

Assessing and characterizing of seismogenic zones in Iran using GIS-based spatial analysis techniques

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Abstract

Geospatial analysis techniques have been widely used in various fields in Earth sciences, specially for geohazard assessment studies. In this research, these techniques have been applied for identification and characterization of seismogenic zones in Iran, based on the analysis of seismicity and active faulting data. For this purpose, the Spatial Analyst extension of ArcGis (version 9.3) has been employed. In order to obtain a temporarily homogeneous earthquake data catalog, a catalog covering a time period of nearly 115 years (1900-2015), were filtered and categorized into three categories: data with low accuracy and precision ($M > 4.5$, 1900-1955), moderately accurate and precise data ($M > 4.0$, 1956-2005), and well located high accuracy and precision data ($M > 3.0$, 2006-2015). Density maps showing the spatial variation of seismicity and active faulting of the Iranian region were prepared. Then, the seismogenic zoning map of Iran was constructed by overlying seismicity and active faulting data layers and as a result, the main seismogenic zones of the region were identified. Accordingly, 6 seismogenic zones namely, North-Western Iran, Alborz, North-Eastern Iran, Zagros, Lut-Central Iran, and Makran, were identified and presented for the region. Furthermore, these partitioned zones were compared based on their seismicity characteristics. The results obtained indicate that among these zones, the Makran zone (with b-value of about 0.58) shows the least earthquake occurrence frequency, and in contrast, the Alborz zone shows the highest seismic activity. The good consistency observed between the seismogenic zoning map presented in this research and the results of the previous works indicates that the spatial analysis techniques can reliably be used for seismic hazard regionalization and identification of seismogenic hazardous zones in seismically active regions.

Keywords: Geohazards, Seismicity, Iran, Spatial Analysis, Seismogenic Zones.