A STUDY ON THE SEISMICITY PARAMETERS IN THE IRANIAN PLATEAU

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This article summarizes a recent study in the framework of the GEM (Global Earth Model) and EMME (Earthquake Model of the Middle East) project to establish the new catalog of seismicity for the Middle East, using all historical (pre-1900), early and modern instrumental events up to 2006. After omitting the duplicate events, aftershocks and foreshocks, and converting all magnitude to Mw scale, 27174 events remain for new catalog of Middle East from 1250 B.C. through 2006. The magnitude of completeness (Mc) was determined by cumulative frequency-magnitude distribution. Value of Mc is around 5.5, 5.0, 4.5 and 4.0, for the time periods before1960, 1963, 1975 and 1995, respectively. The average of teleseismic depths in all regions is less than 20 km. Minimum depth corresponds to Northern region (Alborz-Azarbayjan, Armania) with ~ 6 km. In the other subregions depths are between 10 and 16 km.

The first step for calculating seismic hazard in an area is preparing a uniform catalog consists of all historical and instrumental events. The region considered in this investigation covers a quadrangle limited by 11°N to 44°N and 30°E to 75°E compiled from both local and global sources. All of magnitude scales was unified by using regional conversion equations between mb, Ms, ML and Mw and convert to magnitude in Mw scale. After omitting events with 0 magnitudes and erroneously large depth, there will be a catalog with from all of historical and instrumental events, in Mw magnitude scale (Figure 1). This catalog contains events with magnitude 3.7-8.3 between 1250 B.C. and 2006 of which 10928 events occurred between 1976 and 2006 in last 10 years. This catalog was declustered with the Gardner and Knopoff (1974), Gruenthal, Uhrhammer (1986) and Reseanberg (1985) algorithms. These declustered catalogs contain 10167, 7201, 18144 and 27174 events, respectively.

The uniform catalog of earthquakes has provided a reliable and most complete collection of available information for seismic study in this region. It emerges from temporal and spatial completeness study of the catalog that significant variation in data survival in historical, early instrumental and modern instrumental time periods.

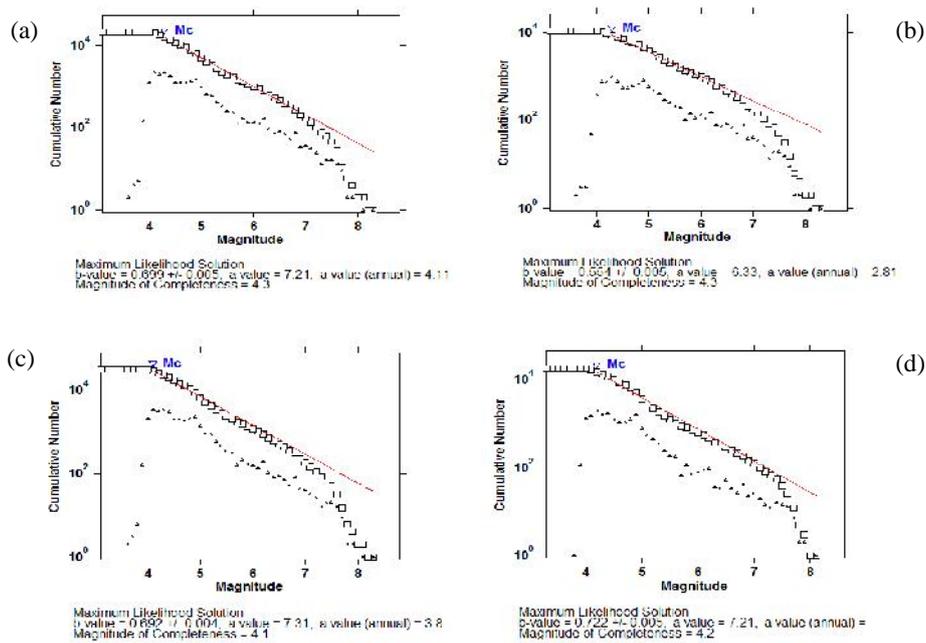Figure 1. Seismicity of Iranian Plateau (1900-2006)

Figure 2. Cumulative frequency number distributions plots after declustering using each of the methods; (a) Gardner and Knopoff method, (b) Gruenthal method, (c) Reseanberg method, and (d) Uhrhammer method

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