# NEW SEISMIC ZONATION OF IRAN FOR APPLICATION IN THE TIME AND MAGNITUDE PREDICTABLE MODEL

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In recent years, numerous studies have been done in order to reduce earthquake destructions. One of the researches in this field is the attempt to determine the time and magnitude of the next earthquake, and to do so, different models have been proposed. Barriers which stand in the way of precise prediction of the place, time, and magnitude of the next probable earthquake have resulted in a shift from prediction methods into the forecast methods (such as the time-dependent probabilistic seismic hazard assessment). Probabilistic time-dependent seismic hazard maps for different regions of the world including California (Peterson et al., 2007), Italy (Akinci et al., 2009), and Alaska (Boyd et al., 2008) have been developed. Generally, time-dependant models are based on seismic cycle theory (and elastic rebound theory) and the observation that recurrence times are quasi-cyclic in some studies of historical earthquakes. Various time-dependent or non-Poisson recurrence models are more consistent with our physical understanding of the main process of earthquake generation. Early models were time-independent models (Poisson models), but considering the fact that the time elapsed from the last mainshock and its magnitude affect the occurrence time and magnitude of the next mainshock in the same region, thus time-dependent models were proposed which have been improved many times during the recent years.

Based on the relationship between the amount of slip of an earthquake and the occurrence time of the next strong earthquake, two main time-dependent models can be considered: slip- and time-predictable model. In the first model, magnitude of the future mainshock depends on the elapsed time since the occurrence of the last mainshock, while in the second model; the occurrence time of the next mainshock depends on the magnitude and time of the last mainshock in the seismogenic source. Application of the regional time and magnitude predictable model for different regions of the world for describing the occurrence of earthquakes has been successful. In the study by Zafarani and Ghafoori (2013), this model was compared with the historical catalogue of Iranian earthquakes. Iranian plateau was divided into 15 seismogenic provinces, and then the time intervals of mainshocks in each of them were determined. But, considering the fact that for the application of these models some prerequisites are needed, among which the precise seismic zonation of the region under study is one of the most important factors, therefore, the precise zonation will result in the improvement of the results obtained from the application of regional time and magnitude predictable model. The current research is dedicated to this subject. Seismogenic regions are relatively small parts of the earth crust which includes the rupture zones (faults, deformation volume) of the largest mainshock of this part of the crust as well as secondary faults where smaller mainshocks are generated. Seismogenic regions are defined by the two basic criteria, i.e. seismic profiles and tectonic regimes of each region. Moreover, the characteristic property of a seismogenic region is the interaction among its faults during the important seismic excitations (redistribution of stress, etc.).

The separation of a seismic area into seismogenic regions is done based on certain seismotectonic and geomorphologic criteria which includes spatial clustering of seismicity, topography variations, dimensions of rupture zones of large earthquakes (surface fault traces, distribution of aftershock volumes of recent events, and well documented focal areas of

historical earthquakes) and evidence for interactions between seismic events.

In the present study, using aforementioned criteria as well as computer programs QGIS and Matlab, a new type of zonation is proposed for Iran region and then it is compared with the previous zonations proposed by Karakaisis (1994) and Papazachos et al. (1997).

The region of Iran in this study has been divided into 30 seismogenic source areas. Figure 1 shows the distribution of epicentres of earthquakes with magnitudes equal to or larger than 6.0 (Mw≥6.0) with the major faults in Iran.

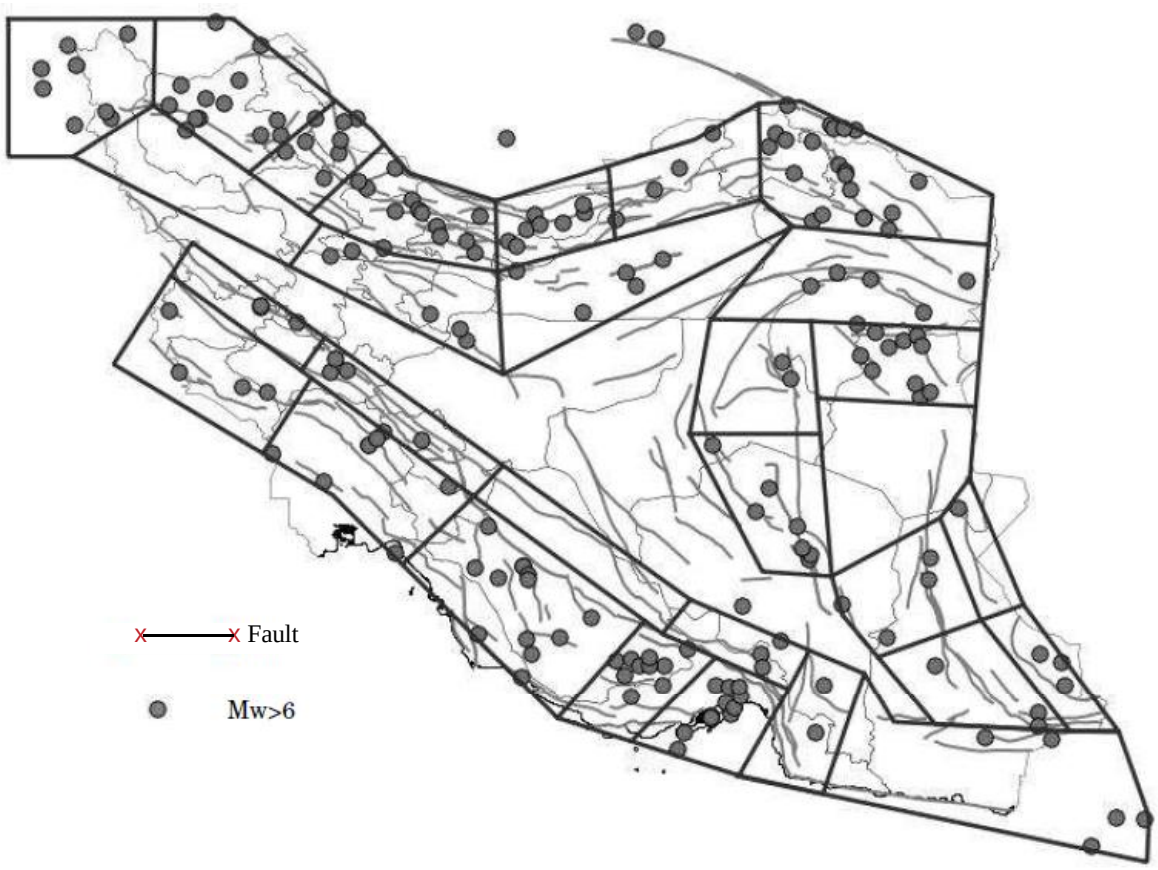


Figure 1. The seismogenic source areas of Iran proposed in the present paper

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