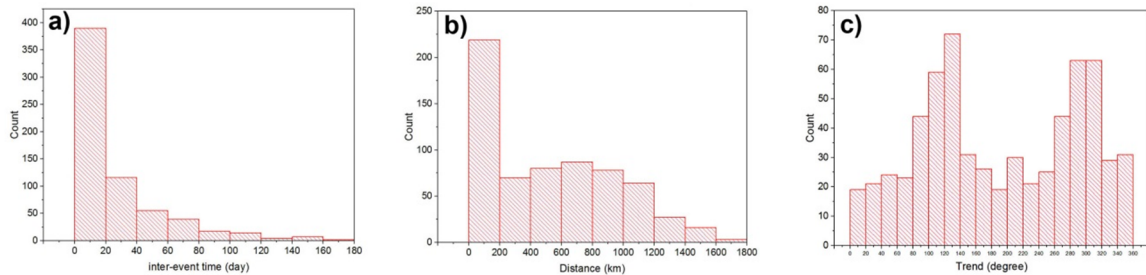


Figure 2. Histograms showing the frequency distribution of a) interevent-time, b) migration distance, and c) directional trend of successive large ( $M \geq 5.0$ ) earthquakes in Iran during 1976-2018.

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