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Data Article

Evaluation of $0 \leq M \leq 8$ earthquake data sets in African – Asian region during 1966–2015



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ABSTRACT

This article evaluates the occurrence of $0 \leq M \leq 8$ earthquake data sets for the period of 50 years (that is, January 1, 1966 to December 31, 2015) in African and Western Asia region. It is bounded by latitude 40° S to 40° N and longitude 30° W to 60° E with the focal depth of 0–700 km. Seventy seven thousand, six hundred and ninety-six data points were presented for the analysis. The data used were extracted from earthquake catalog of Advanced National Seismic system via <http://quake.geo.berkeley.edu/cnss/>, an official website of the Northern California Earthquake Data Centre, USA. Each datum comprised the earthquake occurrence date, time of the earthquake occurrence, epicenter's coordinates, focal depth and magnitude. The Gutenberg–Richter's relationship being the longest observed empirical relationship in seismology, analysis of variance and time series were used to analyze the seismicity of the study area. Annual distributions of earthquake occurrence based on magnitude variations with the limit $0 \leq M \leq 8$ were presented. The two constants *a* and *b* in the Gutenberg–Richter's equation, magnitude of completeness (MC) adjusted R-Square and *F*-value for the period of 1966–1975, 1976–1985, 1986–1995, 1996–2005, 2006–2015, and the entire period of investigation ranging from 1966 to

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2015 were determined so as to investigate the variations of these parameters on earthquake occurrence over time. The histograms of earthquake occurrence against magnitude of earthquakes for the selected years (1966–1975, 1976–1985, 1986–1995, 1996–2005, 2006–2015, and 1966–2015), and the decadal frequency distributions of earthquake occurrence were also plotted. The focal depth occurrence for each magnitude bins (0–0.9, 1–1.9, 2–2.9, 3–3.9, 4–4.9, 5–5.9, 6–6.9, 7–7.9, 8–8.9) were grouped into shallow, intermediate, and deep depths ranging from 0 to 70, 71 to 300, and 301 to 700 km as being used in seismology. The neural network analysis was also applied to the magnitude of the earthquake. The network uses a time series magnitude data as input with the output being the magnitude of the following day. If the nature of the earthquakes time series is stochastic, modeling and prediction is possible. The earthquake data sets presented in this article can further be adopted in the study of seismicity pattern, *b*-value using series of models, earthquake prediction and variations of earthquake parameters on African and/or Arabian plates. When this approach is integrated with other technique(s), it can provide insights to stability of African lithospheric plates especially the coastal region of Africa.

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Specifications Table

Subject area	<i>Computational Geophysics</i>
More specific subject area	<i>Earthquake</i>
Type of data	<i>Table and figure</i>
How data was acquired	<i>The seismic events were recorded by the seismographs of the Northern California Earthquake Data Centre, USA.</i>
Data format	<i>Raw and processed</i>
Experimental factors	<i>The data were extracted from the earthquake catalog of Advanced National Seismic system.</i>
Experimental features	<i>Computational analysis of earthquake parameters for the period of 50 years (1966–2015) using Microsoft Excel, SPSS and MATLAB R2013a software.</i>
Data source location	<i>The data were obtained for $0 \leq M \leq 8$ earthquake latitude $40^\circ S$ to $40^\circ N$ and longitude $30^\circ W$ to $60^\circ E$, focal depth distribution from 0 to 700 km for the period of January 1, 1966 to December 31, 2015. There were 77,696 data points in all.</i>
Data accessibility	<i>The data sets are with this article. It is also available on http://quake.geo.berkeley.edu/cnss/.</i>

Value of the data

- Can be used to study the seismicity pattern in African and/or Western Asia region.
- Can be used for *b*-value estimation using integrated models in African – Western Asia seismology.
- Can be used to study the effect of earthquake occurrence on African and/or Arabian lithospheric plates.
- Can be used to estimate the time scale dependence of earthquake parameters in subregions of Africa (Northern, Central, Western, Southern and Eastern Africa) (Fig. 1) and Middle East.
- Can be used to forecast the earthquake occurrence in African and/or Western Asia region.

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