Estimating the Maximum Earthquake Magnitude in the Iranian Plateau

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Abstract

The Iranian Plateau has been subjected to destructive earthquakes throughout its history. Reliable assessment of the seismic hazard in this earthquake-prone region is therefore essential. Our study focuses on estimating the maximum earthquake magnitude as one of the main parameters of seismic hazard analysis. We implemented two quantitative approaches, namely probabilistic and deterministic. The probabilistic method allows combining the historical (i.e., incomplete) and the instrumental parts of a catalog with different levels of completeness and considers the uncertainties in earthquake magnitude determination. In this study, we used a unified, declustered, and complete catalog of earthquakes in Iran, covering the period from the 4th century B.C. to 2019. We calculated the maximum possible magnitudes for hundreds of grid points by using the seismicity data in a 200-km radial region around each grid point. The maximum possible earthquake was observed to vary between 6.0 and 8.2 and the highest values were found in the Alborz-Azarbayejan seismotectonic province, Kopeh-Dagh, central east Iran, Makran, and the southeast Zagros. The lowest $m_{\max}$ values were found in the Persian Gulf, Arabian Platform, Esfahan–Sirjan region, and the Dasht-e-Kavir Desert in central Iran. As a second part to this study, we calculated the maximum credible earthquakes for 1 103 identified major faults by using five empirical magnitude-scaling relationships. Our results were consistent with both the observed earthquakes and the seismic potential of the various seismogenic zones of Iran. The study results can be used in future seismic hazard analyses, and have fundamental implications for mitigating seismic risk in Iran.

Keywords: maximum earthquake magnitude; probabilistic approach, deterministic approach; seismic hazard, Iran seismicity

Introduction

Iran is located along the Alpine–Himalayan orogenic belt, where strong earthquakes are a regular occurrence. The first recorded event dates back to the 4th century BC, when a devastating earthquake, with an intensity of MMI=X, completely destroyed the ancient city of Ray (Ambraseys and Melville 2005; Berberian et al. 1983). Over the past half-century, catastrophic events, such as the 1962 Buin-Zahra (M 7.0), 1978 Tabas (M 7.3), 1990 Rudbar (M 7.4), and the 2003 Bam (M 6.6) earthquakes caused nearly 100 000 casualties. Clearly, the seismic risk to which people are exposed in this and similar disaster-prone regions must be reduced. Accordingly, seismic hazard analysis has emerged in the effort to lessen the effects of earthquake hazard on society.

Two quantitative approaches can be employed to estimate the seismic hazard in a given region, namely deterministic and probabilistic (Reiter 1991). By using appropriate ground motion models (GMMs), deterministic seismic hazard analysis (DSHA) provides one or more scenarios that represent the expected extreme situations. Such a scenario-based approach is usually calculated by estimating the maximum earthquake magnitude ($m_{\max}$) expected from each seismic source considering the minimum possible source-to-site distance (Abrahamson 2006; Klügel 2008; Klügel et al. 2006). On the other hand, probabilistic seismic hazard analysis (PSHA) takes into account ground motions from the full range of earthquake magnitudes that could occur from each seismic source at a given site over a given recurrence interval (Somerville and Moriwaki 2003).

Most important in both these seismic hazard approaches is that $m_{\max}$ has to be determined for any site of concern. In the DSHA, $m_{\max}$ is a key parameter that develops an individual earthquake scenario for each relevant source. In the PSHA, $m_{\max}$ also plays an important role, as the distribution of earthquake magnitude should be bounded to avoid the inclusion of unrealistically large earthquakes (Wheeler 2009). The current methods to estimate $m_{\max}$ can also be categorized as either deterministic or probabilistic (Kijko 2004). In the deterministic approach, $m_{\max}$ is obtained through empirical relationships based on the tectonic features and geological information of a particular region. These are related to various parameters, such as the type of faulting, slip rate, and the fault rupture dimensions (Anderson et al. 1996, 2017; Field et al. 1999; Hanks and Bakun 2002; Leonard 2010; Nowroozi 1985, 2010; Shaw 2009, 2013;

Somerville et al. 1999; Stein and Hanks 1998; Wells and Coppersmith 1994). In the probabilistic approach, $m_{\max}$ can be estimated by applying an appropriate statistical procedure to the earthquake catalog of the region under study (e.g., Kijko and Sellevoll 1989, 1992; Kijko 2004; Kijko and Singh 2011; Kijko et al. 2016).

Several studies have been conducted in Iran to estimate the seismicity parameters, including the maximum magnitude. The maximum likelihood method has been applied to estimate $m_{\max}$ from incomplete and uncertain earthquake catalogs for different models of the seismotectonic provinces of Iran (Mirzaei et al. 1997b; Tavakoli and Ghafory-Ashtiany 1999). Bastami and Kowsari (2014) estimated the maximum possible earthquake magnitude for the greater Tehran region using Gumbel's first asymptotic distribution. The $m_{\max}$ values have been mapped for the Zagros belt and the Iranian Plateau by Kalaneh and Agh-Atabai (2016) and Khodaverdian et al. (2016), respectively. A procedure developed by Kijko and Sellevoll (1989) and Kijko (2004) has been applied to estimate $m_{\max}$ for fifteen different regions in the Iranian Plateau from a magnitude-type homogeneous earthquake catalog (Mohammadi et al. 2016). An alternative approach was applied by Salamat et al. (2018, 2019), with the assessment of the first moment (the expected value) of $m_{\max}$ being replaced by the confidence level of $m_{\max}$ within a future, finite time interval. Furthermore, Mahsuli et al. (2019) estimated the seismicity parameters, including $m_{\max}$, for the 152 known active faults presented by Hessami and Jamali (2006). Recently, Kowsari et al. (2019) conducted sensitivity analyses to identify the most dominant factors that affect the estimated seismicic hazard parameters, including $m_{\max}$, for five major seismotectonic provinces in Iran. The authors found that the maximum earthquake and the earthquake magnitude uncertainty were the most influential factors.

To our knowledge, however, previous studies on $m_{\max}$ applied only the probabilistic procedures. Probabilistic methods are useful for regions with scant and incomplete information on active faults. A good example of such a region is southeast Iran, where the fault associated with the 26 December 2003 Bam earthquake (M 6.6) had not been identified previously (Talebian et al. 2004). In contrast, deterministic methods are useful for active seismic regions, where the main capable or active faults have been identified (Kowsari et al. 2017).

In this study, possibly for the first time, both the probabilistic and the deterministic approaches to $m_{\max}$ estimation was applied to Iran. The input information for the probabilistic procedures is the recent magnitude-type homogeneous earthquake catalog provided by Mousavi-Bafrouei and Mahani (2020). The product of computation is the $m_{\max}$ map for the territory of Iran. At the same time, the deterministic procedures were applied by application of the empirical relationships between rupture length and earthquake magnitude. In this approach, we used the database of Iranian active faults compiled by Javadi et al. (2013). In addition, we employed several scaling relationships to address the epistemic uncertainties that arose from the uncertainties in the relationships between fault length and magnitude.

Tectonic setting

A 1 000-km-wide compression zone between the colliding Eurasian and Arabian plates, with the overall convergence being approximately 25–35 mm/year, has led to the Iranian Plateau is one of the most seismically active areas in the world (Engdahl et al. 2006; Talebian and Jackson 2004). The plateau extends from the Zagros mountains in the west to the Hindu-Kush mountains in the east, and from the Alborz and Kopeh-Dagh mountains in the north to the Persian Gulf and the Arabian Sea in the south. The spatial and magnitude distribution of earthquakes in the various regions of this plateau differ; therefore, the Iranian Plateau has been divided into several seismotectonic provinces (Stocklin 1968; Takin 1972; Berberian 1976b; Nowroozi 1976; Tavakoli 1996; Mirzaei et al. 1998). Mirzaei et al. (1998) split Iran into five major seismotectonic provinces, namely Alborz-Azarbayejan, Zagros, central east Iran, Kopeh Dagh, and Makran. The seismotectonic model by Mirzaei et al. (1998), based on the reliable earthquake catalog, seismicity patterns, knowledge of tectonic and regional geomorphology is perhaps the best between several available models developed for the region. Figure 1 shows the boundary of the Iranian seismotectonic provinces, as proposed by Mirzaei et al. (1998), along with the distribution of the historical (pre-1900) and instrumentally recorded (1900–2012) earthquakes.

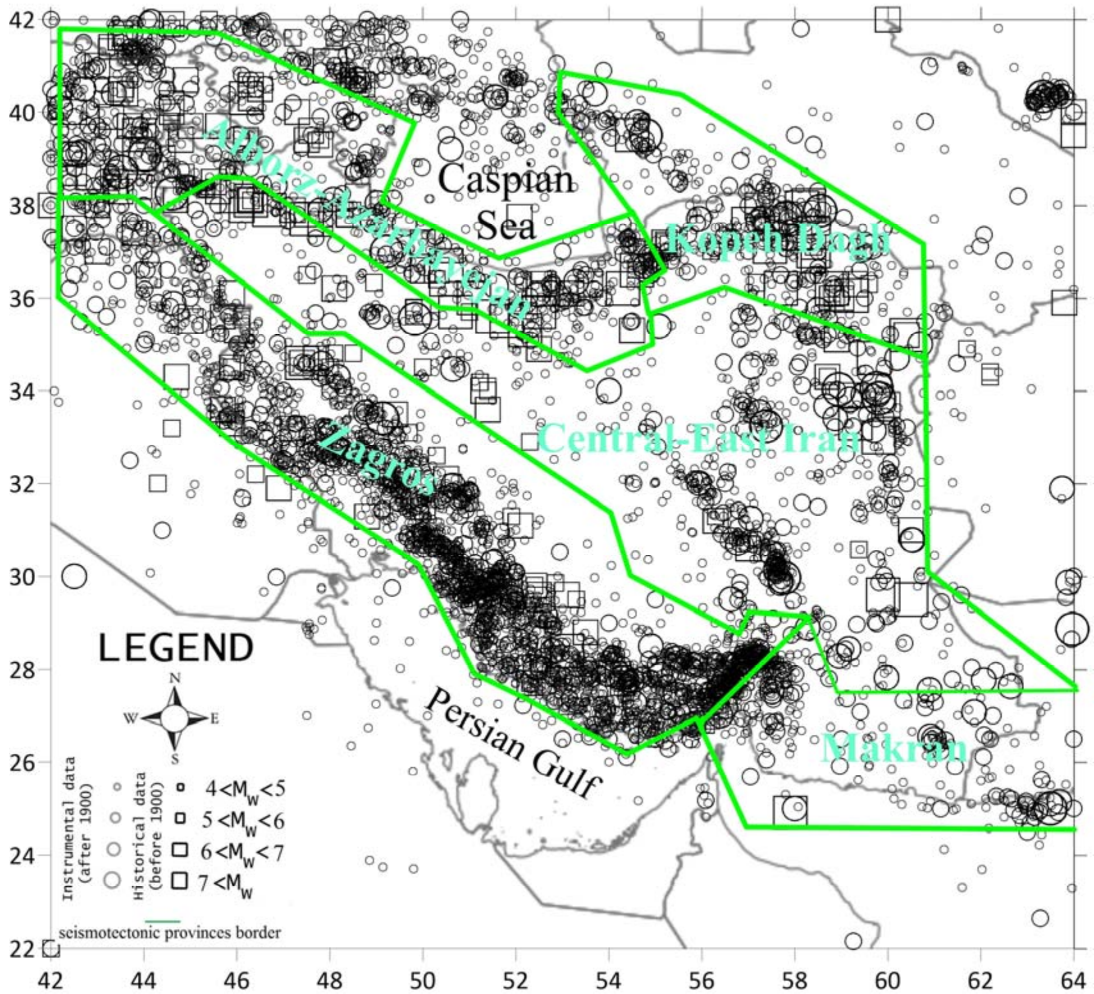


Figure 1. Major seismotectonic provinces of Iran, as proposed by Mirzaei et al. (1998). The squares and circles show the historical (pre-1900) and the instrumentally recorded (1900–2019) earthquakes, respectively.

The highly seismic active region of Alborz–Azarbayejan, covering the north and northwest of Iran, constitutes a part of the northern limit of the Alpine–Himalayan belt, with the focal mechanisms either thrust or strike-slip faulting. The seismicity pattern for Alborz is discontinuous. Strong earthquakes occur mainly in the eastern and central Alborz Mountain within a wide range of depth, with a median of 20 ± 8 km (Engdahl et al. 2006). The earthquake catalog of this province is more complete than those for the other regions of Iran are (Mirzaei et al. 1997b). The Rudbar earthquake of 20 June 1990, which caused the death of 40 000 people and the destruction of 500 000 homes, was the most destructive earthquake of the 20th century in Alborz–Azarbayejan (Berberian and Walker 2010).

The Zagros Mountains of southwest Iran are a key element in the continental collision between the Arabian and Eurasian plates, which began between 35 Ma and

20 Ma (Elliott et al. 2015; McQuarrie and van Hinsbergen 2013; Mouthereau et al. 2012). This mountainous area is almost 1 500 km in length and up to ~300 km wide and is considered one of the most rapidly deforming and seismically active fold-and-thrust belts on Earth (Nissen et al. 2011; Talebian and Jackson 2004). The Zagros region is characterized by numerous small and moderate-sized earthquakes, with magnitudes of 5.5–6.0 m_b in the ~250–350-km-wide zone along the Zagros fold-and-thrust belt (Berberian 1995; Motagh et al. 2015). Nearly all earthquakes in the Zagros region are less than 30 km in depth, with the median depth in this region being 15±7 km (Zare et al. 2014). Furthermore, the seismicity parameters, such as the *b*-value, maximum magnitude, and mean return period of events decrease from the northwestern to the southeastern parts of Zagros (Kalaneh and Agh-Atabai 2016; Khodaverdian et al. 2016). This is consistent with the increasing rate of convergence from 4.5 ± 2 mm/year in the NW to 9 ± 2 mm/year in the SE part of the Zagros range (Vernant et al. 2004).

The central east Iran seismotectonic province, including the Lut, Tabas, Posht-Badam, and Yazd blocks, is restricted by the Zagros range in the southwest, the Alborz in the north, the Kopeh-Dagh in the northeast, and the Makran in the southeastern part. Based on seismological observations, Jackson and McKenzie (1984, 1988) suggested that the central Iranian block could be regarded as rigid. Furthermore, by estimating a Euler vector for five stations in the central Iranian block, Vernant et al. (2004) pointed out that the description of this block as rigid is appropriate, as the deviations from coherent behavior are smaller than ~10% of overall Arabia–Eurasia convergence. Of note, GPS data were used to estimate the present-day kinematics of this region by Walpersdorf et al. (2014) and it was concluded that some of the defined blocks are poorly described as being rigid blocks because of the existence of small faults. In Eastern Iran, moderate to large earthquakes occur, with a median depth of 12±5 km (Zare et al. 2014). The catastrophic Tabas earthquake of 1978 and the Bam earthquake of 2003 occurred in this region.

The Kopeh-Dagh fold-and-thrust belt in northeast Iran accommodates approximately 4.5±1.2 mm/yr of the north–south shortening, which is the result of a combination of right-lateral strike-slip faults and thrust faults that strike between NW–SE and E–W (Hollingsworth et al. 2006). The characteristic of Kopeh-Dagh seismic activity is the relative frequency of large earthquakes occurring at low depths.

The large earthquakes of 1895 at M_s 7.5, 1929 at M_s 7.3, and 1948 at M_s 7.2 indicate the capacity of this region to generate destructive events (Mirzaei et al. 1997b). The 1948 earthquake destroyed Ashkabad, the capital city of Turkmenistan, and caused more than 10 000 casualties in Turkmenistan and 350 in Iran (Berberian and Yeats 2001).

The approximately 900-km-long Makran subduction zone, the result of northward subduction of the Arabian plate beneath Eurasia, extends east from the Strait of Hormoz in Iran to close to Karachi in Pakistan (Heidarzadeh and Kijko 2011). The seismic behavior of the subduction zone shows strong segmentation between east and west. The eastern part has been subjected to large thrust earthquakes, but no well-documented large historical events have occurred in western Makran (Mirzaei et al. 1999). The strongest earthquake (M 8.1) recorded in the Iranian catalog occurred in Makran on 27 November 1945, with a death toll of approximately 4 000 (Ambraseys and Melville 2005). Although there is no documented fault rupture for this event, published tectonic geomorphology, focal mechanism solution, and damage area studies (Byrne et al. 1992; Jackson and McKenzie 1984) indicate that its mechanism is consistent with a shallow thrust dipping northward.

Iranian Earthquake Catalog

In our study, we employed the Iranian earthquake catalog provided by Mousavi-Bafrouei and Mahani (2020), which covers the period from the 4th century B.C. to 2019. The catalog was compiled by local and international agencies, and it contains, inter alia, information on earthquake magnitudes and uncertainties. Mirzaei et al. (1997b) pointed out that the magnitude uncertainties vary between 0.4 and 0.9 magnitude units for the historical period (pre-1900); 0.3 to 0.5 magnitude units for the early instrumental period (1900–1963), and 0.2 to 0.4 magnitude units for the modern instrumental period (1964–1994). In our application of the Mousavi-Bafrouei and Mahani (2020) catalog, we assumed that the magnitude uncertainties follow the assessments provided by Mirzaei et al. (1997b). As regards some instrumental events, the magnitude uncertainty has been reported by various agencies and occasional case studies (e.g. Ambraseys 2001). As regards events with converted M_w, the magnitude uncertainties were estimated according to the procedure developed by Grünthal et al. (2009) and Gasperini et al. (2013). Figure 2 shows the earthquake magnitudes, along with their uncertainties that occurred during the historical period, as well as in three complete time spans of the catalog.

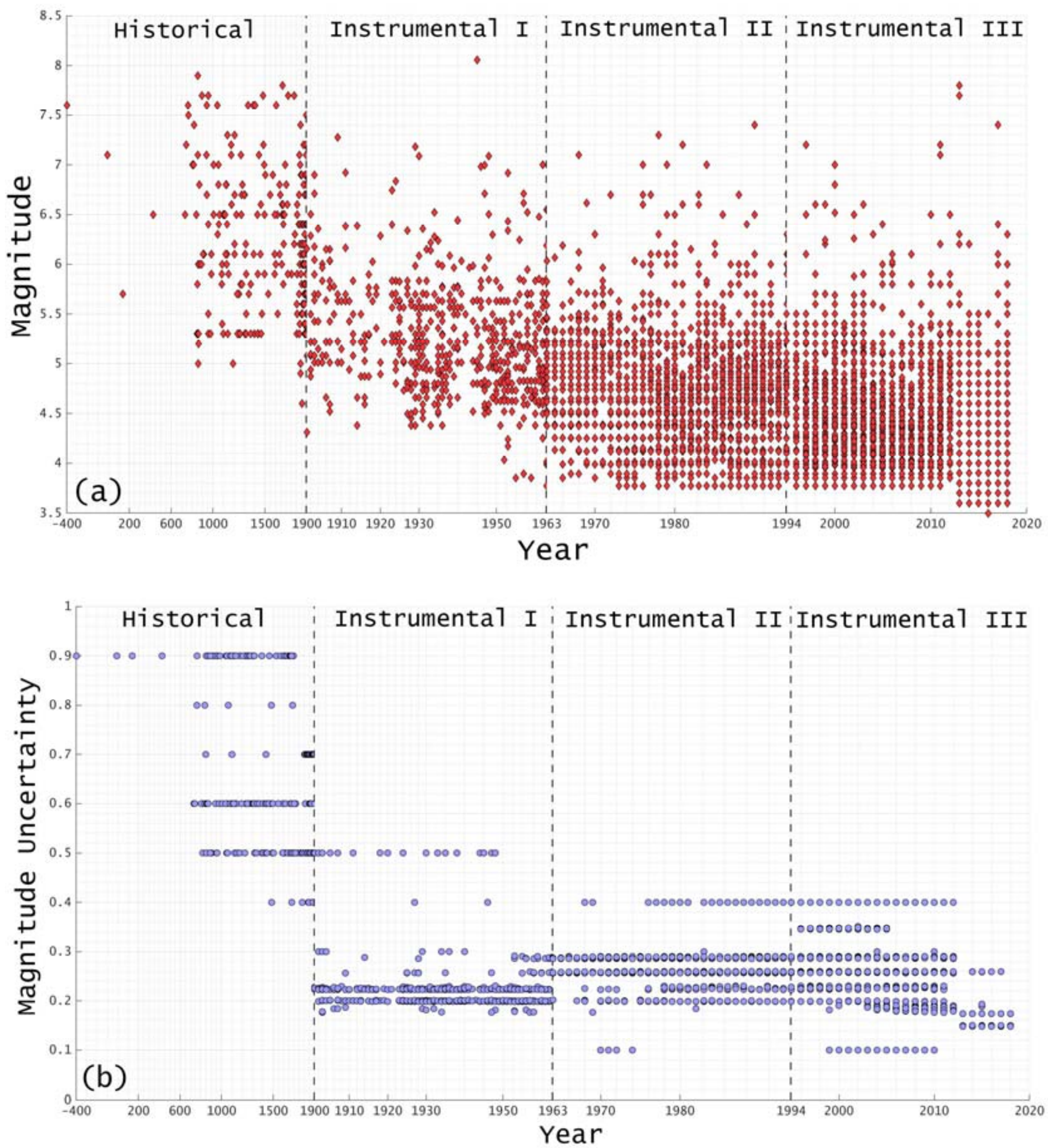


Figure 2. The earthquake magnitude (a) and magnitude uncertainty (b) versus a year from the clustered Iranian catalog in different time periods, namely the historical (pre-1900) and instrumental periods (1900–1963, 1964–1995, and 1996–2019).

1. Estimation of m_{max}: Probabilistic Approach

The Iranian instrumental seismic event catalog is not long enough and not fully representative, as the return periods of large events significantly exceed the catalog span. Therefore, a reliable assessment of seismic hazard parameters requires, in addition to the instrumental data, a significantly longer record of historical events. Furthermore, the completeness of the instrumental catalog varies with time. For application, it was divided into several subcatalogs, with each being complete for seismic events equaling or exceeding a certain level of completeness during a specified period of time. One of the best technique to utilize such an incomplete catalog is an approach developed by Kijko and Sellevoll (1989, 1992), which permits a combination of the largest historical earthquakes and complete (instrumental) data with different levels of completeness. This approach allows taking into account the uncertainty of earthquake magnitude determination, as well as the uncertainties of the applied earthquake-occurrence model (Kijko et al. 2016). The uncertainty in the earthquake-occurrence model is introduced by assuming that both the mean seismic activity rate λ and the b-value (i.e., the parameter of the Gutenberg-Richter frequency magnitude relation) are random variables. One of the easiest ways to account for space–time fluctuations in model parameters is introducing compound distributions (Benjamin and Cornell 1970), also known as a mixture (Daykin et al. 1993) or Bayesian distributions (Campbell, 1982). The compound distributions provide a flexible and easily implementable tool, with enough rigorousness to consider the time–space variation of seismic activity. These variations are used in numerous probabilistic models applied in engineering (Hamada et al. 2008), as well as in the insurance and risk industry (Klugman et al. 2012). To our best knowledge, the first researchers to apply compound distributions in seismic hazard assessment were Benjamin (1968) and Campbell (1982, 1983).

Let us assume that the earthquake magnitudes are independent and distributed identically according to the Gutenberg-Richter frequency magnitude relation (Gutenberg and Richter 1956)

$$log\, N(m) = a - bm, \tag{1}$$

where $N(m)$ is the number of seismic events with magnitude equal or exceeding m, occurring within a specified area and within the specified period of time. Coefficients a and b characterize the seismicity of the area and depend on the tectonic features of the area. After the additional assumption that space–time variation of the b-value can be represented by a gamma distribution, the compound exponential-gamma cumulative distribution function (CDF) of earthquake magnitude can be expressed as (Campbell 1982, 1983; Kijko 2004):

$$F_M(m) = \begin{cases} 0 & \text{for } m < m_{min} \\ C_\beta \left[1 - (\frac{p}{p + m - m_{min}})^q\right] & \text{for } m_{min} \leq m \leq m_{max} \\ 1 & \text{for } m > m_{max} \end{cases} \quad (2)$$

where $C_\beta = \left[1 - \left({}^{p}/_{(p + m_{max} - m_{min})}\right)^q\right]^{-1}$ is a normalizing coefficient, $p = \bar{\beta}/(\sigma_\beta)^2$ and $q = (\bar{\beta}/\sigma_\beta)^2$, $r = p/(p + m_{max} - m_{min})$. The symbol $\bar{\beta}$ denotes the mean value of parameter β and σ_β is the standard deviation of $\bar{\beta}$ (Kijko and Singh 2011). The Gamma distribution is used extensively to model various random variables, as it does not impose too many limitations and it can fit a large variety of shapes (Benjamin and Cornell 1970).

Therefore, the area characteristic, the maximum possible earthquake magnitude m_{max}, which is based on the compound earthquake occurrence model, can be estimated by the solution of equation (Kijko 2004):

$$m_{max} = m_{max}^{obs} + \frac{\delta^{\frac{1}{q+2}} exp[nr^q/(1 - r^q)]}{\beta} [\Gamma(-1/q, \delta r^q) - \Gamma(-1/q, \delta)] \quad (3)$$

where n is the number of seismic events with magnitudes equal to or exceeding a specified magnitude level m_{min}, $\delta = n\left[1 - \left({}^{p}/_{(p + m_{max} - m_{min})}\right)^q\right]^{-1}$, $r = p/(p + m_{max} - m_{min})$, $p = \bar{\beta}/\sigma^2$, $q = \bar{\beta}^2/\sigma^2$, and $\Gamma(\cdot,\cdot)$ is the complementary gamma function. If the applied seismic event catalog is incomplete, the number of events n is replaced by an estimated n, equal to $\bar{\lambda} \cdot t$, where $\bar{\lambda}$ denotes the mean activity rate of seismic events with magnitude m_{min} and stronger, and t is the time span of the earthquake catalog. Note that in equation (3), the unknown m_{max} is present in both sides of equation (3), and the estimator for m_{max} can be obtained only through an iteration process.

In our study, the assessment of the area-characteristic maximum possible earthquake magnitude m_{max} was performed by applying the Kijko-Sellevoll technique, as it is the most suitable to process the type of information provided by relatively long, but highly incomplete Iranian catalog, and the maximum possible magnitude was calculated by equation (3). The assessment of m_{max} was done for uniformly distributed grid points at an interval of $1° \times 1°$ decimal degree over the Iranian Plateau.

Estimation of m_{max}: Deterministic Approach

In most deterministic analyses, m_{max} is usually referred to as the maximum credible earthquake (Reiter 1991); however, for consistency, we continued using the notation m_{max}. In most instances, the deterministic value of m_{max} is obtained with the help of respectable empirical scaling relations that provide insight into the underlying mechanics of the rupture process (Yen and Ma 2011). Earthquake magnitude–fault characteristic scaling relations have been developed for the various rupture and geometrical characteristics of the fault. Several studies have been carried out over the past decades, resulting in different such scaling relations based on fault parameters, such as rupture length, downdip rupture width, rupture area, fault slip rate, and the maximum and average displacement (e.g., Wells and Coppersmith 1994; Anderson et al., 1996, 2017; Hanks and Bakun 2002; Shaw 2009, 2013; Leonard 2010).

The first such relation for earthquakes occurring in the Iranian Plateau was developed by Nowroozi (1985). It was derived using the information on fourteen well-studied earthquakes in Iran, mostly reported by Berberian (1976a). The relation describes links between the surface magnitude M_s, fault length, and fault displacement. In 2010, the relation was revised and the surface magnitude was replaced by the moment magnitude M_w (Nowroozi 2010). More recently, based on a database of Iranian earthquakes occurring during 1900–2014, Ghassemi (2016) analyzed the geometric and kinematic aspects of surface ruptures in several seismotectonic regions of Iran. His analyses resulted in several empirical relations between M_w, surface rupture length, and maximum displacement for different fault mechanisms. In our study of m_{max}, we examined and applied five different magnitude-scaling relations, namely by Wells and Coppersmith (1994); Leonard (2010); Nowroozi (2010); Ghassemi (2016); and Thingbaijam et al. (2017). These relations are listed in Table 1.

Table 1. Magnitude-scaling relations to estimate the maximum earthquake magnitude for the Iranian Plateau

Reference	Style of faulting	Relationship
Wells and Coppersmith (1994)	Strike slip	$M_w = 1.12 \log L + 5.16$
	Reverse	$M_w = 1.22 \log L + 5.00$
	Normal	$M_w = 1.32 \log L + 4.86$
Leonard (2010)	Strike slip	$M_w = 1.67 \log L + 4.17$
	Dip slip	$M_w = 1.67 \log L + 4.24$
Nowroozi (2010)	All	$M_w = 0.86 \log L + 2.79$
Ghassemi (2016)	Strike slip	$M_w = 0.81 \log L + 5.66$
	Thrust	$M_w = 0.97 \log L + 5.29$
Thingbaijam *et al.* (2017)	Strike slip	$M_w = 1.47 \log L + 4.32$
	Reverse	$M_w = 1.63 \log L + 4.38$
	Normal	$M_w = 2.06 \log L + 3.55$

These relationships were applied to 1 103 major faults indicated in the Iranian fault map (Javadi et al. 2013). The map presents a comprehensive database of major active faults in the Iranian Plateau. Although a large number of major faults had been mapped already on small-scale geological maps, this GIS-based map was compiled to resolve various issues related to the location, geometry, and kinematics of faults, as well as their spatial distribution. The preliminary version of the map is based on the 1:100 000-scale map created by the Geological Survey of Iran and the National Iranian Oil Company. The next step was to modify and update the 1:250 000-scale geological maps by considering and including regional information (e.g., the map of faults in Iran by Berberian (1976c), tectonic map of Iran (Nogole-Sadat and Almasian 1993), and the major active faults map of Iran (Hessami et al. 2003). The final database provides updated information related to fault length and location, often based on remote sensing data, satellite imagery, and digital elevation models. In addition, the major faults were investigated during field work to analyze their geometric and kinematic characteristics (Javadi et al. 2013).

Most information on the fault mechanism is based on published data up to 2013. The strike-slip faults are classified into right-lateral and left-lateral strike-slip faults, and the dip-slip faults are shown as reverse, thrust, and normal faults. Attempts have been made to present both the dip-slip and the strike-slip components of oblique-slip faults. Because of the high seismic activity of the Iranian Plateau, the major faults indicated on this map are either active Quaternary faults or faults with high seismic potentials.

Results and Discussion

In this study, both the probabilistic and deterministic approaches were used to estimate $m_{\max}$ for the Iranian Plateau. First, a new homogenized and declustered earthquake catalog (Mousavi-Bafroui and Mahani 2020) was used to obtain the spatial distribution of the maximum possible earthquake magnitudes over the Iranian Plateau with the help of a probabilistic procedure. For this purpose, we assumed that the earthquake magnitudes were independent and identically distributed according to the Gutenberg-Richter frequency-magnitude relation. The applied technique allows combining the largest historical events with complete (instrumental) data with different levels of completeness. The approach permits taking into account the uncertainty of earthquake magnitude determination and the uncertainties of the applied earthquake occurrence model (Kijko et al. 2016). Figure 3 shows the spatial distribution of seismicity in the Iranian Plateau.

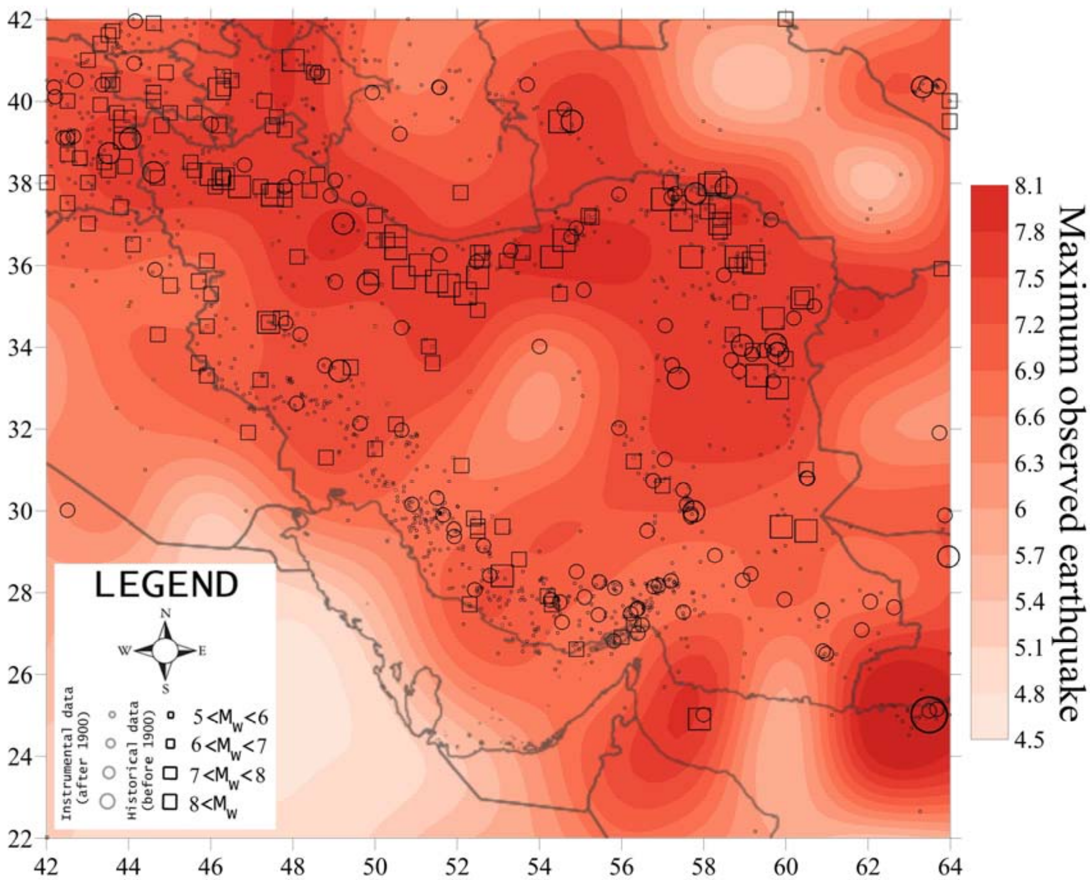


Figure 3. Spatial distribution of seismicity in the Iranian Plateau. The squares and circles show the historical (pre-1900) and instrumental (post-1900) earthquakes, respectively.

The historical (pre-1900) and instrumental (post-1900) earthquakes are shown by squares and circles, respectively. The largest maximum observed magnitude is the 1945 M 8.1 earthquake that occurred in the Makran zone. This figure clearly shows that large earthquakes occurred in Alborz-Azarbayejan, Kopeh-Dagh, and east Iran. Furthermore, it shows that seismic activity is not distributed uniformly in the Iranian Plateau. For example, seismic activity is high and characterized by moderate earthquakes in Zagros, whereas strong events occurred in the Alborz-Azarbayejan seismic zone (Zamani and Agh-Atabai 2009).

Probabilistic results

To estimate the area-characteristic maximum possible magnitude, we defined uniformly distributed grid points at an interval of 1° × 1° along the north–south and east–west directions over the Iranian Plateau. The assessment of $m_{\max}$ was based on seismic events recorded within a radius of 200 km around the grid site. The selection of the 200 km radius is based on observations that events at distances >200 km have a negligible contribution to the seismic hazard results (Khodaverdian et al. 2016). The applied probabilistic approach to assess the area-characteristic maximum possible earthquake magnitude was particularly useful for regions where the active tectonic faults are unknown. The map of such estimated $m_{\max}$ is shown in Figure 4.

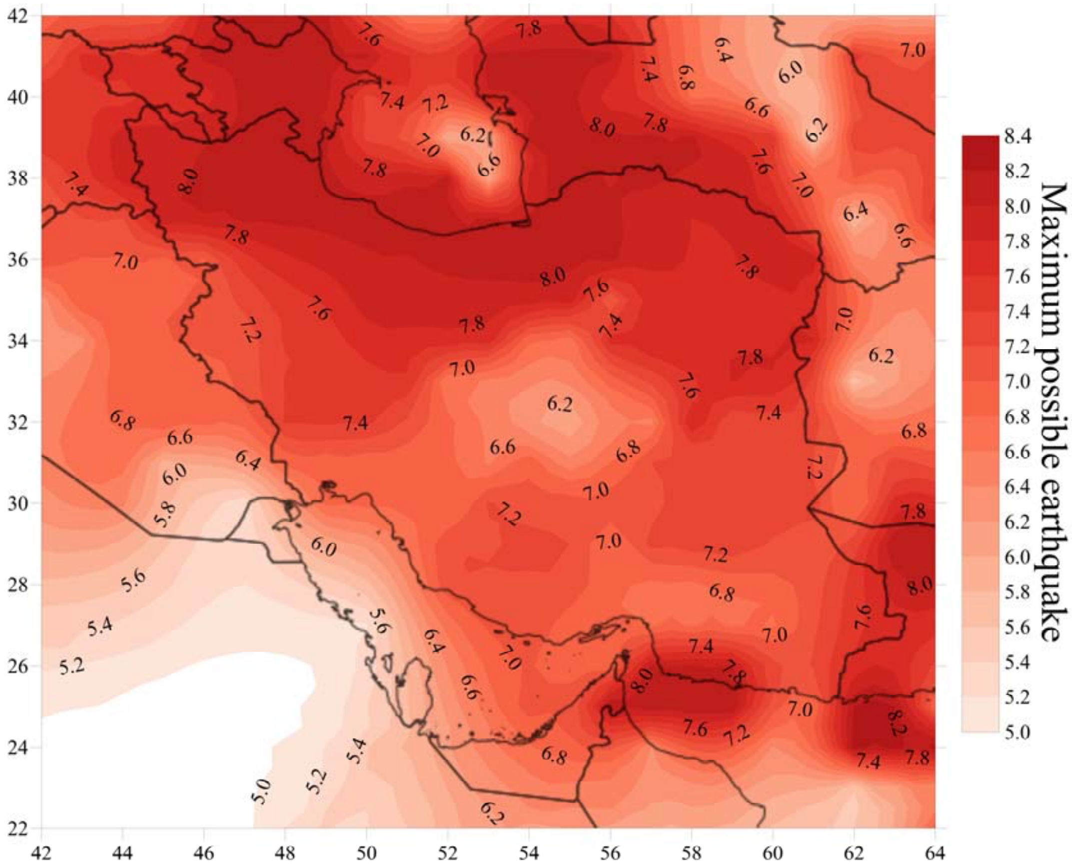


Figure 4. Spatial distribution of the estimated maximum possible earthquake magnitude for the Iranian Plateau. The values were calculated for uniformly distributed grid points at an interval of 1° × 1° decimal degree.

Figure 4 illustrates the high $m_{\max}$ values in the Alborz-Azarbayejan (north and northwest Iran), Kopeh-Dagh (northeast Iran), Kerman (central east Iran), Makran and Banndar Abbas (southeast Zagros). The estimated $m_{\max}$ values vary from 6.0 to 8.2. The lowest $m_{\max}$ were observed for the Persian Gulf, Arabian Platform, Esfahan–Sirjan region, and the Dasht-e-Kavir in central Iran. The results are compatible with the results from Yazdani and Kowsari (2013), who calculated the probability of occurrence of large earthquakes for Iran. In the Zagros area, the $m_{\max}$ values vary from 6.6 to 7.8, and are compatible with the results from previous studies (Kalaneh and Agh-Atabai 2016; Karimiparidari et al. 2013; Khodaverdian et al. 2016; Mohammadi et al. 2016). In the Alborz-Azarbayejan and Kopeh-Dagh seismotectonic provinces, the estimated $m_{\max}$ value varies from 7.8 to 8.0, which is in close agreement with the estimated $m_{\max}$ of 8.0 in Khodaverdian et al. (2016) and 7.9 in Mohammadi et al. (2016) and Mousavi-Bafroui and Mahani (2020). In Eastern Iran, the estimated $m_{\max}$ varies from 6.8 to 7.8 that is fairly consistent with the calculated values of 6.8-7.6 in

Khodaverdian et al. (2016). Furthermore, a similar pattern in Figures 3 and 4 indicates that $m_{\max}$ estimated by the applied probabilistic procedure was affected strongly by the maximum observed magnitude in the earthquake catalog. This finding is in agreement with the results of a sensitivity analysis (Kowsari et al. 2019), which revealed that, on average, as regards the seismicity of the Iranian Plateau, the maximum observed magnitude contributed ca. 55% of information to the estimated $m_{\max}$. In other words, the maximum observed earthquake magnitude is one of the most important parameters that define the estimated value of $m_{\max}$.

Deterministic results

In the second part of this study, we calculated $m_{\max}$ for 1 103 major tectonic faults identified in the Iranian Plateau by applying five magnitude-scaling relations i.e., Wells and Coppersmith (1994); Leonard (2010); Nowroozi (2010); Ghassemi (2016); Thingbaijam et al. (2017). The epistemic uncertainty of the estimated $m_{\max}$ was taken into account by applying the formalism of the logic tree (Abrahamson and Bommer, 2005; Bommer et al., 2005), with each branch representing a different magnitude-scaling relation. The larger weights were associated with relations based on Iranian data, i.e., 0.3 and 0.25 for scaling relations by Ghassemi (2016) and Nowroozi (2010), respectively, whereas smaller weights (i.e., 0.15) were assigned to relations based on non-Iranian data. For the sake of presentation, we divided the Iranian Plateau into five regions and we show the identified major faults in each region. Figures 5–10 show the estimated $m_{\max}$ values for the 1 103 identified tectonic faults. The faults are colored according to the value of the estimated $m_{\max}$. The faults capable of producing earthquakes of $6.0 \leq M_w < 6.5$ are colored green, $6.5 \leq M_w < 7.0$ yellow, and $7.0 \leq M_w < 7.5$ red. The characteristics of these faults, including their names, lengths, faulting mechanisms, and the calculated $m_{\max}$ for each magnitude-scaling relationship are shown in Tables A1–A6 and Figures A1–A6 in Appendix 1.

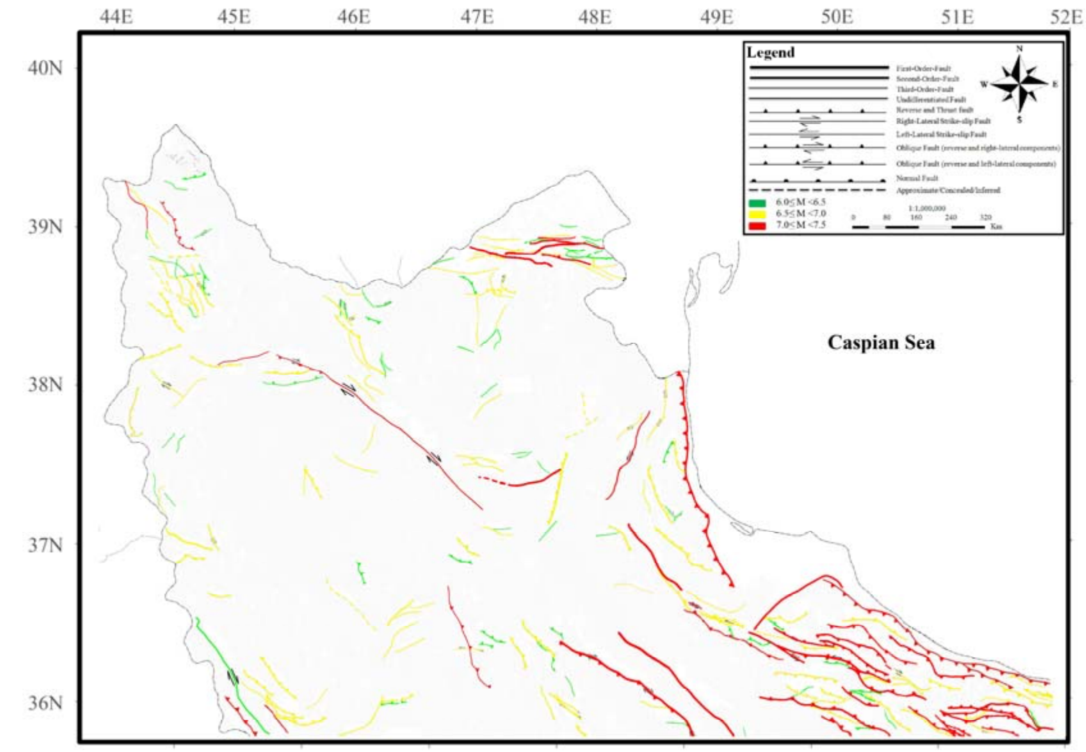


Figure 5. Estimated $m_{\max}$ for major faults listed by Javadi *et al.* (2013) for northwest Iran. The color associated with the fault is based on the value of the estimated $m_{\max}$. The faults capable of producing earthquakes of $6.0 \le M_w < 6.5$ are colored green, $6.5 \le M_w < 7.0$ yellow, and $7.0 \le M_w < 7.5$ red.

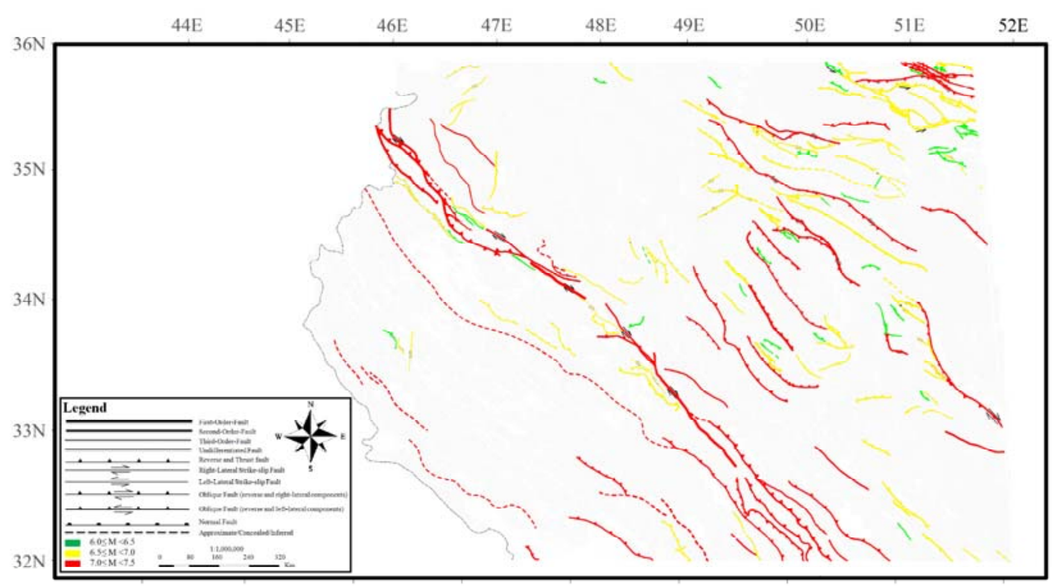


Figure 6. Estimated $m_{\max}$ for major faults listed by Javadi et al. (2013) for west Iran. The color associated with the fault is based on the value of the estimated $m_{\max}$. The faults capable of producing earthquakes of $6.0 \le M_w < 6.5$ are colored green, $6.5 \le M_w < 7.0$ yellow, and $7.0 \le M_w < 7.5$ red.

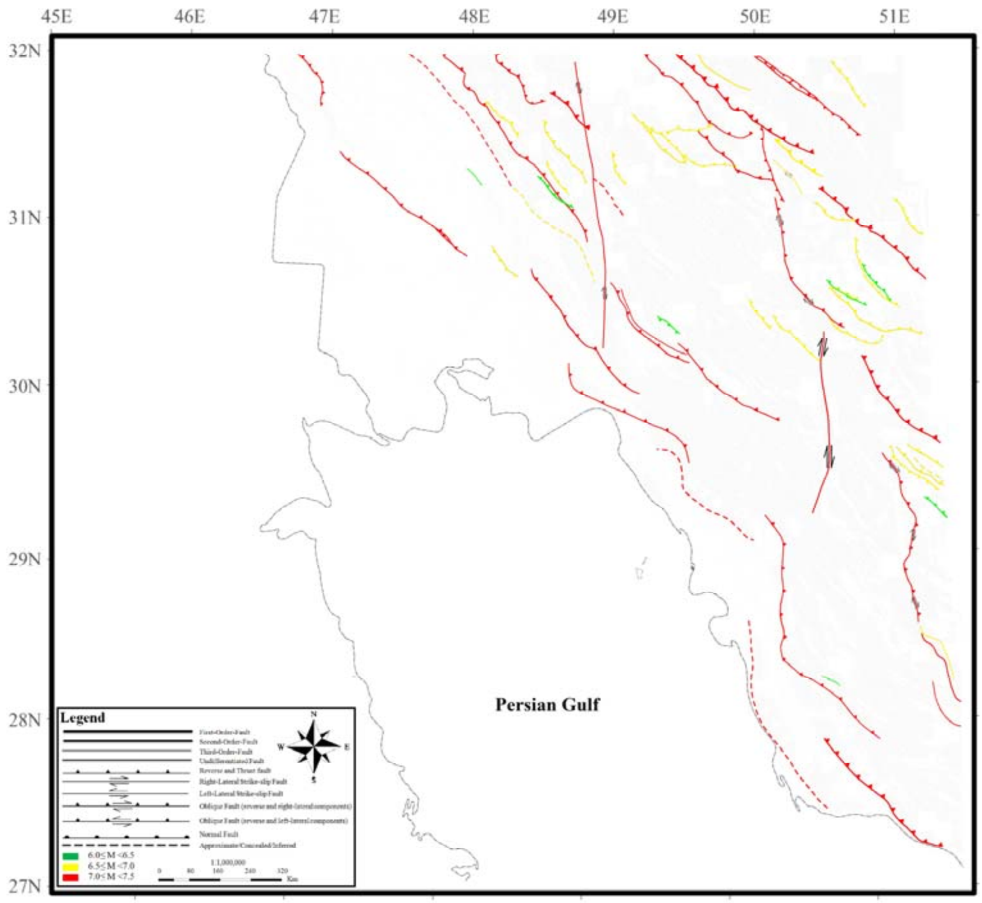


Figure 7. Estimated $m_{\max}$ for major faults listed by Javadi et al. (2013) for southwest Iran. The color associated with the fault is based on the value of the estimated $m_{\max}$. The faults capable of producing earthquakes of $6.0 \leq M_w < 6.5$ are colored green, $6.5 \leq M_w < 7.0$ yellow, and $7.0 \leq M_w < 7.5$ red.

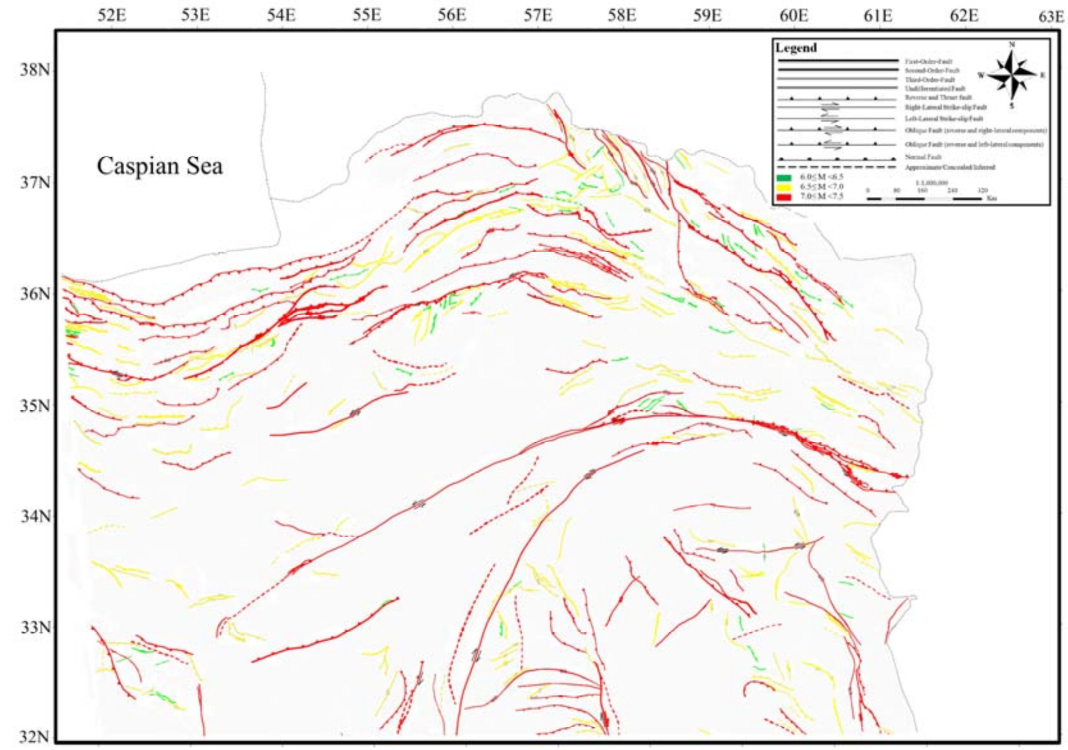


Figure 8. Estimated $m_{\max}$ for major faults listed by Javadi et al. (2013) for northeast Iran. The color associated with the fault is based on the value of the estimated $m_{\max}$. The faults capable of producing earthquakes of $6.0 \leq M_w < 6.5$ are colored green, $6.5 \leq M_w < 7.0$ yellow, and $7.0 \leq M_w < 7.5$ red.

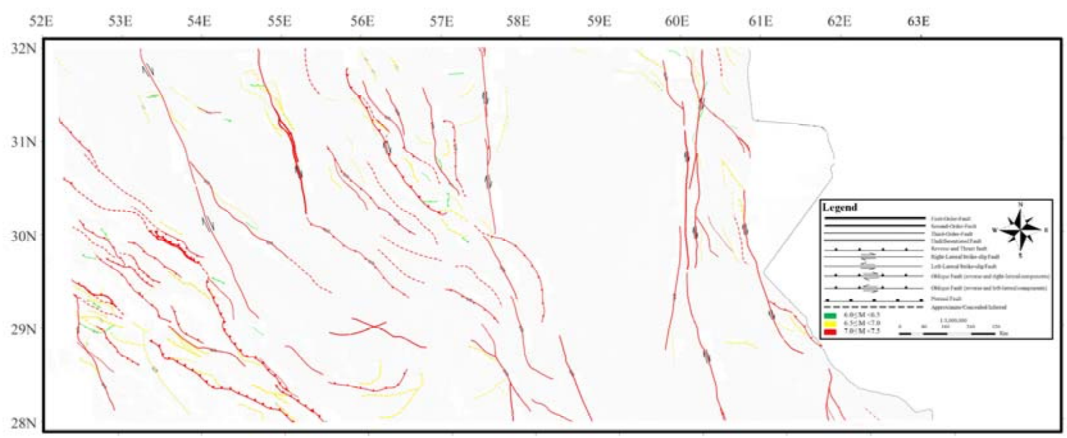


Figure 9. Estimated $m_{\max}$ for major faults listed by Javadi et al. (2013) for east Iran. The color associated with the fault is based on the value of the estimated $m_{\max}$. The faults capable of producing earthquakes of $6.0 \leq M_w < 6.5$ are colored green, $6.5 \leq M_w < 7.0$ yellow, and $7.0 \leq M_w < 7.5$ red.

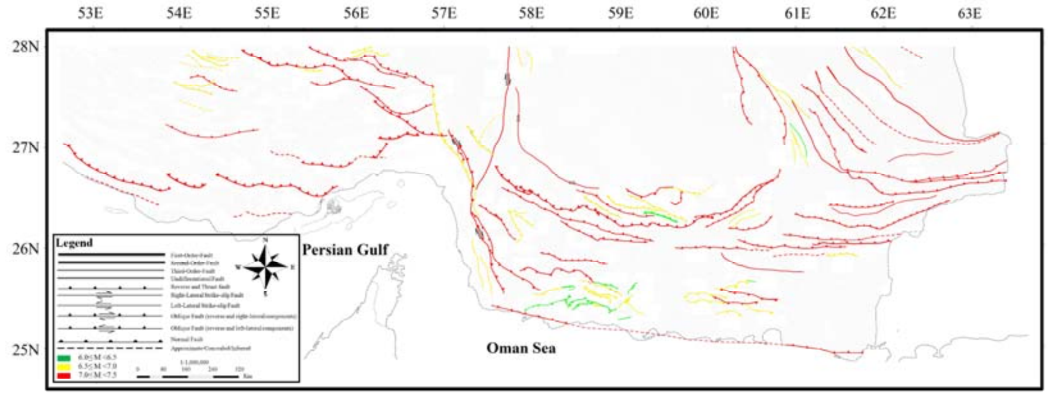
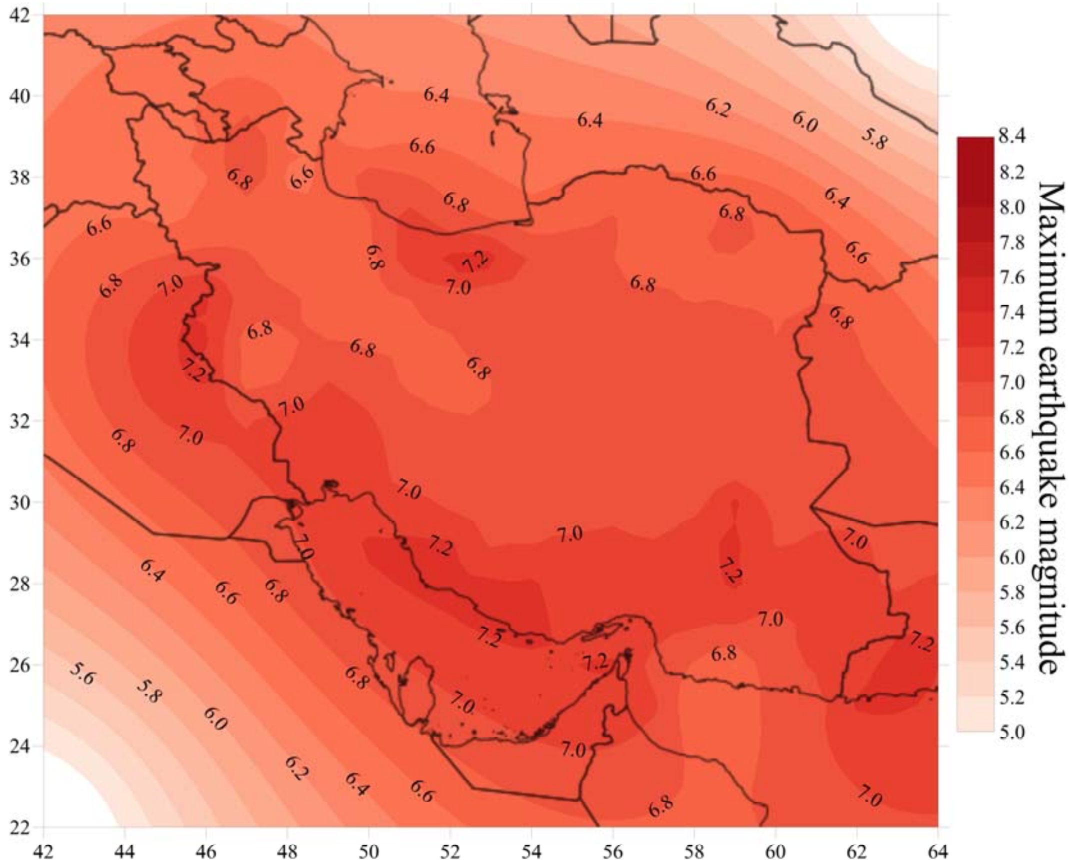


Figure 10. Estimated $m_{\max}$ for major faults listed by Javadi et al. (2013) for southeast Iran. The color associated with the fault is based on the value of the estimated $m_{\max}$. The faults capable of producing earthquakes of $6.0 \leq M_w < 6.5$ are colored green, $6.5 \leq M_w < 7.0$ yellow, and $7.0 \leq M_w < 7.5$ red.

As the surface rupture length of an earthquake is usually shorter than is the entire length of the fault on which it occurs, deciding segment length of future earthquakes is challenging (Wesnousky 2008). To calculate the $m_{\max}$ for each fault, we assumed maximum surface rupture lengths of 85 and 125 km for thrust and strike-slip faults, respectively. Surface rupture lengths of 85 and 125 km were reported from the 1997 M 7.2 Zirkuh, South Khorasan, and 1978 M 7.3 Tabas earthquakes, respectively (Ghassemi 2016). This implies that we did not consider the geometrical complexity of the faults to predict the behavior of large fault zones in terms of being ruptured along with single or multiple segments. Verification of the calculated $m_{\max}$ values for the 1 103 major faults was difficult, as little information on the length of surface rupture is available for the investigated area. However, the results presented in Figures 5–10 are in good agreement with known surface ruptures associated with strong earthquakes, such as the M 7.0 Buin-Zahra earthquake of 1962, M 7.3 Tabas earthquake of 1978, M 7.4 Rudbar earthquake of 1990, and the 12 November 2017 M 7.3 Ezgeleh-Sarpolzahab earthquake, which is the largest earthquake ever recorded instrumentally in the Zagros region (Nissen et al. 2019).

Comparing the probabilistic and deterministic results

For the sake of comparison between the probabilistic and deterministic results, we show the contour map of the $m_{\max}$ values estimated by the deterministic approach over the Iranian plateau. For this purpose, we used the same points as those that were used in the probabilistic approach by defining uniformly distributed grid points at an interval of 1° × 1° decimal degree over the country. Then, we adopt a radius of 200 km around the grid points and consider all the faults within this radius and calculate the weighted mean and standard deviation for these identified faults that are shown in Figure 11.



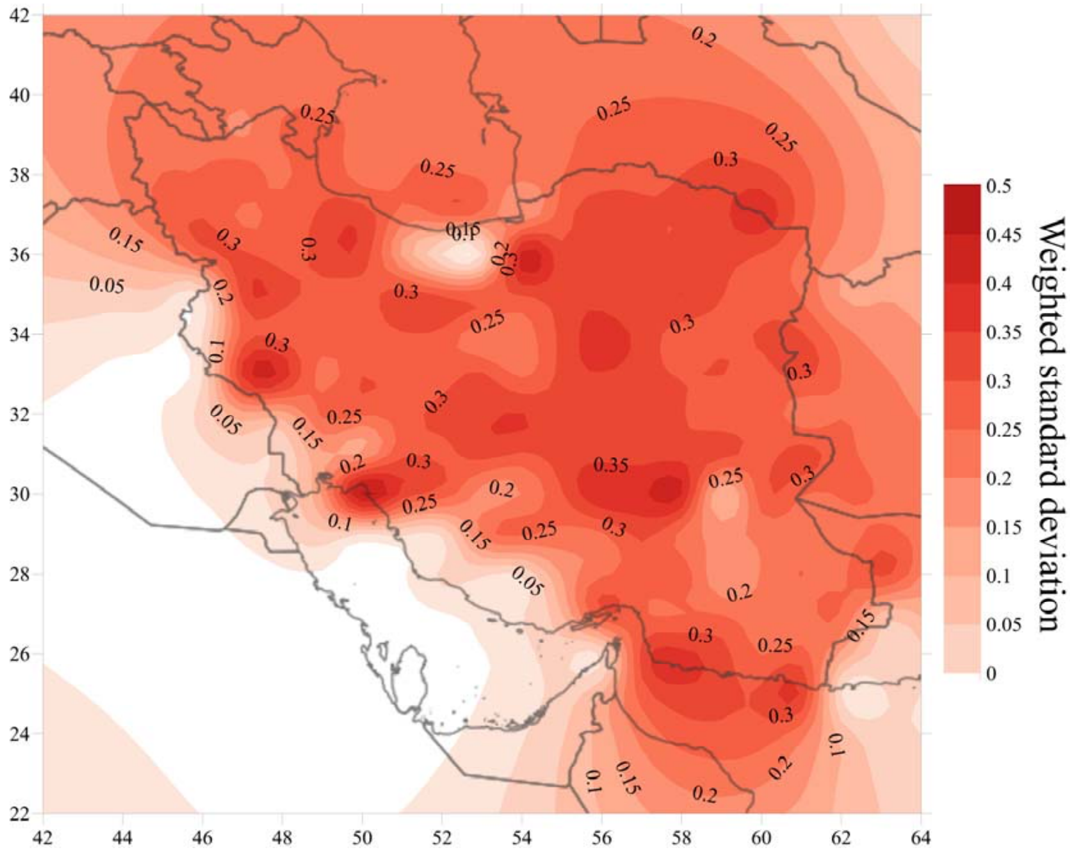


Figure 11. Spatial distribution of the maximum magnitude estimated by the deterministic approach for the Iranian plateau. The weighted mean (top figure) and standard deviation (bottom figure) values are calculated for all the identified faults within a radius of 200 km around uniformly distributed grid points at an interval of 1° × 1° decimal degree.

The deterministic results show the highest $m_{\max}$ values along the Zagros mountains in West and South West Iran due to presence of main Zagros, high Zagros, Noudsheh, Mountain front, Mishan, Kazerun, Ragsefid and Borazjan faults in these areas. Moreover, such high $m_{\max}$ values are also seen in South East Iran due to presence of Bam, Gowk and Shahdad faults that all are capable to produce earthquakes with magnitude larger than 7.2. Furthermore, the highest values of the weighted standard deviation are seen in Zagros, Central, East and North East Iran. This indicates a considerable difference in the length of the identified faults in those regions and will result in different $m_{\max}$ values predicted by the magnitude-scaling relationships with high standard deviation. Moreover, the spatial distribution of the weighted standard deviation shows the confidence in the estimation of $m_{\max}$ values and reveals to what extent the results can be trusted. Furthermore, for each grid point, we calculate the difference between the $m_{\max}$ estimated by the probabilistic and deterministic methods that are shown in Figure 12.

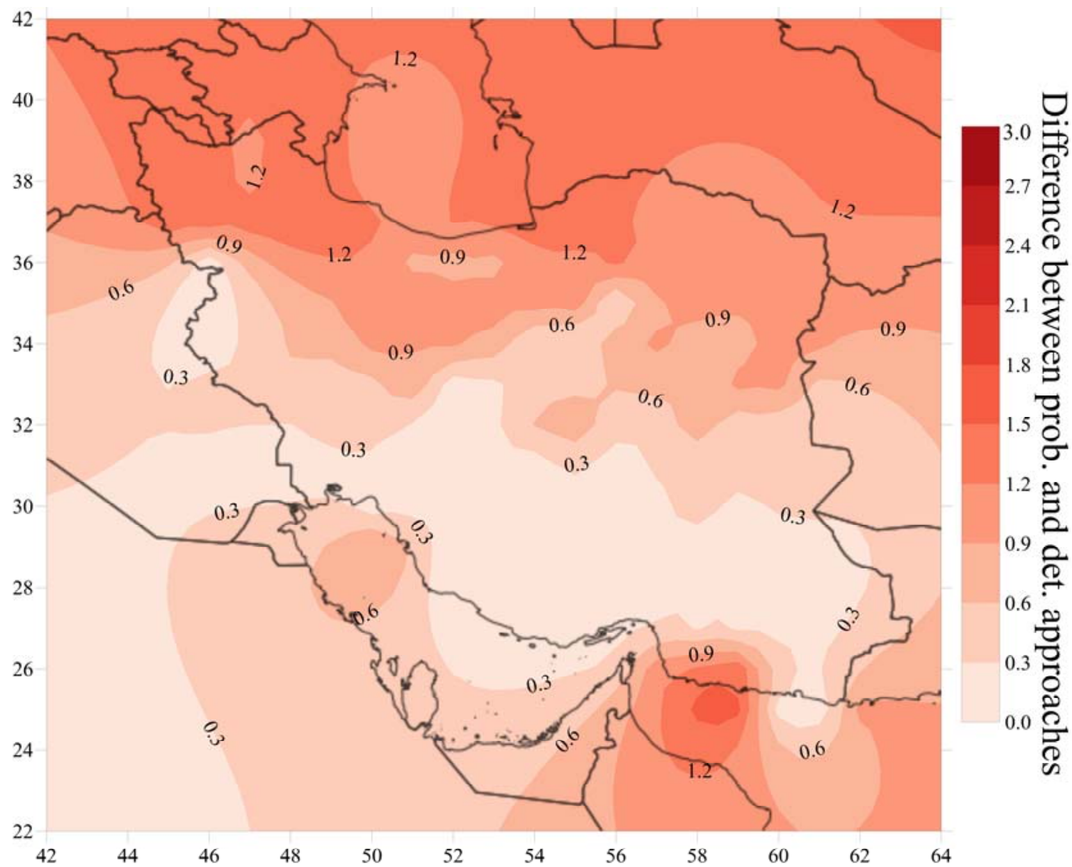


Figure 12. The difference between the maximum possible earthquakes obtained by the probabilistic method and the maximum credible earthquake values that are estimated by the empirical magnitude-scaling relationships.

This figure shows that the difference between the probabilistic and deterministic is higher in the northern and southern parts of the country where most of the historical large earthquakes have occurred (see Figure 3). The reasons for such a difference in $m_{\max}$ estimates by the two approaches is that the $m_{\max}$ determined by the help of probabilistic procedures strongly dependent on the largest observed earthquakes which often are paleo/historic events, with very uncertain magnitudes (Kowsari et al. 2019). In general, the maximum magnitudes that we calculated deterministically reflect the tectonic features and available geological information on the active faults, whereas the probabilistic results depend entirely on the information provided by the applied seismic event earthquake catalog and the applied statistical tool. It does not matter how good is our statistical tool. If the applied seismic event catalog is short, the estimated $m_{\max}$ does not reflect the full seismic potential of the investigated region. However, the probabilistic methods are useful in regions with unknown active faults or limited information on tectonic and geological features. In such instances, the application of the probabilistic procedures is recommended, as they combine the incomplete (historical) and complete (instrumental) parts of a catalog. The uncertainties associated with the earthquake occurrence models can be addressed by using an approach developed by, e.g., Kijko et al. (2016) and Smit et al. (2019).

Conclusion

The Iranian Plateau, situated on the Alpine–Himalayan orogenic system, has experienced many large and devastating earthquakes. Consequently, high death tolls have been reported for recent strong earthquakes in various parts of Iran, which is ascribed mainly to either the non-engineered buildings or poorly constructed houses and infrastructure. Reliable assessment of seismic hazard is therefore crucial in such an earthquake-prone region to predict the seismic risk and the probable effects of future earthquakes. This study focused on the estimation of the maximum possible earthquake magnitude, $m_{\max}$, as one of the most important parameters required by any seismic hazard analysis. In our study, the assessment of $m_{\max}$ was conducted employing two entirely different approaches, namely probabilistic and deterministic. The applied probabilistic procedure allows combining the historical and instrumental parts of a catalog with different levels of completeness, on account of the uncertainty of earthquake magnitude determination and the uncertainties of the applied earthquake occurrence model. The procedure was applied to a magnitude-homogenized and declustered catalog of earthquakes in Iran covering the period from the 4th century B.C. to 2019. The maximum possible earthquake magnitudes were calculated for the grid points by applying the seismicity data within a 200-km radius around each grid point. The estimated maximum possible earthquake magnitudes varied between 6.0 and 8.2, with the highest values observed in the Alborz-Azarbayejan, Kopeh-Dagh, central east Iran, Makran and southeast Zagros. The $m_{\max}$ values were lowest for the Persian Gulf, Arabian Platform, Esfahan–Sirjan region, and the Dasht-e-Kavir in central Iran. It was observed that the $m_{\max}$ estimated by the probabilistic procedure were influenced strongly by the maximum observed magnitude.

In the second part of the study, we calculated the $m_{\max}$ for 1 103 identified major faults. This is the first comprehensive study conducted on the major faults of Iran. We applied the empirical magnitude-scaling relationships approach, with five magnitude-scaling relations being used, namely from Wells and Coppersmith (1994), Leonard (2010), Nowroozi (2010), Ghassemi (2016), and Thingbaijam et al. (2017). The epistemic uncertainty was addressed by incorporating logic tree framework. Our results are consistent with both the observed earthquakes and the seismic potential of the different seismogenic zones of Iran.

The results of this study provide useful information on the maximum possible earthquake magnitude as one of the important input parameters to seismic hazard studies in Iran. The constructed map of major tectonic faults and the respectable maximum earthquake magnitudes can be used in future seismic hazard analyses and have fundamental implications for the mitigation of seismic risk in Iran.

Future research will be conducted on the development and application of a Bayesian procedure that would allow assessment of $m_{\max}$ based on a combination of the two applied approaches, namely probabilistic (i.e., based on a seismic event catalog) and deterministic (i.e., based on the characteristics of the active faults).

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Appendix 1

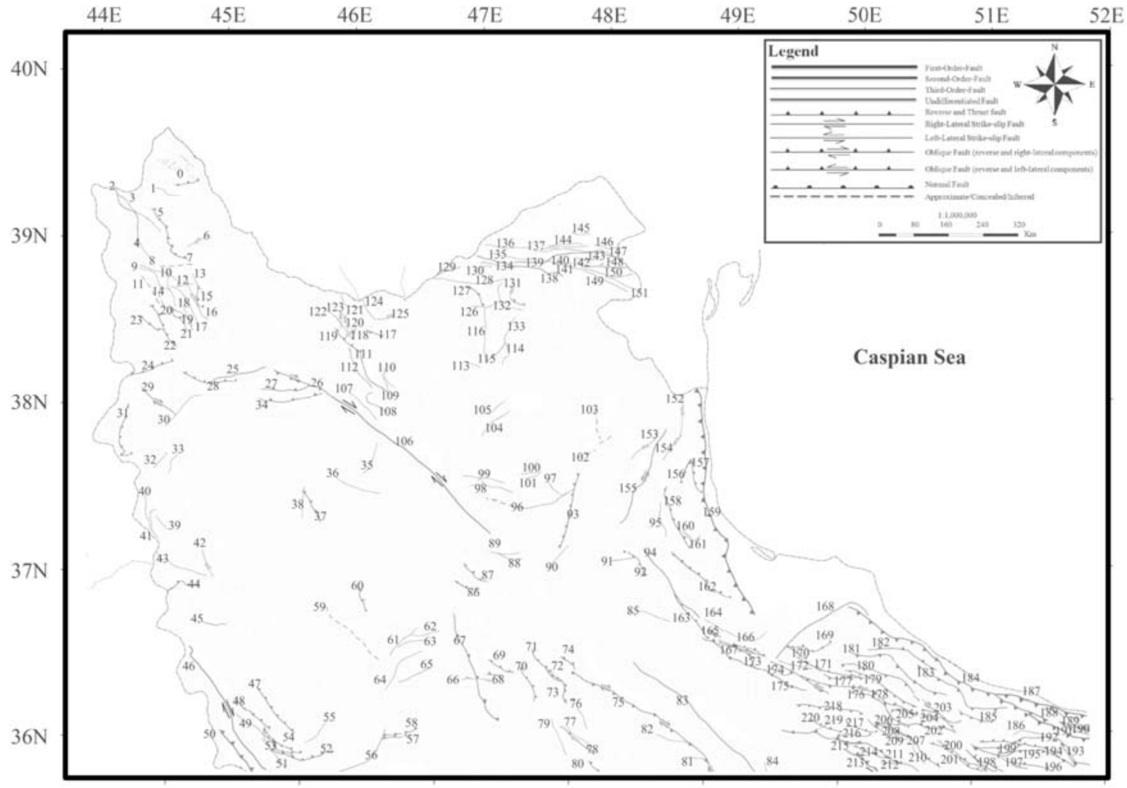

Figure A1. The identified major faults presented by Javadi et al (2013) for North-West Iran. The characteristics of each fault corresponding to its number are shown in Table A1.

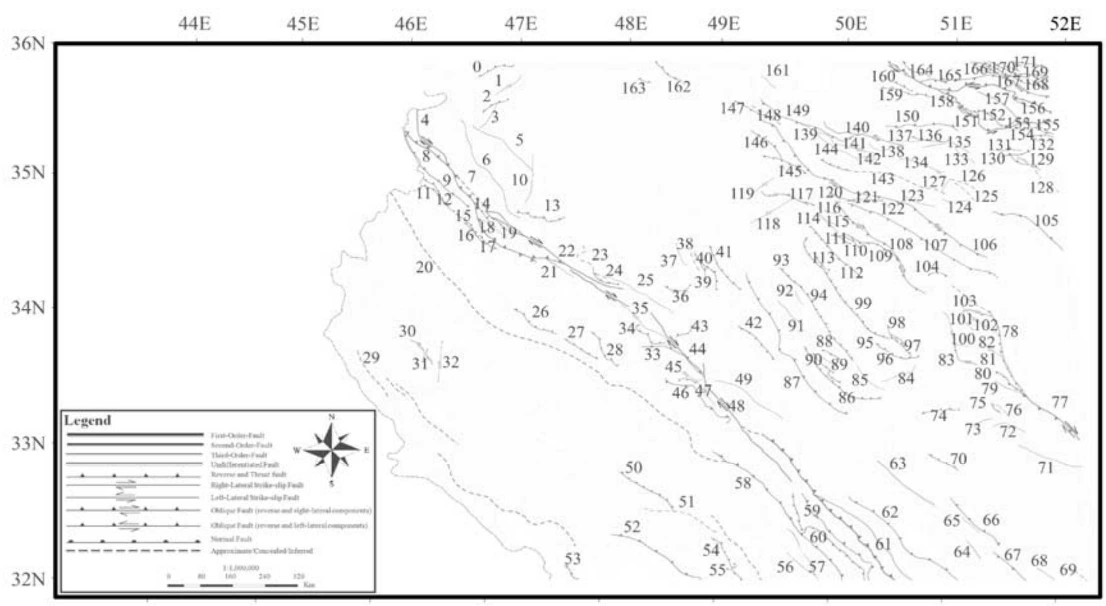

Figure A2. The identified major faults presented by Javadi et al (2013) for West Iran. The characteristics of each fault corresponding to its number are shown in Table A2.

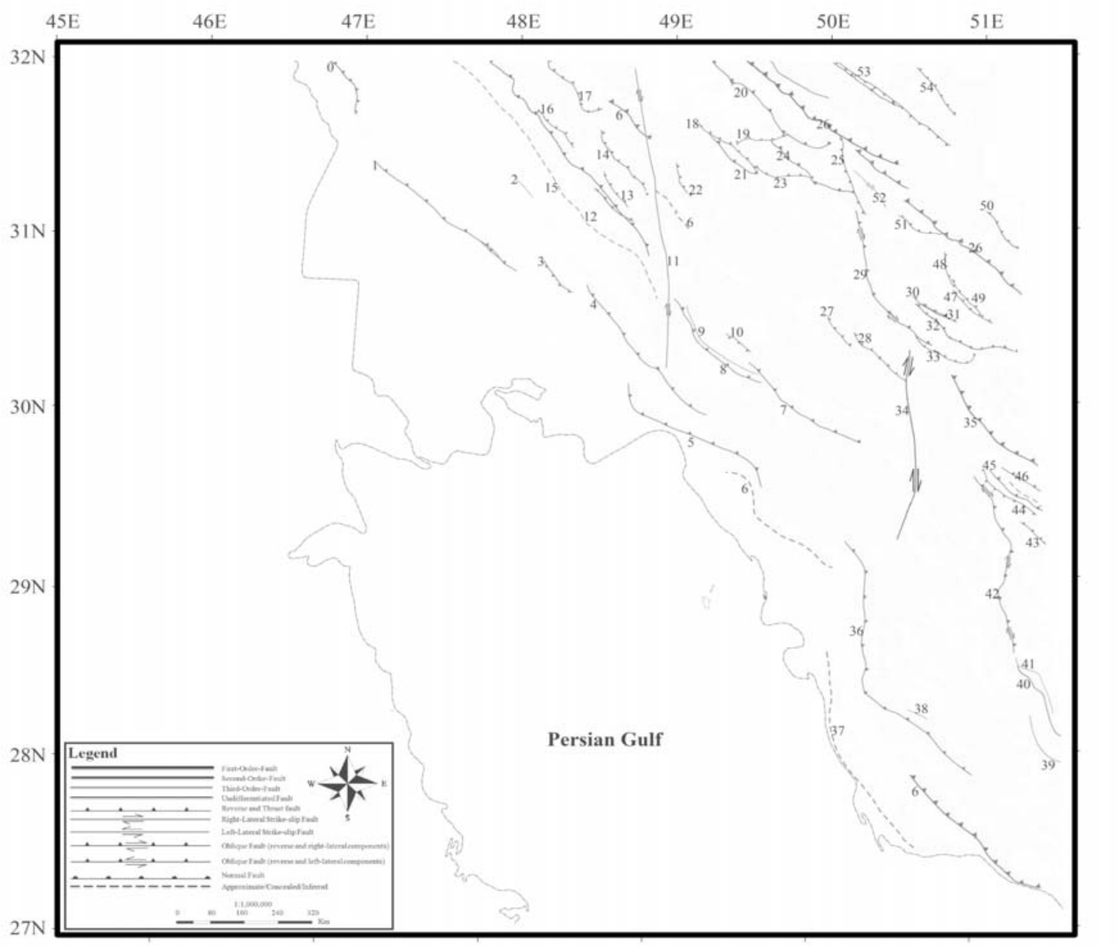

Figure A3. The identified major faults presented by Javadi et al (2013) for South-West Iran. The characteristics of each fault corresponding to its number are shown in Table A3.

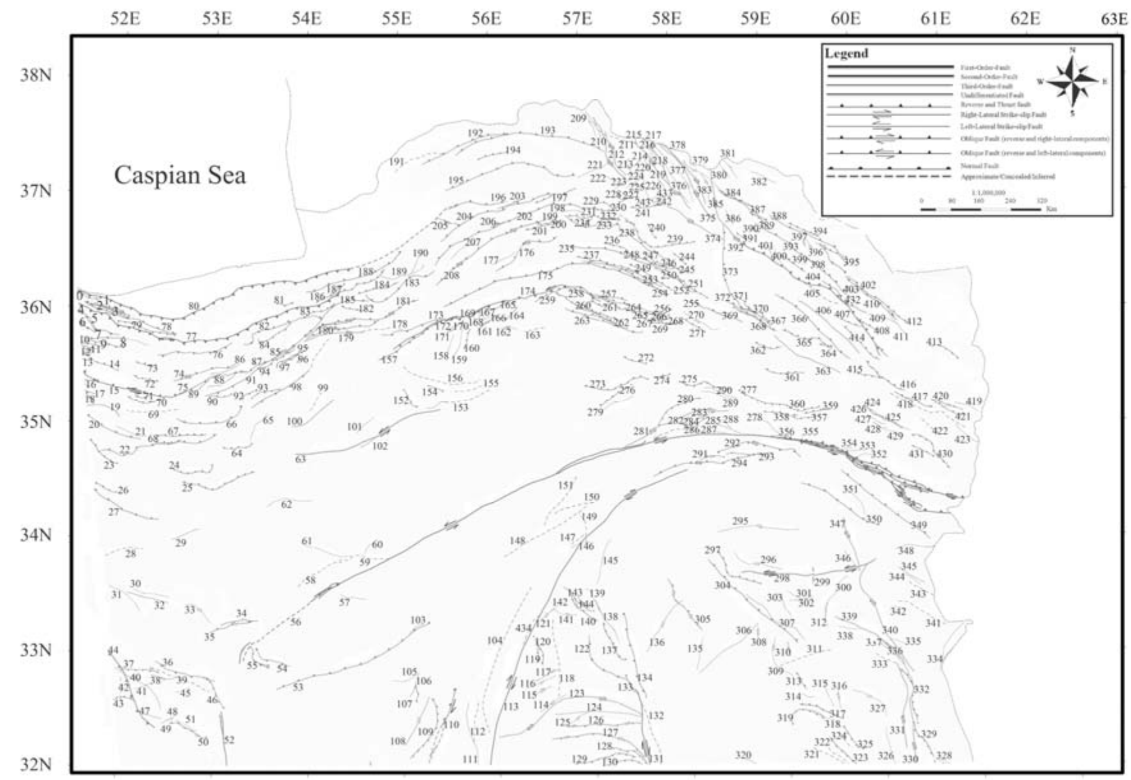

Figure A4. The identified major faults presented by Javadi et al (2013) for North-East Iran. The characteristics of each fault corresponding to its number are shown in Table A4.

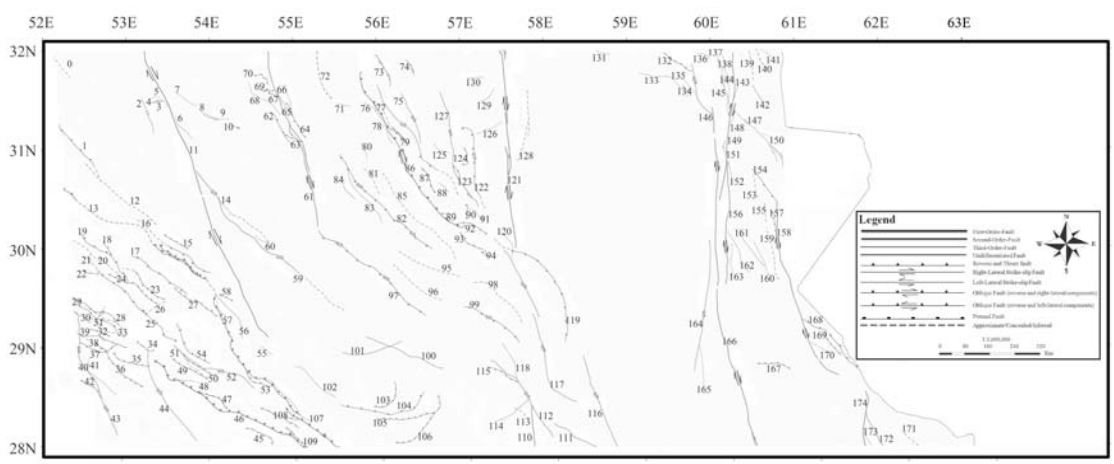

Figure A5. The identified major faults presented by Javadi et al (2013) for East Iran. The characteristics of each fault corresponding to its number are shown in Table A5.

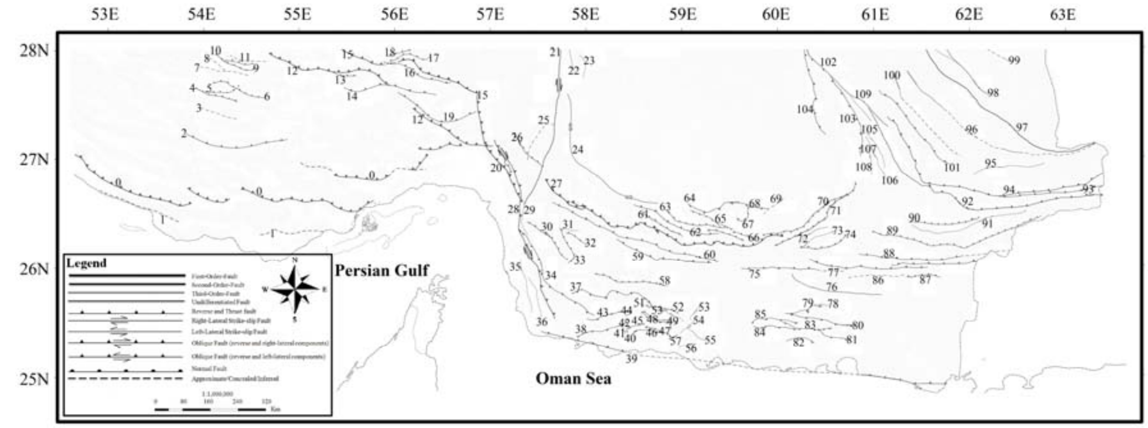

Figure A6. The identified major faults presented by Javadi et al (2013) for South-East Iran. The characteristics of each fault corresponding to its number are shown in Table A6.

Table A1. The maximum magnitude values estimated by different magnitude-scaling relationships for the identified major faults presented by Javadi et al (2013) for North-West Iran. Moreover, the fault's name, length and faulting mechanism (R: Reverse; T: Thrust; N: Normal, SS: Strike Slip and U: Unknown) are presented.

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
0	Ilanqareh	16	T	6.46	6.40	6.47	6.23	6.20	6.37
1	Hasun-e Bozorg	19	U	6.64	6.46	6.56	6.34	6.33	6.49
2	Dibak	53	U	7.02	6.84	7.08	7.02	7.09	7.00
3	Baghcheh Juq	40	U	6.92	6.74	6.94	6.84	6.89	6.86
4	Incheh	16	U	6.57	6.40	6.48	6.23	6.20	6.41
5	Baitamesh	62	T	7.03	6.90	7.19	7.12	7.21	7.06
6	Soufi	14	SS	6.58	6.35	6.44	6.07	6.00	6.34
7	Ishgeh Sou	20	U	6.65	6.48	6.59	6.38	6.37	6.52
8	Kafil	31	U	6.82	6.64	6.81	6.67	6.70	6.73
9	Meidan-Qozghan	40	U	6.92	6.74	6.94	6.84	6.89	6.86
10	Sonat	15	U	6.55	6.37	6.44	6.19	6.15	6.37
11	Zour Abad	30	U	6.81	6.63	6.79	6.65	6.67	6.72
12	Aq Chay	12	U	6.46	6.29	6.33	6.04	5.99	6.26
13	Shurik	15	U	6.55	6.37	6.44	6.19	6.15	6.37
14	Galvance	16	U	6.57	6.40	6.48	6.23	6.20	6.41
15	Hamzian	15	T	6.43	6.37	6.43	6.19	6.15	6.34
16	Zagheh	35	SS	6.90	6.69	6.89	6.68	6.59	6.77
17	Asgar Abad	40	U	6.92	6.74	6.94	6.84	6.89	6.86
18	Aghdargh	20	U	6.65	6.48	6.59	6.38	6.37	6.52
19	Farokh Yashar	22	U	6.69	6.51	6.64	6.44	6.44	6.56
20	Gardik	22	T	6.59	6.51	6.64	6.44	6.44	6.53
21	Pir Younes	12	U	6.46	6.29	6.33	6.04	5.99	6.26
22	Qashghabolaq-Faris	35	T	6.79	6.69	6.88	6.75	6.79	6.77
23	Hessar Talkhok	23	T	6.61	6.53	6.66	6.47	6.47	6.56
24	Chahar Sotun	33	T	6.76	6.67	6.85	6.71	6.74	6.74
25	Tasuj	61	T	7.02	6.89	7.18	7.11	7.20	7.05
26	North of Mishu	65	R	7.05	6.92	7.21	7.16	7.34	7.10
27	South of Mishu	48	R	6.92	6.81	7.05	6.96	7.12	6.95
28	Barkashlu-Shekaryazi	30	T	6.72	6.63	6.80	6.65	6.67	6.69
29	Salmas	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
30	Shor Gol	33	U	6.84	6.67	6.84	6.71	6.74	6.76
31	Hassanlu	50	T	6.94	6.82	7.07	6.98	7.05	6.95
32	Gush	13	U	6.49	6.32	6.37	6.09	6.05	6.30
33	Aishik	15	U	6.55	6.37	6.44	6.19	6.15	6.37
34	Sufian	10	T	6.26	6.22	6.22	5.92	5.85	6.13
35	Astari	24	U	6.72	6.55	6.68	6.50	6.50	6.61

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
36	Orbat	33	U	6.84	6.67	6.84	6.71	6.74	6.76
37	Buket	25	T	6.64	6.56	6.71	6.52	6.54	6.60
38	Shiramin	21	U	6.67	6.50	6.61	6.41	6.41	6.54
39	Silvana	12	U	6.46	6.29	6.33	6.04	5.99	6.26
40	Khanqah (Ahar)	11	U	6.43	6.26	6.29	5.98	5.92	6.22
41	Jermi	25	U	6.74	6.56	6.70	6.52	6.54	6.63
42	Seyvan	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
43	Shivehboro	42	U	6.94	6.76	6.96	6.87	6.92	6.88
44	Oshnavieh	20	R	6.55	6.48	6.59	6.38	6.50	6.51
45	Paveh	20	U	6.65	6.48	6.59	6.38	6.37	6.52
46	Piranshahr	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
47	Pazheh Bard	40	R	6.84	6.74	6.95	6.84	7.00	6.85
48	Musa	35	T	6.79	6.69	6.88	6.75	6.79	6.77
49	Siser	30	U	6.81	6.63	6.79	6.65	6.67	6.72
50	Main Zagros	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
51	Baneh	80	U	7.18	7.00	7.29	7.29	7.40	7.20
52	Nejhu	48	T	6.92	6.81	7.05	6.96	7.02	6.93
53	Sadbar	38	T	6.82	6.72	6.93	6.80	6.85	6.81
54	Khapureh Deh	33	T	6.76	6.67	6.85	6.71	6.74	6.74
55	Minoo	22	U	6.69	6.51	6.64	6.44	6.44	6.56
56	Taleh ja	48	U	6.99	6.81	7.03	6.96	7.02	6.95
57	Qaplanto	18	T	6.51	6.44	6.53	6.31	6.29	6.43
58	Ziviyeh	26	R	6.66	6.58	6.73	6.55	6.69	6.64
59	Zarineh Rud	50	U	7.00	6.82	7.05	6.98	7.05	6.97
60	Qetar	16	T	6.46	6.40	6.47	6.23	6.20	6.37
61	Kohlu	26	U	6.75	6.58	6.72	6.55	6.56	6.65
62	Badamlu	20	U	6.65	6.48	6.59	6.38	6.37	6.52
63	Aman Kandi	20	U	6.65	6.48	6.59	6.38	6.37	6.52
64	Hulehsu	38	U	6.90	6.72	6.91	6.80	6.85	6.83
65	Pichaqeli	23	U	6.71	6.53	6.66	6.47	6.47	6.59
66	Zendan-e-Soleiman	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
67	Hampa	82	T	7.14	7.00	7.33	7.31	7.42	7.20
68	Laelkan	10	T	6.26	6.22	6.22	5.92	5.85	6.13
69	Kozlu-Qareh Naz	20	T	6.55	6.48	6.59	6.38	6.37	6.49
70	Giljak	26	T	6.66	6.58	6.73	6.55	6.56	6.62
71	Guni	33	T	6.76	6.67	6.85	6.71	6.74	6.74

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
72	Moghanlu	19	T	6.53	6.46	6.56	6.34	6.33	6.46
73	Kahriz	12	T	6.34	6.29	6.32	6.04	5.99	6.22
74	Torpakhlu	13	T	6.37	6.32	6.36	6.09	6.05	6.27
75	Soltanieh	150	R	7.16	7.02	7.35	7.33	7.53	7.23
76	Qoltuq	16	U	6.57	6.40	6.48	6.23	6.20	6.41
77	Qamarlak	22	U	6.69	6.51	6.64	6.44	6.44	6.56
78	Halab	30	T	6.72	6.63	6.80	6.65	6.67	6.69
79	Nimeh Kar	27	U	6.77	6.59	6.74	6.58	6.59	6.66
80	Qaieh-Jugh	30	T	6.72	6.63	6.80	6.65	6.67	6.69
81	Chopoghlu	16	U	6.57	6.40	6.48	6.23	6.20	6.41
82	Dehjalal	27	U	6.77	6.59	6.74	6.58	6.59	6.66
83	Zanjan	140	R	7.16	7.02	7.35	7.33	7.53	7.23
84	Shinin	10	U	6.39	6.22	6.24	5.92	5.85	6.17
85	Giljin	29	U	6.80	6.62	6.78	6.62	6.65	6.70
86	Takht-e Paien	18	T	6.51	6.44	6.53	6.31	6.29	6.43
87	Talesh Kandi	21	T	6.57	6.50	6.61	6.41	6.41	6.51
88	Mahkuh	17	U	6.59	6.42	6.51	6.27	6.25	6.44
89	Qalehjuq	20	U	6.65	6.48	6.59	6.38	6.37	6.52
90	Khanyordi	19	U	6.64	6.46	6.56	6.34	6.33	6.49
91	Jeraz	17	U	6.59	6.42	6.51	6.27	6.25	6.44
92	Dordelvar	22	T	6.59	6.51	6.64	6.44	6.44	6.53
93	Bozqush	52	R	6.95	6.84	7.09	7.01	7.18	6.99
94	Masuleh	62	T	7.03	6.90	7.19	7.12	7.21	7.06
95	Andalibi	25	U	6.74	6.56	6.70	6.52	6.54	6.63
96	Benarvan	62	U	7.08	6.90	7.16	7.12	7.21	7.07
97	Naramiq	15	U	6.55	6.37	6.44	6.19	6.15	6.37
98	Bashkandi	34	U	6.86	6.68	6.86	6.73	6.76	6.78
99	Anbaran	33	U	6.84	6.67	6.84	6.71	6.74	6.76
100	Andarab	12	U	6.46	6.29	6.33	6.04	5.99	6.26
101	Doniq	12	U	6.46	6.29	6.33	6.04	5.99	6.26
102	Yamchi	30	U	6.81	6.63	6.79	6.65	6.67	6.72
103	Atashgah	22	U	6.69	6.51	6.64	6.44	6.44	6.56
104	Barakhosh	26	U	6.75	6.58	6.72	6.55	6.56	6.65
105	Sheran	15	U	6.55	6.37	6.44	6.19	6.15	6.37
106	Tabriz	150	SS	7.35	7.16	7.51	7.52	7.40	7.36
107	Baba Baghi	27	U	6.77	6.59	6.74	6.58	6.59	6.66

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
108	Bohlul Daghi	24	U	6.72	6.55	6.68	6.50	6.50	6.61
109	Gamanaj-e Bala	18	U	6.62	6.44	6.54	6.31	6.29	6.46
110	Golujeh	16	U	6.57	6.40	6.48	6.23	6.20	6.41
111	Varkash	36	U	6.88	6.70	6.89	6.77	6.81	6.81
112	Cheraghali	33	U	6.84	6.67	6.84	6.71	6.74	6.76
113	Arparan	12	U	6.46	6.29	6.33	6.04	5.99	6.26
114	Golizeh	16	U	6.57	6.40	6.48	6.23	6.20	6.41
115	Bimlu	18	U	6.62	6.44	6.54	6.31	6.29	6.46
116	Qaleh Malek	38	U	6.90	6.72	6.91	6.80	6.85	6.83
117	Leilab-Aliyar	12	R	6.34	6.29	6.32	6.04	6.14	6.25
118	Kharvanaq	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
119	Astarkhan-Komar	22	R	6.59	6.51	6.64	6.44	6.57	6.55
120	Kuchan	16	SS	6.63	6.40	6.51	6.16	6.09	6.40
121	Siddo	22	U	6.69	6.51	6.64	6.44	6.44	6.56
122	Komar	28	U	6.78	6.60	6.76	6.60	6.62	6.68
123	Komr-e Bala	12	SS	6.53	6.29	6.37	5.97	5.91	6.27
124	Dozal-Changu	17	U	6.59	6.42	6.51	6.27	6.25	6.44
125	Avan	12	SS	6.53	6.29	6.37	5.97	5.91	6.27
126	Arab Shah	20	U	6.65	6.48	6.59	6.38	6.37	6.52
127	Mokhtegan	16	R	6.46	6.40	6.47	6.23	6.35	6.39
128	Avarcin	48	U	6.99	6.81	7.03	6.96	7.02	6.95
129	Tou Ali Bala	17	U	6.59	6.42	6.51	6.27	6.25	6.44
130	Khanqah (Oroonieh)	27	U	6.77	6.59	6.74	6.58	6.59	6.66
131	Menjav	20	R	6.55	6.48	6.59	6.38	6.50	6.51
132	Horand	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
133	Majid Abad-Kinab	25	N	6.74	6.56	6.71	6.52	6.43	6.61
134	Qayehbashi	24	U	6.72	6.55	6.68	6.50	6.50	6.61
135	Aghlaqan Jiq	30.5	U	6.81	6.64	6.80	6.66	6.68	6.72
136	Shahuni	30	U	6.81	6.63	6.79	6.65	6.67	6.72
137	North of Digdash	16	U	6.57	6.40	6.48	6.23	6.20	6.41
138	Khanbaghi	61	U	7.08	6.89	7.15	7.11	7.20	7.07
139	Khorosludagh	72	U	7.14	6.96	7.23	7.22	7.32	7.15
140	Qarajeh Aghol	24	U	6.72	6.55	6.68	6.50	6.50	6.61
141	Hamzelu	55	U	7.04	6.86	7.10	7.05	7.12	7.02
142	Ojaq Qeshlaq I	10	U	6.39	6.22	6.24	5.92	5.85	6.17
143	Ojaq Qeshlaq II	14	U	6.52	6.35	6.41	6.14	6.10	6.34

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
144	Northen Amirkhalu	25	U	6.74	6.56	6.70	6.52	6.54	6.63
145	Ortadagh	12	U	6.46	6.29	6.33	6.04	5.99	6.26
146	Chanaqbolagh	11	U	6.43	6.26	6.29	5.98	5.92	6.22
147	Narqeshlaqi	15	U	6.55	6.37	6.44	6.19	6.15	6.37
148	Hadibeiglu	15	U	6.55	6.37	6.44	6.19	6.15	6.37
149	Germi	32	U	6.83	6.65	6.83	6.69	6.72	6.75
150	Mazan	35	U	6.87	6.69	6.87	6.75	6.79	6.79
151	Hachakandi	30	U	6.81	6.63	6.79	6.65	6.67	6.72
152	Noor	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
153	West of Talesh	27	SS	6.81	6.59	6.76	6.51	6.42	6.65
154	Qarpuzlu	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
155	Sangavard	74	SS	7.16	6.97	7.25	7.17	7.07	7.11
156	West of Luleh Chal	15	T	6.43	6.37	6.43	6.19	6.15	6.34
157	East of Luleh Chal	22	T	6.59	6.51	6.64	6.44	6.44	6.53
158	Niki	50	T	6.94	6.82	7.07	6.98	7.05	6.95
159	Astara	400	R	7.16	7.02	7.35	7.33	7.53	7.23
160	Ardeh	15	SS	6.61	6.37	6.48	6.12	6.05	6.37
161	Shafarud	14	SS	6.58	6.35	6.44	6.07	6.00	6.34
162	Delmadeh	54	T	6.97	6.85	7.11	7.03	7.11	6.99
163	Vanno	38	T	6.82	6.72	6.93	6.80	6.85	6.81
164	Baklor	34	U	6.86	6.68	6.86	6.73	6.76	6.78
165	Rudbar	80	R	7.13	7.00	7.32	7.29	7.49	7.20
166	Vilvar	22	T	6.59	6.51	6.64	6.44	6.44	6.53
167	Kellass	22	T	6.59	6.51	6.64	6.44	6.44	6.53
168	Lahijan	60	U	7.07	6.89	7.14	7.10	7.19	7.06
169	Khan Dasht	32	T	6.75	6.65	6.84	6.69	6.72	6.72
170	Dasht-e Daman	14	T	6.40	6.35	6.40	6.14	6.10	6.30
171	Kelishom	90	R	7.16	7.02	7.35	7.33	7.53	7.23
172	Baresar	23	U	6.71	6.53	6.66	6.47	6.47	6.59
173	Kabatteh	13	T	6.37	6.32	6.36	6.09	6.05	6.27
174	Kuh-e Shirkand	18	T	6.51	6.44	6.53	6.31	6.29	6.43
175	Manjil	80	T	7.13	7.00	7.32	7.29	7.40	7.19
176	Kharkhoon	19	T	6.53	6.46	6.56	6.34	6.33	6.46
177	Varbon	28	T	6.69	6.60	6.77	6.60	6.62	6.66
178	Jirandeh	178	T	7.16	7.02	7.35	7.33	7.45	7.22
179	Zarin Rajeh	70	T	7.08	6.95	7.25	7.20	7.30	7.12

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
186	Marzan Abad	24	R	6.63	6.55	6.68	6.50	6.63	6.60
187	Khazar	600	R	7.16	7.02	7.35	7.33	7.53	7.23
188	Tabarestan	26	T	6.66	6.58	6.73	6.55	6.56	6.62
189	North. Galand Rud	48	T	6.92	6.81	7.05	6.96	7.02	6.93
190	Middle Galand Rud	41	T	6.85	6.75	6.97	6.85	6.90	6.85
191	Tasher	30	T	6.72	6.63	6.80	6.65	6.67	6.69
192	Kojur	110	T	7.16	7.02	7.35	7.33	7.45	7.22
193	Khachak	19	T	6.53	6.46	6.56	6.34	6.33	6.46
194	Sama- Majlar	57	T	6.99	6.87	7.14	7.07	7.15	7.02
195	Zanus	71	T	7.08	6.95	7.26	7.21	7.31	7.13
196	Baladeh	70	T	7.08	6.95	7.25	7.20	7.30	7.12
197	Vali Abad	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
198	Kandovan	200	T	7.16	7.02	7.35	7.33	7.45	7.22
199	Dazin	25	T	6.64	6.56	6.71	6.52	6.54	6.60
200	Azadbar	60	T	7.01	6.89	7.17	7.10	7.19	7.04
201	Narian	45	T	6.89	6.78	7.02	6.91	6.97	6.90
202	Zavardash	67	T	7.06	6.93	7.23	7.18	7.27	7.10
203	Nusha	57	SS	7.07	6.87	7.13	7.00	6.90	6.99
204	Niadareh	28	T	6.69	6.60	6.77	6.60	6.62	6.66
205	Abask	20	R	6.55	6.48	6.59	6.38	6.50	6.51
206	Kushk	16	T	6.46	6.40	6.47	6.23	6.20	6.37
207	Dikin	52	T	6.95	6.84	7.09	7.01	7.08	6.97
208	South of Dikin	20	T	6.55	6.48	6.59	6.38	6.37	6.49
209	Alamut	75	R	7.11	6.97	7.29	7.25	7.44	7.17
210	Kash	17	U	6.59	6.42	6.51	6.27	6.25	6.44
211	North Qazvin	100	T	7.16	7.02	7.35	7.33	7.45	7.22
212	Qarib Mazraeh	14	T	6.40	6.35	6.40	6.14	6.10	6.30
213	North Tehran	185	R	7.16	7.02	7.35	7.33	7.53	7.23
214	Veres	25	T	6.64	6.56	6.71	6.52	6.54	6.60
215	Akbar Abad	22	T	6.59	6.51	6.64	6.44	6.44	6.53
216	Nizuj	26	T	6.66	6.58	6.73	6.55	6.56	6.62
217	Vartovan	22	T	6.59	6.51	6.64	6.44	6.44	6.53
218	Daryasar	48	T	6.92	6.81	7.05	6.96	7.02	6.93
219	Ashna	12	U	6.46	6.29	6.33	6.04	5.99	6.26
220	Moalemkhani	24	R	6.63	6.55	6.68	6.50	6.63	6.60

Table A2. The maximum magnitude values estimated by different magnitude-scaling relationships for the identified major faults presented by Javadi et al (2013) for West Iran. Moreover, the fault's name, length and faulting mechanism (R: Reverse; T: Thrust; N: Normal, SS: Strike Slip and U: Unknown) are presented.

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
0	Zarineh-Obato	30	T	6.72	6.63	6.80	6.65	6.67	6.69
1	Kotak	27	SS	6.81	6.59	6.76	6.51	6.42	6.65
2	Gorji	22	T	6.59	6.51	6.64	6.44	6.44	6.53
3	Darvishan	25	U	6.74	6.56	6.70	6.52	6.54	6.63
4	Piranshahr	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
5	Dopaseh	63	U	7.09	6.91	7.17	7.13	7.22	7.08
6	Aupahnag	100	U	7.20	7.02	7.32	7.33	7.45	7.23
7	Morvarid	150	SS	7.35	7.16	7.51	7.52	7.40	7.36
8	Main Zagros	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
9	Noudsheh	85	T	7.16	7.02	7.35	7.33	7.45	7.22
10	Sanandaj	43	U	6.94	6.76	6.97	6.88	6.94	6.89
11	South of Sirvan	26	T	6.66	6.58	6.73	6.55	6.56	6.62
12	North of Sirvan	31	T	6.73	6.64	6.82	6.67	6.70	6.71
13	Gol Tappeh	53	T	6.96	6.84	7.10	7.02	7.09	6.98
14	Bozvash	30	T	6.72	6.63	6.80	6.65	6.67	6.69
15	Kalaveh I	24	T	6.63	6.55	6.68	6.50	6.50	6.58
16	Kalaveh II	26.5	T	6.67	6.58	6.74	6.56	6.58	6.63
17	Darchadman	20	T	6.55	6.48	6.59	6.38	6.37	6.49
18	Gashki	25	U	6.74	6.56	6.70	6.52	6.54	6.63
19	Shahieh	16	T	6.46	6.40	6.47	6.23	6.20	6.37
20	High Zagros	1375	T	7.16	7.02	7.35	7.33	7.45	7.22
21	Mianrahan	15	U	6.55	6.37	6.44	6.19	6.15	6.37
22	Sahneh	100	SS	7.27	7.08	7.40	7.37	7.26	7.25
23	Kharkesh	55	T	6.98	6.86	7.12	7.05	7.12	7.00
24	Tushmalan	23	T	6.61	6.53	6.66	6.47	6.47	6.56
25	Lord kamar	32	SS	6.87	6.65	6.85	6.62	6.53	6.72
26	Shirazi	42	T	6.86	6.76	6.98	6.87	6.92	6.86
27	Kuh-e Sefid (Harsin)	32	T	6.75	6.65	6.84	6.69	6.72	6.72
28	Manga	43	T	6.87	6.76	6.99	6.88	6.94	6.87
29	Mountain front	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
30	Bankol I	16	R	6.46	6.40	6.47	6.23	6.35	6.39
31	Bankol II	22	R	6.59	6.51	6.64	6.44	6.57	6.55
32	Manasht	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
33	Baraftab	60	T	7.01	6.89	7.17	7.10	7.19	7.04
34	Zafar Abad (Nahavand)	39	T	6.83	6.73	6.94	6.82	6.87	6.83
35	Garun	50	SS	7.03	6.82	7.06	6.91	6.82	6.93

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
36	Kuh-e Cheshmeh Darreh	22	T	6.59	6.51	6.64	6.44	6.44	6.53
37	Sulan	22	U	6.69	6.51	6.64	6.44	6.44	6.56
38	Keshin-Simin	15	U	6.55	6.37	6.44	6.19	6.15	6.37
39	Yalfan- Ninjeh	30	R	6.72	6.63	6.80	6.65	6.79	6.71
40	Tafrijan-Kandelan	35	R	6.79	6.69	6.88	6.75	6.90	6.79
41	Siah Kamar- Alavi	45	T	6.89	6.78	7.02	6.91	6.97	6.90
42	Toreh	70	R	7.08	6.95	7.25	7.20	7.39	7.14
43	Alvan	20	T	6.55	6.48	6.59	6.38	6.37	6.49
44	Nahavand	100	R	7.16	7.02	7.35	7.33	7.53	7.23
45	Mish Parvar	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
46	Razan	25	T	6.64	6.56	6.71	6.52	6.54	6.60
47	Absardeh	43	SS	6.97	6.76	6.99	6.81	6.72	6.86
48	Dorud	100	SS	7.27	7.08	7.40	7.37	7.26	7.25
49	Gavmir	65	U	7.10	6.92	7.18	7.16	7.25	7.10
50	Dowraq	56	T	6.98	6.86	7.13	7.06	7.14	7.01
51	Balarud	63	U	7.09	6.91	7.17	7.13	7.22	7.08
52	Lahbari	248	T	7.16	7.02	7.35	7.33	7.45	7.22
53	Shamekli	62	T	7.03	6.90	7.19	7.12	7.21	7.06
54	Sikhvand	38	T	6.82	6.72	6.93	6.80	6.85	6.81
55	Lali	37	T	6.81	6.71	6.91	6.78	6.83	6.80
56	Mafarun	79	T	7.13	6.99	7.32	7.28	7.39	7.18
57	Lapad	44	U	6.95	6.77	6.99	6.90	6.96	6.91
58	Zard Kuh	220	R	7.16	7.02	7.35	7.33	7.53	7.23
59	Ardal	200	R	7.16	7.02	7.35	7.33	7.53	7.23
60	Solaghan	138	T	7.16	7.02	7.35	7.33	7.45	7.22
61	Shahr-e Kord	156	U	7.20	7.02	7.32	7.33	7.45	7.23
62	Hardang	172	T	7.16	7.02	7.35	7.33	7.45	7.22
63	Khonsar	60	U	7.07	6.89	7.14	7.10	7.19	7.06
64	Tang-e Barzeh Galeh	19	U	6.64	6.46	6.56	6.34	6.33	6.49
65	Aureh Kuh	20	U	6.65	6.48	6.59	6.38	6.37	6.52
66	Najaf Abad	48	R	6.92	6.81	7.05	6.96	7.12	6.95
67	Lanjan	50	T	6.94	6.82	7.07	6.98	7.05	6.95
68	Vazir Abad	34	U	6.86	6.68	6.86	6.73	6.76	6.78
69	Kolah Qazi	30	U	6.81	6.63	6.79	6.65	6.67	6.72
70	Harua	28	T	6.69	6.60	6.77	6.60	6.62	6.66
71	Kalahrud	62	U	7.08	6.90	7.16	7.12	7.21	7.07

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
72	Maravand	30	U	6.81	6.63	6.79	6.65	6.67	6.72
73	Joshaghan (Kashan)	20	U	6.65	6.48	6.59	6.38	6.37	6.52
74	Muteh	30	T	6.72	6.63	6.80	6.65	6.67	6.69
75	Kamo	12	R	6.34	6.29	6.32	6.04	6.14	6.25
76	Chall	20	U	6.65	6.48	6.59	6.38	6.37	6.52
77	Zefreh	150	SS	7.35	7.16	7.51	7.52	7.40	7.36
78	Kashan	73	T	7.09	6.96	7.27	7.23	7.33	7.14
79	Gojar	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
80	Jazeh	32	R	6.75	6.65	6.84	6.69	6.84	6.74
81	Ravand	22	U	6.69	6.51	6.64	6.44	6.44	6.56
82	Qeh	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
83	Bidhend	60	SS	7.09	6.89	7.15	7.03	6.93	7.02
84	Mahalat	30	U	6.81	6.63	6.79	6.65	6.67	6.72
85	Anjidan	30	U	6.81	6.63	6.79	6.65	6.67	6.72
86	Kuh-e Homa	70	T	7.08	6.95	7.25	7.20	7.30	7.12
87	Khondab	152	T	7.16	7.02	7.35	7.33	7.45	7.22
88	Aman Abad	13	R	6.37	6.32	6.36	6.09	6.20	6.29
89	Kuh-e Shahneshin	18	U	6.62	6.44	6.54	6.31	6.29	6.46
90	Nurian	43	T	6.87	6.76	6.99	6.88	6.94	6.87
91	Jireya	26	U	6.75	6.58	6.72	6.55	6.56	6.65
92	Qatar Aghaj	13	U	6.49	6.32	6.37	6.09	6.05	6.30
93	Tabarteh	28	T	6.69	6.60	6.77	6.60	6.62	6.66
94	Tuzlu Gol	70	R	7.08	6.95	7.25	7.20	7.39	7.14
95	Sang Khorideh	15	R	6.43	6.37	6.43	6.19	6.30	6.36
96	Varin	32	R	6.75	6.65	6.84	6.69	6.84	6.74
97	Khurheh	30	R	6.72	6.63	6.80	6.65	6.79	6.71
98	Kahak	30	R	6.72	6.63	6.80	6.65	6.79	6.71
99	Talkhab	114	T	7.16	7.02	7.35	7.33	7.45	7.22
100	Rehaq	13	U	6.49	6.32	6.37	6.09	6.05	6.30
101	Miyam	18	U	6.62	6.44	6.54	6.31	6.29	6.46
102	Anar Boneh	42	SS	6.97	6.76	6.98	6.80	6.71	6.85
103	Mehr Abad (Shiraz)	24	T	6.63	6.55	6.68	6.50	6.50	6.58
104	Dochah	17	T	6.48	6.42	6.50	6.27	6.25	6.40
105	Siah Kuh (Kashmar)	75	U	7.15	6.97	7.26	7.25	7.35	7.17
106	Kushk-e Nosrat	220	SS	7.35	7.16	7.51	7.52	7.40	7.36
107	Alborz	45	R	6.89	6.78	7.02	6.91	7.08	6.91

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
108	Indes	100	SS	7.27	7.08	7.40	7.37	7.26	7.25
109	Farasmaneh	65	T	7.05	6.92	7.21	7.16	7.25	7.09
110	Zurjin	12	T	6.34	6.29	6.32	6.04	5.99	6.22
111	Ezeddin	15	T	6.43	6.37	6.43	6.19	6.15	6.34
112	Tafresh	55	T	6.98	6.86	7.12	7.05	7.12	7.00
113	Chaghar	15	T	6.43	6.37	6.43	6.19	6.15	6.34
114	Kohlu-e Paien	24	U	6.72	6.55	6.68	6.50	6.50	6.61
115	North of Kohlu-e Pain	20	U	6.65	6.48	6.59	6.38	6.37	6.52
116	Nobaran	50	U	7.00	6.82	7.05	6.98	7.05	6.97
117	Dokhan	47	R	6.91	6.80	7.04	6.94	7.11	6.94
118	Omar Abad-Khianak	40	SS	6.95	6.74	6.95	6.77	6.67	6.83
119	Karafs-Souzan	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
120	Ardamin	26	R	6.66	6.58	6.73	6.55	6.69	6.64
121	Neshveh	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
122	Qermez Aghash	15	SS	6.61	6.37	6.48	6.12	6.05	6.37
123	Zard Rang	15	U	6.55	6.37	6.44	6.19	6.15	6.37
124	Khan Kish	22	U	6.69	6.51	6.64	6.44	6.44	6.56
125	Nazar Abad	24	U	6.72	6.55	6.68	6.50	6.50	6.61
126	Parandak	34	U	6.86	6.68	6.86	6.73	6.76	6.78
127	Paivand	13	U	6.49	6.32	6.37	6.09	6.05	6.30
128	Kahrizak	55	SS	7.06	6.86	7.11	6.98	6.88	6.98
129	Tanbakui	11	SS	6.50	6.26	6.33	5.91	5.85	6.23
130	South of Rey	18.5	T	6.52	6.45	6.55	6.33	6.31	6.45
131	North of Rey	17	T	6.48	6.42	6.50	6.27	6.25	6.40
132	Sorkh-e Hessar	30	T	6.72	6.63	6.80	6.65	6.67	6.69
133	Shour	21	U	6.67	6.50	6.61	6.41	6.41	6.54
134	Bidlu	38	U	6.90	6.72	6.91	6.80	6.85	6.83
135	Chaghu	41	U	6.93	6.75	6.95	6.85	6.90	6.87
136	Gomrokan	30	T	6.72	6.63	6.80	6.65	6.67	6.69
137	Sariyal	21	U	6.67	6.50	6.61	6.41	6.41	6.54
138	Moheb Ali	28	U	6.78	6.60	6.76	6.60	6.62	6.68
139	Kour Cheshmeh	33	SS	6.88	6.67	6.86	6.64	6.55	6.74
140	Ipak	100	R	7.16	7.02	7.35	7.33	7.53	7.23
141	Saridarreh-Haji Abad	36	SS	6.91	6.70	6.90	6.70	6.61	6.78
142	Saridagh	19	SS	6.69	6.46	6.59	6.27	6.20	6.48
143	Khoshkrud	25	T	6.64	6.56	6.71	6.52	6.54	6.60

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
144	Haji Arab-Someinak	45	U	6.96	6.78	7.00	6.91	6.97	6.92
145	Ahamad Abad-Karvansara	40	R	6.84	6.74	6.95	6.84	7.00	6.85
146	Avaj	35	T	6.79	6.69	6.88	6.75	6.79	6.77
147	Abdarreh	30	T	6.72	6.63	6.80	6.65	6.67	6.69
148	Khar Rud	30	U	6.81	6.63	6.79	6.65	6.67	6.72
149	Hassan Abad (Ghazwin)	90	R	7.16	7.02	7.35	7.33	7.53	7.23
150	Eshtehard	63	T	7.03	6.91	7.20	7.13	7.22	7.07
151	North Tehran	185	R	7.16	7.02	7.35	7.33	7.53	7.23
152	Pourkan-Vardij	55	T	6.98	6.86	7.12	7.05	7.12	7.00
153	Niavaran	45	T	6.89	6.78	7.02	6.91	6.97	6.90
154	Mahmoudieh	11	R	6.30	6.26	6.27	5.98	6.08	6.20
155	Kowsar	13	R	6.37	6.32	6.36	6.09	6.20	6.29
156	Ahar	30	T	6.72	6.63	6.80	6.65	6.67	6.69
157	Emamzadeh Davoud	45	R	6.89	6.78	7.02	6.91	7.08	6.91
158	Baghestan	33	T	6.76	6.67	6.85	6.71	6.74	6.74
159	Qeshlaq-Aladaghlu	42	R	6.86	6.76	6.98	6.87	7.03	6.88
160	Bagher Abad	15	T	6.43	6.37	6.43	6.19	6.15	6.34
161	Darejin	16	U	6.57	6.40	6.48	6.23	6.20	6.41
162	Qaieh-Jugh	30	T	6.72	6.63	6.80	6.65	6.67	6.69
163	Aslanlu	12	T	6.34	6.29	6.32	6.04	5.99	6.22
164	Vanedar	28	T	6.69	6.60	6.77	6.60	6.62	6.66
165	Taleqan	120	U	7.20	7.02	7.32	7.33	7.45	7.23
166	Garab	17	T	6.48	6.42	6.50	6.27	6.25	6.40
167	Gachsar	12	R	6.34	6.29	6.32	6.04	6.14	6.25
168	Varangeh Rud	70	R	7.08	6.95	7.25	7.20	7.39	7.14
169	Kahar	76	T	7.11	6.98	7.29	7.26	7.36	7.16
170	Dona-Siahbisheh	12	R	6.34	6.29	6.32	6.04	6.14	6.25
171	Vali Abad	20	SS	6.71	6.48	6.62	6.31	6.23	6.51

Table A3. The maximum magnitude values estimated by different magnitude-scaling relationships for the identified major faults presented by Javadi et al (2013) for South-West Iran. Moreover, the fault's name, length and faulting mechanism (R: Reverse; T: Thrust; N: Normal, SS: Strike Slip and U: Unknown) are presented.

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
0	Shamekli	62	T	7.03	6.90	7.19	7.12	7.21	7.06
1	Ahvaz	60	T	7.01	6.89	7.17	7.10	7.19	7.04
2	Avafi	15	U	6.55	6.37	6.44	6.19	6.15	6.37
3	Maroon	50	T	6.94	6.82	7.07	6.98	7.05	6.95
4	Aghajari	150	T	7.16	7.02	7.35	7.33	7.45	7.22
5	Rag Sefid	113	R	7.16	7.02	7.35	7.33	7.53	7.23
6	Mountain front	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
7	Mishan	87	T	7.16	7.02	7.35	7.33	7.45	7.22
8	Behbahan	80	R	7.13	7.00	7.32	7.29	7.49	7.20
9	Tashan	60	R	7.01	6.89	7.17	7.10	7.28	7.06
10	Baba Khaneh	20	T	6.55	6.48	6.59	6.38	6.37	6.49
11	Izeh	210	SS	7.35	7.16	7.51	7.52	7.40	7.36
12	Jarreh	33	T	6.76	6.67	6.85	6.71	6.74	6.74
13	Shah Neshin	28	T	6.69	6.60	6.77	6.60	6.62	6.66
14	Mordehfel	54	T	6.97	6.85	7.11	7.03	7.11	6.99
15	Ramhormoz	100	T	7.16	7.02	7.35	7.33	7.45	7.22
16	Masjed Soleiman	37	T	6.81	6.71	6.91	6.78	6.83	6.80
17	Andakan	71	T	7.08	6.95	7.26	7.21	7.31	7.13
18	Gareh	43	T	6.87	6.76	6.99	6.88	6.94	6.87
19	Kordan	35	T	6.79	6.69	6.88	6.75	6.79	6.77
20	Ardal	200	R	7.16	7.02	7.35	7.33	7.53	7.23
21	Bazoft	50	T	6.94	6.82	7.07	6.98	7.05	6.95
22	Mangasht	45	T	6.89	6.78	7.02	6.91	6.97	6.90
23	Kermani	40	T	6.84	6.74	6.95	6.84	6.89	6.84
24	Dopolan	66	T	7.05	6.92	7.22	7.17	7.26	7.09
25	Sabzeh Kuh	55	R	6.98	6.86	7.12	7.05	7.22	7.01
26	Main Zagros	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
27	Kuh-e Noh	26	T	6.66	6.58	6.73	6.55	6.56	6.62
28	Sivak	30	T	6.72	6.63	6.80	6.65	6.67	6.69
29	Dena	105	R	7.16	7.02	7.35	7.33	7.53	7.23
30	Taveh Siah	18	T	6.51	6.44	6.53	6.31	6.29	6.43
31	Bideh	34	T	6.77	6.68	6.87	6.73	6.76	6.76
32	Kuh Siah	47	T	6.91	6.80	7.04	6.94	7.01	6.92
33	Chal Kalagh	46	U	6.97	6.79	7.01	6.93	6.99	6.93
34	Kazerun	450	SS	7.35	7.16	7.51	7.52	7.40	7.36
35	High Zagros	1375	T	7.16	7.02	7.35	7.33	7.45	7.22

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
36	Borazjan	180	T	7.16	7.02	7.35	7.33	7.45	7.22
37	Zagros Foredeep	200	R	7.16	7.02	7.35	7.33	7.53	7.23
38	Khurmuj	13	U	6.49	6.32	6.37	6.09	6.05	6.30
39	Abu Ali	57	U	7.05	6.87	7.12	7.07	7.15	7.03
40	Surmeh	80	U	7.18	7.00	7.29	7.29	7.40	7.20
41	Sikh	45	U	6.96	6.78	7.00	6.91	6.97	6.92
42	Karehbas	160	SS	7.35	7.16	7.51	7.52	7.40	7.36
43	Derak	20	T	6.55	6.48	6.59	6.38	6.37	6.49
44	Qalat	28	T	6.69	6.60	6.77	6.60	6.62	6.66
45	Kelestan	52	T	6.95	6.84	7.09	7.01	7.08	6.97
46	Katah	25	T	6.64	6.56	6.71	6.52	6.54	6.60
47	Janga	33	T	6.76	6.67	6.85	6.71	6.74	6.74
48	Hana	25	T	6.64	6.56	6.71	6.52	6.54	6.60
49	Kuh-e Aqdagh	20	T	6.55	6.48	6.59	6.38	6.37	6.49
50	Cher Cher	35	T	6.79	6.69	6.88	6.75	6.79	6.77
51	Semirom	30	T	6.72	6.63	6.80	6.65	6.67	6.69
52	Mourchegan	31	SS	6.86	6.64	6.83	6.60	6.51	6.71
53	North of Rakh	98	T	7.16	7.02	7.35	7.33	7.45	7.22
54	Mobarakeh	39	R	6.83	6.73	6.94	6.82	6.98	6.84

Table A4. The maximum magnitude values estimated by different magnitude-scaling relationships for the identified major faults presented by Javadi et al (2013) for North-East Iran. Moreover, the fault's name, length and faulting mechanism (R: Reverse; T: Thrust; N: Normal, SS: Strike Slip and U: Unknown) are presented.

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
0	Tabarestan	26	T	6.66	6.58	6.73	6.55	6.56	6.62
1	North. Galand Rud	48	T	6.92	6.81	7.05	6.96	7.02	6.93
2	Tasher	30	T	6.72	6.63	6.80	6.65	6.67	6.69
3	Middle Galand Rud	41	T	6.85	6.75	6.97	6.85	6.90	6.85
4	Kojur	110	T	7.16	7.02	7.35	7.33	7.45	7.22
5	Khachak	19	T	6.53	6.46	6.56	6.34	6.33	6.46
6	Sama- Majlar	57	T	6.99	6.87	7.14	7.07	7.15	7.02
7	Baladeh	70	T	7.08	6.95	7.25	7.20	7.30	7.12
8	Kahar	76	T	7.11	6.98	7.29	7.26	7.36	7.16
9	Bardun	35	T	6.79	6.69	6.88	6.75	6.79	6.77
10	Farakin	29	R	6.71	6.62	6.78	6.62	6.77	6.69
11	Rostam Chal	13	T	6.37	6.32	6.36	6.09	6.05	6.27
12	Varangeh Rud	70	R	7.08	6.95	7.25	7.20	7.39	7.14
13	Taleqan	120	U	7.20	7.02	7.32	7.33	7.45	7.23
14	Qebleh	40	T	6.84	6.74	6.95	6.84	6.89	6.84
15	Mosha	400	R	7.16	7.02	7.35	7.33	7.53	7.23
16	Latian	11	T	6.30	6.26	6.27	5.98	5.92	6.18
17	Telo Paein	20	T	6.55	6.48	6.59	6.38	6.37	6.49
18	Sorkh-e Hessar	30	T	6.72	6.63	6.80	6.65	6.67	6.69
19	Qasr-e Firozeh	26	U	6.75	6.58	6.72	6.55	6.56	6.65
20	Eivanakai	75	T	7.11	6.97	7.29	7.25	7.35	7.16
21	Kalarz	31	T	6.73	6.64	6.82	6.67	6.70	6.71
22	Garmsar	100	T	7.16	7.02	7.35	7.33	7.45	7.22
23	Pishva	34	R	6.77	6.68	6.87	6.73	6.88	6.77
24	Gachab	47	T	6.91	6.80	7.04	6.94	7.01	6.92
25	Kuh-e Gugerd	80	T	7.13	7.00	7.32	7.29	7.40	7.19
26	Davazdah Emam	45	R	6.89	6.78	7.02	6.91	7.08	6.91
27	Siah Kuh (Jajarm)	130	SS	7.35	7.16	7.51	7.52	7.40	7.36
28	Maranjab	38	R	6.82	6.72	6.93	6.80	6.96	6.83
29	South MalekAbad	30	U	6.81	6.63	6.79	6.65	6.67	6.72
30	North Mahureh-Chah Kalleh	36	U	6.88	6.70	6.89	6.77	6.81	6.81
31	Kuh-e Maleh Shur	41	U	6.93	6.75	6.95	6.85	6.90	6.87
32	South Mahur-e Chah Kalleh	41	U	6.93	6.75	6.95	6.85	6.90	6.87
33	Kuh-e Mahdiyeh	25	SS	6.78	6.56	6.73	6.45	6.37	6.61
34	Chah Gireh	37	SS	6.92	6.71	6.92	6.71	6.62	6.79
35	Chah Mishuri	45	SS	6.99	6.78	7.01	6.84	6.75	6.88

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
36	Shahrab	64	SS	7.11	6.91	7.18	7.08	6.97	7.05
37	Kachomesghal-Gennian	37	R	6.81	6.71	6.91	6.78	6.94	6.82
38	Takht-e Pachenar	15	SS	6.61	6.37	6.48	6.12	6.05	6.37
39	Niestanak	62	U	7.08	6.90	7.16	7.12	7.21	7.07
40	Marbin-Rengan	64	U	7.09	6.91	7.18	7.15	7.24	7.09
41	Bar Gohar	18	U	6.62	6.44	6.54	6.31	6.29	6.46
42	Abbas Abad	24	U	6.72	6.55	6.68	6.50	6.50	6.61
43	Lamar	30	T	6.72	6.63	6.80	6.65	6.67	6.69
44	Zefreh	150	SS	7.35	7.16	7.51	7.52	7.40	7.36
45	Mehrandeh	15	SS	6.61	6.37	6.48	6.12	6.05	6.37
46	Soheyl-e Pakuh	37	U	6.89	6.71	6.90	6.78	6.83	6.82
47	Tinjan	20	U	6.65	6.48	6.59	6.38	6.37	6.52
48	Kajan	27	SS	6.81	6.59	6.76	6.51	6.42	6.65
49	Haji Abad (Gorgan)	16	T	6.46	6.40	6.47	6.23	6.20	6.37
50	Borj	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
51	Soltan Nasir	17	U	6.59	6.42	6.51	6.27	6.25	6.44
52	Dehshir	500	SS	7.35	7.16	7.51	7.52	7.40	7.36
53	Biabanak	163	R	7.16	7.02	7.35	7.33	7.53	7.23
54	Ashin	40	T	6.84	6.74	6.95	6.84	6.89	6.84
55	Anarak	33	T	6.76	6.67	6.85	6.71	6.74	6.74
56	Doruneh	800	SS	7.35	7.16	7.51	7.52	7.40	7.36
57	Rashid Kuh	26	U	6.75	6.58	6.72	6.55	6.56	6.65
58	Dasht-e Kavir V	50	U	7.00	6.82	7.05	6.98	7.05	6.97
59	Dasht-e Kavir IV	55	U	7.04	6.86	7.10	7.05	7.12	7.02
60	Dasht-e Kavir III	51	U	7.01	6.83	7.06	7.00	7.07	6.98
61	Dasht-e Kavir II	53	U	7.02	6.84	7.08	7.02	7.09	7.00
62	Dasht-e Kavir I	50	U	7.00	6.82	7.05	6.98	7.05	6.97
63	Torud	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
64	Khurian	30	R	6.72	6.63	6.80	6.65	6.79	6.71
65	Delazian	40	U	6.92	6.74	6.94	6.84	6.89	6.86
66	Semnan	72	T	7.09	6.96	7.27	7.22	7.32	7.14
67	Kuh-e Sarasiab	50	R	6.94	6.82	7.07	6.98	7.15	6.97
68	Qarbilak	24	R	6.63	6.55	6.68	6.50	6.63	6.60
69	Hessarbon	30	U	6.81	6.63	6.79	6.65	6.67	6.72
70	Sarbandan	27	R	6.68	6.59	6.75	6.58	6.72	6.66
71	Zarin Kuh	78	T	7.12	6.99	7.31	7.28	7.38	7.18

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
72	Gilas	33	T	6.76	6.67	6.85	6.71	6.74	6.74
73	Baijan	45	T	6.89	6.78	7.02	6.91	6.97	6.90
74	Urim	64	R	7.04	6.91	7.20	7.15	7.33	7.09
75	Firuzkuh	70	U	7.13	6.95	7.22	7.20	7.30	7.13
76	Allahband	77	T	7.12	6.98	7.30	7.27	7.37	7.17
77	North Alborz	550	SS	7.35	7.16	7.51	7.52	7.40	7.36
78	South. Galand Rud	74	T	7.10	6.97	7.28	7.24	7.34	7.15
79	Kalardasht	40	T	6.84	6.74	6.95	6.84	6.89	6.84
80	Khazar	600	R	7.16	7.02	7.35	7.33	7.53	7.23
81	Keva	16	T	6.46	6.40	6.47	6.23	6.20	6.37
82	Badeleh	89	T	7.16	7.02	7.35	7.33	7.45	7.22
83	Namakdeh	30	R	6.72	6.63	6.80	6.65	6.79	6.71
84	Langar	42	T	6.86	6.76	6.98	6.87	6.92	6.86
85	Astaneh	100	SS	7.27	7.08	7.40	7.37	7.26	7.25
86	Pa Qalaeh	31	SS	6.86	6.64	6.83	6.60	6.51	6.71
87	Chashm	44	R	6.88	6.77	7.01	6.90	7.06	6.90
88	Paein Kuh	31	R	6.73	6.64	6.82	6.67	6.81	6.73
89	Poldar	25	U	6.74	6.56	6.70	6.52	6.54	6.63
90	Sefidab	29	T	6.71	6.62	6.78	6.62	6.65	6.67
91	Bashm	100	R	7.16	7.02	7.35	7.33	7.53	7.23
92	Anzab	17.5	R	6.49	6.43	6.52	6.29	6.41	6.44
93	Nokeh	29	R	6.71	6.62	6.78	6.62	6.77	6.69
94	Mahtab	35	T	6.79	6.69	6.88	6.75	6.79	6.77
95	Mila	40	T	6.84	6.74	6.95	6.84	6.89	6.84
96	Give	14	R	6.40	6.35	6.40	6.14	6.25	6.33
97	Tuyeh	30	T	6.72	6.63	6.80	6.65	6.67	6.69
98	Attari	65	T	7.05	6.92	7.21	7.16	7.25	7.09
99	Larestan	20	U	6.65	6.48	6.59	6.38	6.37	6.52
100	Anjilu	102	SS	7.28	7.09	7.41	7.38	7.27	7.26
101	Alikhan	23	U	6.71	6.53	6.66	6.47	6.47	6.59
102	Bidestan	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
103	Var	17	U	6.59	6.42	6.51	6.27	6.25	6.44
104	Naini	152	SS	7.35	7.16	7.51	7.52	7.40	7.36
105	Chah Angosht	26	U	6.75	6.58	6.72	6.55	6.56	6.65
106	Bayazeh	26	U	6.75	6.58	6.72	6.55	6.56	6.65
107	Kuh-e Sorkh	21	T	6.57	6.50	6.61	6.41	6.41	6.51

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
108	Chapedoni	53	SS	7.05	6.84	7.09	6.95	6.85	6.96
109	Chatak-Neybaz	70	T	7.08	6.95	7.25	7.20	7.30	7.12
110	Posht-e Badam	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
111	Sarbala	80	SS	7.19	7.00	7.29	7.22	7.12	7.15
112	Garou	41	SS	6.96	6.75	6.97	6.78	6.69	6.84
113	Kalmard	380	SS	7.35	7.16	7.51	7.52	7.40	7.36
114	Kamar Mahdi	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
115	Chah-e Bidu	24	SS	6.77	6.55	6.71	6.43	6.35	6.59
116	Aliasghar	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
117	Tal-e Zard	27	SS	6.81	6.59	6.76	6.51	6.42	6.65
118	Darya	85	R	7.16	7.02	7.35	7.33	7.53	7.23
119	Cheshmeh Baji	18	T	6.51	6.44	6.53	6.31	6.29	6.43
120	Dom-e Marmar	25	T	6.64	6.56	6.71	6.52	6.54	6.60
121	Robat-e Gur	21	SS	6.72	6.50	6.64	6.34	6.26	6.53
122	Tabas	85	T	7.16	7.02	7.35	7.33	7.45	7.22
123	Cheshmeh Rostam	156	SS	7.35	7.16	7.51	7.52	7.40	7.36
124	Zenughan	85	U	7.20	7.02	7.32	7.33	7.45	7.23
125	Lahour	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
126	Qouri Chai	72	SS	7.16	6.96	7.24	7.15	7.05	7.10
127	Anaraki Takht-e Nader	110	T	7.16	7.02	7.35	7.33	7.45	7.22
128	Shekasteh Abshaleh	35	R	6.79	6.69	6.88	6.75	6.90	6.79
129	Boneh	80	R	7.13	7.00	7.32	7.29	7.49	7.20
130	Kuh-e Nayband	33	R	6.76	6.67	6.85	6.71	6.86	6.76
131	Nayband	400	SS	7.35	7.16	7.51	7.52	7.40	7.36
132	Deh Tah	82	U	7.19	7.00	7.30	7.31	7.42	7.21
133	Neysan	22	T	6.59	6.51	6.64	6.44	6.44	6.53
134	Esfandiar	88	R	7.16	7.02	7.35	7.33	7.53	7.23
135	Murisk	38	U	6.90	6.72	6.91	6.80	6.85	6.83
136	Khoushab	62	SS	7.10	6.90	7.17	7.05	6.95	7.03
137	Sardar	80	T	7.13	7.00	7.32	7.29	7.40	7.19
138	Paein	50	U	7.00	6.82	7.05	6.98	7.05	6.97
139	Ghor-e Neyzar	28	U	6.78	6.60	6.76	6.60	6.62	6.68
140	Baharestan	30	T	6.72	6.63	6.80	6.65	6.67	6.69
141	Feiz Abad (Tabbas)	24	SS	6.77	6.55	6.71	6.43	6.35	6.59
142	Nakhlah	10	SS	6.46	6.22	6.28	5.85	5.79	6.18
143	Azmighan	40	SS	6.95	6.74	6.95	6.77	6.67	6.83

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
144	Mazar	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
145	Honu	47	U	6.98	6.80	7.02	6.94	7.01	6.94
146	Khoda Afarid	20	U	6.65	6.48	6.59	6.38	6.37	6.52
147	Ali Abad (Tabbas)	20	U	6.65	6.48	6.59	6.38	6.37	6.52
148	Ladar	100	U	7.20	7.02	7.32	7.33	7.45	7.23
149	Deh Ilkhani	32	U	6.83	6.65	6.83	6.69	6.72	6.75
150	Chah Toom	40	U	6.92	6.74	6.94	6.84	6.89	6.86
151	Kal-e Dorouneh	60	U	7.07	6.89	7.14	7.10	7.19	7.06
152	Kuh-e Rezveh	27	T	6.68	6.59	6.75	6.58	6.59	6.64
153	Tighshuri	70	U	7.13	6.95	7.22	7.20	7.30	7.13
154	Shotor Kuh	16	T	6.46	6.40	6.47	6.23	6.20	6.37
155	Majerad	36	U	6.88	6.70	6.89	6.77	6.81	6.81
156	Sefidsang	80	U	7.18	7.00	7.29	7.29	7.40	7.20
157	Qods	75	T	7.11	6.97	7.29	7.25	7.35	7.16
158	Salek	30	R	6.72	6.63	6.80	6.65	6.79	6.71
159	Kiki (Bojnord)	40	T	6.84	6.74	6.95	6.84	6.89	6.84
160	Soukhteh Kuh	20	T	6.55	6.48	6.59	6.38	6.37	6.49
161	Chah Seyedan	20	U	6.65	6.48	6.59	6.38	6.37	6.52
162	Siah Kuh (Varamin)	140	T	7.16	7.02	7.35	7.33	7.45	7.22
163	Sardar Abad	20	U	6.65	6.48	6.59	6.38	6.37	6.52
164	Kal-e Abdar	17	R	6.48	6.42	6.50	6.27	6.39	6.42
165	Chahshur	34	T	6.77	6.68	6.87	6.73	6.76	6.76
166	Miandasht	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
167	Dochileh	15	R	6.43	6.37	6.43	6.19	6.30	6.36
168	Kal Taqi	10	SS	6.46	6.22	6.28	5.85	5.79	6.18
169	Abasemano	13	SS	6.56	6.32	6.41	6.02	5.96	6.30
170	Khondar	11	U	6.43	6.26	6.29	5.98	5.92	6.22
171	Sokoun	25	SS	6.78	6.56	6.73	6.45	6.37	6.61
172	Shirmar	25	T	6.64	6.56	6.71	6.52	6.54	6.60
173	Armian	65	T	7.05	6.92	7.21	7.16	7.25	7.09
174	Mayamei	220	U	7.20	7.02	7.32	7.33	7.45	7.23
175	Hokm Abad	232	T	7.16	7.02	7.35	7.33	7.45	7.22
176	Jajarm	75	T	7.11	6.97	7.29	7.25	7.35	7.16
177	Godargaz	22	U	6.69	6.51	6.64	6.44	6.44	6.56
178	Dehmolla	40	U	6.92	6.74	6.94	6.84	6.89	6.86
179	Damghan	100	SS	7.27	7.08	7.40	7.37	7.26	7.25

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
180	Tazareh	75	R	7.11	6.97	7.29	7.25	7.44	7.17
181	Shahrud	105	R	7.16	7.02	7.35	7.33	7.53	7.23
182	Mojen	24	T	6.63	6.55	6.68	6.50	6.50	6.58
183	Abr	82	T	7.14	7.00	7.33	7.31	7.42	7.20
184	Mian Kuh	20	T	6.55	6.48	6.59	6.38	6.37	6.49
185	Shah Kuh	110	T	7.16	7.02	7.35	7.33	7.45	7.22
186	Tal Anbar	77	T	7.12	6.98	7.30	7.27	7.37	7.17
187	Haji Abad (Naein)	20	R	6.55	6.48	6.59	6.38	6.50	6.51
188	Ali Abad (Katoul)	102	T	7.16	7.02	7.35	7.33	7.45	7.22
189	Kuh-e Sarkhan	47	T	6.91	6.80	7.04	6.94	7.01	6.92
190	Razi	28	U	6.78	6.60	6.76	6.60	6.62	6.68
191	Golijeh	55	U	7.04	6.86	7.10	7.05	7.12	7.02
192	Bashtapeh	185	T	7.16	7.02	7.35	7.33	7.45	7.22
193	Maraveh Tapeh	200	T	7.16	7.02	7.35	7.33	7.45	7.22
194	Balkur	30	T	6.72	6.63	6.80	6.65	6.67	6.69
195	Takal Kuh	135	T	7.16	7.02	7.35	7.33	7.45	7.22
196	Golestan	62	R	7.03	6.90	7.19	7.12	7.31	7.08
197	Chaman Bid	20	T	6.55	6.48	6.59	6.38	6.37	6.49
198	Joshaghan (Bojnord)	30	U	6.81	6.63	6.79	6.65	6.67	6.72
199	Chahar Chubeh	14	T	6.40	6.35	6.40	6.14	6.10	6.30
200	Kuh-e Siahchun	26	T	6.66	6.58	6.73	6.55	6.56	6.62
201	Karf	35	T	6.79	6.69	6.88	6.75	6.79	6.77
202	Robat-e Qarebil	215	T	7.16	7.02	7.35	7.33	7.45	7.22
203	Almeh	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
204	Kurkhod	133	T	7.16	7.02	7.35	7.33	7.45	7.22
205	Douzin	30	T	6.72	6.63	6.80	6.65	6.67	6.69
206	Sefidali	14.5	SS	6.59	6.36	6.46	6.10	6.03	6.36
207	Nardin	32	U	6.83	6.65	6.83	6.69	6.72	6.75
208	Siah Kuh (Abbas Abad)	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
209	Gholaman	35	SS	6.90	6.69	6.89	6.68	6.59	6.77
210	Qetlish	75	SS	7.17	6.97	7.26	7.18	7.07	7.12
211	Gifan	40	U	6.92	6.74	6.94	6.84	6.89	6.86
212	Qezelghan	50	SS	7.03	6.82	7.06	6.91	6.82	6.93
213	Jengah	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
214	Hessar	17	SS	6.65	6.42	6.54	6.20	6.13	6.43
215	Zeydar	23	U	6.71	6.53	6.66	6.47	6.47	6.59

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
216	Baghan	75	SS	7.17	6.97	7.26	7.18	7.07	7.12
217	Kunjkhur	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
218	Qeljegh	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
219	Lujli	60	SS	7.09	6.89	7.15	7.03	6.93	7.02
220	Tukur	36	SS	6.91	6.70	6.90	6.70	6.61	6.78
221	Kikanlu	37	U	6.89	6.71	6.90	6.78	6.83	6.82
222	Abdol Abad	28	SS	6.82	6.60	6.78	6.53	6.45	6.66
223	Ghorlog	28	SS	6.82	6.60	6.78	6.53	6.45	6.66
224	Baba Aman	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
225	Kari	12	T	6.34	6.29	6.32	6.04	5.99	6.22
226	Shurak	25	SS	6.78	6.56	6.73	6.45	6.37	6.61
227	Chahar Kharvar	17	T	6.48	6.42	6.50	6.27	6.25	6.40
228	Abchor	14	T	6.40	6.35	6.40	6.14	6.10	6.30
229	Firuzeh	20	T	6.55	6.48	6.59	6.38	6.37	6.49
230	Kiki (Miami)	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
231	Shiroyeh	16	T	6.46	6.40	6.47	6.23	6.20	6.37
232	Kuh-e Salok	28	T	6.69	6.60	6.77	6.60	6.62	6.66
233	North of Sameran	13	T	6.37	6.32	6.36	6.09	6.05	6.27
234	Qacheh Robat	23	T	6.61	6.53	6.66	6.47	6.47	6.56
235	Abri Tapeh-Gurian	105	T	7.16	7.02	7.35	7.33	7.45	7.22
236	Haji Koshteh	21	T	6.57	6.50	6.61	6.41	6.41	6.51
237	Hardeh Jovein	63	R	7.03	6.91	7.20	7.13	7.32	7.08
238	Esfarayen	125	T	7.16	7.02	7.35	7.33	7.45	7.22
239	Jahan	86	T	7.16	7.02	7.35	7.33	7.45	7.22
240	Ordeghan	17	T	6.48	6.42	6.50	6.27	6.25	6.40
241	Zavaram	32	T	6.75	6.65	6.84	6.69	6.72	6.72
242	Gereh Zoo	15	T	6.43	6.37	6.43	6.19	6.15	6.34
243	Hossein Abad	23	U	6.71	6.53	6.66	6.47	6.47	6.59
244	Anbar Abad	18	T	6.51	6.44	6.53	6.31	6.29	6.43
245	Nowruzi	13	U	6.49	6.32	6.37	6.09	6.05	6.30
246	Khourab	35	T	6.79	6.69	6.88	6.75	6.79	6.77
247	South Hesari	25	T	6.64	6.56	6.71	6.52	6.54	6.60
248	Posht-e Bahram	52	T	6.95	6.84	7.09	7.01	7.08	6.97
249	Kalateh Aghazadeh	64	T	7.04	6.91	7.20	7.15	7.24	7.08
250	Safi Abad	25	T	6.64	6.56	6.71	6.52	6.54	6.60
251	Dehno (Naishabour)	38	T	6.82	6.72	6.93	6.80	6.85	6.81

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
252	Maghsud Abad	24	T	6.63	6.55	6.68	6.50	6.50	6.58
253	Baba Cheshmeh	82	T	7.14	7.00	7.33	7.31	7.42	7.20
254	South of Baba Cheshmeh	30	T	6.72	6.63	6.80	6.65	6.67	6.69
255	Neyshabour	72	R	7.09	6.96	7.27	7.22	7.41	7.15
256	Jalambadan	70	T	7.08	6.95	7.25	7.20	7.30	7.12
257	Zamand-Zarghan	25	R	6.64	6.56	6.71	6.52	6.66	6.62
258	Ramshin	80	T	7.13	7.00	7.32	7.29	7.40	7.19
259	Abrud	105	T	7.16	7.02	7.35	7.33	7.45	7.22
260	Bizeh	47	T	6.91	6.80	7.04	6.94	7.01	6.92
261	Fath Abad	60	T	7.01	6.89	7.17	7.10	7.19	7.04
262	Dehno (Sabzewar)	42	T	6.86	6.76	6.98	6.87	6.92	6.86
263	Sabzevar	60	T	7.01	6.89	7.17	7.10	7.19	7.04
264	Anbarestan-Afchang	33	T	6.76	6.67	6.85	6.71	6.74	6.74
265	Sang Sefid	33	T	6.76	6.67	6.85	6.71	6.74	6.74
266	Alaik	24	T	6.63	6.55	6.68	6.50	6.50	6.58
267	Baghjar-Soleimanieh	12	T	6.34	6.29	6.32	6.04	5.99	6.22
268	Mazrae Dahaneh	12	T	6.34	6.29	6.32	6.04	5.99	6.22
269	Baghjar-Qarehgol	23	T	6.61	6.53	6.66	6.47	6.47	6.56
270	Feiz Abad (Sabzevar)	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
271	Shahzadeh Heidar	23	T	6.61	6.53	6.66	6.47	6.47	6.56
272	Darin	25	U	6.74	6.56	6.70	6.52	6.54	6.63
273	Mozafar Abad	67	T	7.06	6.93	7.23	7.18	7.27	7.10
274	Tondook	17	T	6.48	6.42	6.50	6.27	6.25	6.40
275	Sangerd	54	T	6.97	6.85	7.11	7.03	7.11	6.99
276	Mehrkardu	35	R	6.79	6.69	6.88	6.75	6.90	6.79
277	Bezq	55	T	6.98	6.86	7.12	7.05	7.12	7.00
278	Fadiheh	42	U	6.94	6.76	6.96	6.87	6.92	6.88
279	Dowlat Abad-Chahshen	38	U	6.90	6.72	6.91	6.80	6.85	6.83
280	Sebeh	40	U	6.92	6.74	6.94	6.84	6.89	6.86
281	Taknar	110	SS	7.30	7.11	7.45	7.43	7.32	7.30
282	Kabudan	16	T	6.46	6.40	6.47	6.23	6.20	6.37
283	Kuh-e Baghdasht	16	T	6.46	6.40	6.47	6.23	6.20	6.37
284	Ahudam	14	T	6.40	6.35	6.40	6.14	6.10	6.30
285	Kalateh Teimur	57	U	7.05	6.87	7.12	7.07	7.15	7.03
286	Keriz	19	T	6.53	6.46	6.56	6.34	6.33	6.46
287	Siah Kuh (Kashmar)	75	U	7.15	6.97	7.26	7.25	7.35	7.17

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
288	Kuh-e Doshakh	15	U	6.55	6.37	6.44	6.19	6.15	6.37
289	Mohammad Abad	37	U	6.89	6.71	6.90	6.78	6.83	6.82
290	Dehmian	38	SS	6.93	6.72	6.93	6.73	6.64	6.80
291	Sonbol	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
292	Kashmar	90	R	7.16	7.02	7.35	7.33	7.53	7.23
293	Dough Abad	45	SS	6.99	6.78	7.01	6.84	6.75	6.88
294	Mahdi Abad (Kashmar)	100	R	7.16	7.02	7.35	7.33	7.53	7.23
295	North of Gonabad	82	SS	7.20	7.00	7.30	7.24	7.13	7.16
296	Kakhk	54	SS	7.05	6.85	7.10	6.96	6.87	6.97
297	Karimu	60	T	7.01	6.89	7.17	7.10	7.19	7.04
298	Dasht-e Bayaz	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
299	Makarem	18	SS	6.67	6.44	6.57	6.24	6.16	6.46
300	Kuh-e Poshteh Chah Barqu	51	U	7.01	6.83	7.06	7.00	7.07	6.98
301	Vandik	27	U	6.77	6.59	6.74	6.58	6.59	6.66
302	Qayen	24	SS	6.77	6.55	6.71	6.43	6.35	6.59
303	Razdonbal	62	U	7.08	6.90	7.16	7.12	7.21	7.07
304	Ferdows	121	R	7.16	7.02	7.35	7.33	7.53	7.23
305	Robat Shur	62	SS	7.10	6.90	7.17	7.05	6.95	7.03
306	Chah Zarrin	74	U	7.15	6.97	7.25	7.24	7.34	7.16
307	Sarab	76	R	7.11	6.98	7.29	7.26	7.45	7.18
308	Doost Abad	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
309	Chahak	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
310	Afriz	13	SS	6.56	6.32	6.41	6.02	5.96	6.30
311	Sedeh	54	U	7.03	6.85	7.09	7.03	7.11	7.01
312	Kuh-e Sepah	25	U	6.74	6.56	6.70	6.52	6.54	6.63
313	Shushud	20	T	6.55	6.48	6.59	6.38	6.37	6.49
314	Kuh-e Madar Mishan	14	U	6.52	6.35	6.41	6.14	6.10	6.34
315	Marak	30	U	6.81	6.63	6.79	6.65	6.67	6.72
316	Kouch	21	SS	6.72	6.50	6.64	6.34	6.26	6.53
317	Birjand	45	T	6.89	6.78	7.02	6.91	6.97	6.90
318	Surk	36	U	6.88	6.70	6.89	6.77	6.81	6.81
319	Allahyar	77	T	7.12	6.98	7.30	7.27	7.37	7.17
320	Chah Amina	31	U	6.82	6.64	6.81	6.67	6.70	6.73
321	Sahl Abad	95	U	7.20	7.02	7.32	7.33	7.45	7.23
322	Mokhtaran	45	U	6.96	6.78	7.00	6.91	6.97	6.92
323	Kuh-e Bazu	86	T	7.16	7.02	7.35	7.33	7.45	7.22

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
324	Noghab	38	U	6.90	6.72	6.91	6.80	6.85	6.83
325	Sanouk	30	T	6.72	6.63	6.80	6.65	6.67	6.69
326	Dough	45	U	6.96	6.78	7.00	6.91	6.97	6.92
327	Nowzad	46	SS	7.00	6.79	7.02	6.86	6.76	6.89
328	Hassan Abad (Zabol)	31	U	6.82	6.64	6.81	6.67	6.70	6.73
329	Narges	80	R	7.13	7.00	7.32	7.29	7.49	7.20
330	Avaz	63	SS	7.11	6.91	7.18	7.06	6.96	7.04
331	Gazik	87	SS	7.22	7.03	7.33	7.28	7.17	7.19
332	Morghtigh	60	R	7.01	6.89	7.17	7.10	7.28	7.06
333	Zeydan	22	R	6.59	6.51	6.64	6.44	6.57	6.55
334	Yazdan	55	U	7.04	6.86	7.10	7.05	7.12	7.02
335	Ahangaran	18	U	6.62	6.44	6.54	6.31	6.29	6.46
336	Surand	31	R	6.73	6.64	6.82	6.67	6.81	6.73
337	Gomenj	63	U	7.09	6.91	7.17	7.13	7.22	7.08
338	Kuh-e Cheshmeh Zarbi	20	U	6.65	6.48	6.59	6.38	6.37	6.52
339	Khatibi	85	R	7.16	7.02	7.35	7.33	7.53	7.23
340	Abiz	125	SS	7.35	7.16	7.51	7.52	7.40	7.36
341	Barenjgan	55	U	7.04	6.86	7.10	7.05	7.12	7.02
342	Shahrakht	15	U	6.55	6.37	6.44	6.19	6.15	6.37
343	Kuh-e Sirkhun	30	U	6.81	6.63	6.79	6.65	6.67	6.72
344	Kal-e Zelzeleh	20	U	6.65	6.48	6.59	6.38	6.37	6.52
345	Pol-e Siah	28	U	6.78	6.60	6.76	6.60	6.62	6.68
346	Deh Khatib	25	U	6.74	6.56	6.70	6.52	6.54	6.63
347	Jabbar	55	SS	7.06	6.86	7.11	6.98	6.88	6.98
348	Niaz Abad	40	SS	6.95	6.74	6.95	6.77	6.67	6.83
349	Khaf	110	R	7.16	7.02	7.35	7.33	7.53	7.23
350	Jangal	85	R	7.16	7.02	7.35	7.33	7.53	7.23
351	Gitab	36	U	6.88	6.70	6.89	6.77	6.81	6.81
352	Gorazi	22	U	6.69	6.51	6.64	6.44	6.44	6.56
353	Sagh	28	U	6.78	6.60	6.76	6.60	6.62	6.68
354	Darriz	15	U	6.55	6.37	6.44	6.19	6.15	6.37
355	Bagh Miyan	10	U	6.39	6.22	6.24	5.92	5.85	6.17
356	Chenar	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
357	Marjaneh	25	R	6.64	6.56	6.71	6.52	6.66	6.62
358	Kuh-e Alamzar	35	T	6.79	6.69	6.88	6.75	6.79	6.77
359	Serisha	24	R	6.63	6.55	6.68	6.50	6.63	6.60

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
360	Quricheh	33	R	6.76	6.67	6.85	6.71	6.86	6.76
361	Homaei	38	T	6.82	6.72	6.93	6.80	6.85	6.81
362	Mushan	19	T	6.53	6.46	6.56	6.34	6.33	6.46
363	Emam Taghi	40	R	6.84	6.74	6.95	6.84	7.00	6.85
364	Ostach	24	T	6.63	6.55	6.68	6.50	6.50	6.58
365	Dizbad	62	T	7.03	6.90	7.19	7.12	7.21	7.06
366	Shandiz-Sangbast	100	R	7.16	7.02	7.35	7.33	7.53	7.23
367	North of Barfriz	17	T	6.48	6.42	6.50	6.27	6.25	6.40
368	Abghouy	45	T	6.89	6.78	7.02	6.91	6.97	6.90
369	Batu	16	U	6.57	6.40	6.48	6.23	6.20	6.41
370	North of Neyshabour	100	T	7.16	7.02	7.35	7.33	7.45	7.22
371	Bar	30	T	6.72	6.63	6.80	6.65	6.67	6.69
372	Buzhan	61	T	7.02	6.89	7.18	7.11	7.20	7.05
373	Binalud	127	T	7.16	7.02	7.35	7.33	7.45	7.22
374	Shokranlu	47	SS	7.01	6.80	7.03	6.87	6.78	6.90
375	Quchan	134	SS	7.35	7.16	7.51	7.52	7.40	7.36
376	Palkanlu	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
377	Qarehcheh	40	R	6.84	6.74	6.95	6.84	7.00	6.85
378	Turanlu	85	SS	7.21	7.02	7.32	7.26	7.15	7.18
379	Dorbadam	48	SS	7.01	6.81	7.04	6.89	6.79	6.91
380	Kuh-e Aslameh	18	SS	6.67	6.44	6.57	6.24	6.16	6.46
381	Bardar	36	SS	6.91	6.70	6.90	6.70	6.61	6.78
382	Nokhandan	27	U	6.77	6.59	6.74	6.58	6.59	6.66
383	Aghkamar	27	SS	6.81	6.59	6.76	6.51	6.42	6.65
384	Chemeni	58	T	7.00	6.88	7.15	7.08	7.16	7.03
385	Zoobaran	85	SS	7.21	7.02	7.32	7.26	7.15	7.18
386	Yadegar-Tabrik	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
387	Kamas	88	T	7.16	7.02	7.35	7.33	7.45	7.22
388	Zoobala	85	T	7.16	7.02	7.35	7.33	7.45	7.22
389	Meiab	280	T	7.16	7.02	7.35	7.33	7.45	7.22
390	Emarat	43	R	6.87	6.76	6.99	6.88	7.05	6.89
391	Kuh-e Meidani	13	T	6.37	6.32	6.36	6.09	6.05	6.27
392	Kashaf Rud	162	R	7.16	7.02	7.35	7.33	7.53	7.23
393	Amrudak	57	R	6.99	6.87	7.14	7.07	7.25	7.03
394	Layen-e Kohneh	26	T	6.66	6.58	6.73	6.55	6.56	6.62
395	Qareh Dagh	45	T	6.89	6.78	7.02	6.91	6.97	6.90

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
396	Araghchin Tapeh	16	SS	6.63	6.40	6.51	6.16	6.09	6.40
397	Hezar Masjed	12	SS	6.53	6.29	6.37	5.97	5.91	6.27
398	Kardeh	50	T	6.94	6.82	7.07	6.98	7.05	6.95
399	Ardak	12	SS	6.53	6.29	6.37	5.97	5.91	6.27
400	Bozmehrun	17	SS	6.65	6.42	6.54	6.20	6.13	6.43
401	Baro	17	SS	6.65	6.42	6.54	6.20	6.13	6.43
402	Goji	55	T	6.98	6.86	7.12	7.05	7.12	7.00
403	Joghri	18	T	6.51	6.44	6.53	6.31	6.29	6.43
404	Mansar	100	T	7.16	7.02	7.35	7.33	7.45	7.22
405	Tus	40	U	6.92	6.74	6.94	6.84	6.89	6.86
406	Torghabeh	77	T	7.12	6.98	7.30	7.27	7.37	7.17
407	Kal Shur	22	T	6.59	6.51	6.64	6.44	6.44	6.53
408	Kheir Abad	30	T	6.72	6.63	6.80	6.65	6.67	6.69
409	Kalateh-e Shahzadeh	17	U	6.59	6.42	6.51	6.27	6.25	6.44
410	Kalateh Arabha	115	T	7.16	7.02	7.35	7.33	7.45	7.22
411	Koolab-e Paien	30	U	6.81	6.63	6.79	6.65	6.67	6.72
412	Bazangan	20	T	6.55	6.48	6.59	6.38	6.37	6.49
413	Shahtutak	34	T	6.77	6.68	6.87	6.73	6.76	6.76
414	Abravan	48	R	6.92	6.81	7.05	6.96	7.12	6.95
415	Gandab	28	T	6.69	6.60	6.77	6.60	6.62	6.66
416	Kuh-e Shahan	50	T	6.94	6.82	7.07	6.98	7.05	6.95
417	Chahar Cheshmeh	36	R	6.80	6.70	6.90	6.77	6.92	6.80
418	Gourband	85	T	7.16	7.02	7.35	7.33	7.45	7.22
419	Kondeh Sukhteh	24	U	6.72	6.55	6.68	6.50	6.50	6.61
420	Holang	34	SS	6.89	6.68	6.88	6.66	6.57	6.75
421	Gol Banou	54	SS	7.05	6.85	7.10	6.96	6.87	6.97
422	Torbat-e Jam	40	U	6.92	6.74	6.94	6.84	6.89	6.86
423	Shahd Abad	28	SS	6.82	6.60	6.78	6.53	6.45	6.66
424	Kuh-e Sefid (Torbat Jam)	22	U	6.69	6.51	6.64	6.44	6.44	6.56
425	Sibak	34	R	6.77	6.68	6.87	6.73	6.88	6.77
426	Kuh-e Cheshmeh Padeshuh	53	T	6.96	6.84	7.10	7.02	7.09	6.98
427	Kuh-e Kelilaq	22	U	6.69	6.51	6.64	6.44	6.44	6.56
428	Takhtgah	15	R	6.43	6.37	6.43	6.19	6.30	6.36
429	Kuh-e Sartakht	21	T	6.57	6.50	6.61	6.41	6.41	6.51
430	Rasoul Abad	55	T	6.98	6.86	7.12	7.05	7.12	7.00
431	Kajab	25	T	6.64	6.56	6.71	6.52	6.54	6.60
432	Ahmad Abad (Mashhad)	15	T	6.43	6.37	6.43	6.19	6.15	6.34
433	Shirvan	35	SS	6.90	6.69	6.89	6.68	6.59	6.77
434	Rahdar	36	U	6.88	6.70	6.89	6.77	6.81	6.81

Table A5. The maximum magnitude values estimated by different magnitude-scaling relationships for the identified major faults presented by Javadi et al (2013) for East Iran. Moreover, the fault's name, length and faulting mechanism (R: Reverse; T: Thrust; N: Normal, SS: Strike Slip and U: Unknown) are presented.

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
0	Qaruneh	50	U	7.00	6.82	7.05	6.98	7.05	6.97
1	Naghat	100	T	7.16	7.02	7.35	7.33	7.45	7.22
2	Borna	40	SS	6.95	6.74	6.95	6.77	6.67	6.83
3	Passioneh	13	SS	6.56	6.32	6.41	6.02	5.96	6.30
4	Chupan	14	SS	6.58	6.35	6.44	6.07	6.00	6.34
5	Gashar	25	SS	6.78	6.56	6.73	6.45	6.37	6.61
6	Amir Abad	34	U	6.86	6.68	6.86	6.73	6.76	6.78
7	Milsefid	30	U	6.81	6.63	6.79	6.65	6.67	6.72
8	Hamaneh	20	U	6.65	6.48	6.59	6.38	6.37	6.52
9	Taft	95	SS	7.25	7.06	7.38	7.34	7.23	7.23
10	Zardashti	20	N	6.65	6.48	6.58	6.38	6.23	6.49
11	Dehshir	500	SS	7.35	7.16	7.51	7.52	7.40	7.36
12	Abadeh	108	U	7.20	7.02	7.32	7.33	7.45	7.23
13	Main Zagros Revers	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
14	Kamrud	27	SS	6.81	6.59	6.76	6.51	6.42	6.65
15	Kuh-e Qalat	32	T	6.75	6.65	6.84	6.69	6.72	6.72
16	Surian	190	T	7.16	7.02	7.35	7.33	7.45	7.22
17	Qader Abad	79	T	7.13	6.99	7.32	7.28	7.39	7.18
18	Kaftar	18	T	6.51	6.44	6.53	6.31	6.29	6.43
19	Musakhani	71	T	7.08	6.95	7.26	7.21	7.31	7.13
20	Palangi	90	U	7.20	7.02	7.32	7.33	7.45	7.23
21	Emamzadeh Esmaiel	36	U	6.88	6.70	6.89	6.77	6.81	6.81
22	Dashtak	15	T	6.43	6.37	6.43	6.19	6.15	6.34
23	Mobarak Abad	55	T	6.98	6.86	7.12	7.05	7.12	7.00
24	Arsanjan	68	T	7.06	6.93	7.24	7.19	7.28	7.11
25	Sivand	122	T	7.16	7.02	7.35	7.33	7.45	7.22
26	Tavabe	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
27	Rowshan Kuh	62	T	7.03	6.90	7.19	7.12	7.21	7.06
28	Mahruyan	80	T	7.13	7.00	7.32	7.29	7.40	7.19
29	Katah	25	T	6.64	6.56	6.71	6.52	6.54	6.60
30	Sufeya	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
31	Tarbar	11	R	6.30	6.26	6.27	5.98	6.08	6.20
32	Saadi	23	T	6.61	6.53	6.66	6.47	6.47	6.56
33	Bamo	96	U	7.20	7.02	7.32	7.33	7.45	7.23
34	Mahdi Abad (Yazd)	40	R	6.84	6.74	6.95	6.84	7.00	6.85
35	Maharlu	45	T	6.89	6.78	7.02	6.91	6.97	6.90

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
36	Chareh	76	T	7.11	6.98	7.29	7.26	7.36	7.16
37	Bid Zard	18	SS	6.67	6.44	6.57	6.24	6.16	6.46
38	Soltan I	47	T	6.91	6.80	7.04	6.94	7.01	6.92
39	Soltan II	54	T	6.97	6.85	7.11	7.03	7.11	6.99
40	Sepidar	59	T	7.00	6.88	7.16	7.09	7.17	7.04
41	Zafar Abad	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
42	Zanjiran	30	T	6.72	6.63	6.80	6.65	6.67	6.69
43	Sabzposhan	230	SS	7.35	7.16	7.51	7.52	7.40	7.36
44	Sarvestan	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
45	Kuh-e Chador	40	T	6.84	6.74	6.95	6.84	6.89	6.84
46	High Zagros	1375	T	7.16	7.02	7.35	7.33	7.45	7.22
47	Todaj	40	T	6.84	6.74	6.95	6.84	6.89	6.84
48	Ebrahim abad	35	U	6.87	6.69	6.87	6.75	6.79	6.79
49	Runiz	47	T	6.91	6.80	7.04	6.94	7.01	6.92
50	Khanehkat I	46	T	6.90	6.79	7.03	6.93	6.99	6.91
51	Khanehkat II	46	SS	7.00	6.79	7.02	6.86	6.76	6.89
52	Bakhtegan	107	SS	7.29	7.10	7.43	7.41	7.30	7.29
53	Horgan	44	T	6.88	6.77	7.01	6.90	6.96	6.89
54	Pichkan	62	T	7.03	6.90	7.19	7.12	7.21	7.06
55	Kuh-e Hossein Abad	17	U	6.59	6.42	6.51	6.27	6.25	6.44
56	Chahak-Qouri	60	SS	7.09	6.89	7.15	7.03	6.93	7.02
57	Bagh Madan	25	U	6.74	6.56	6.70	6.52	6.54	6.63
58	North of Neyestan	15	R	6.43	6.37	6.43	6.19	6.30	6.36
59	Shahr-e Babak	235	SS	7.35	7.16	7.51	7.52	7.40	7.36
60	Kuh-e Chah Talkh	16	SS	6.63	6.40	6.51	6.16	6.09	6.40
61	Anar	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
62	Mehr Abad (Shiraz)	24	T	6.63	6.55	6.68	6.50	6.50	6.58
63	Bagh-e Bidmeshk	20	R	6.55	6.48	6.59	6.38	6.50	6.51
64	West of Kavireh Dareh Anjir	47	R	6.91	6.80	7.04	6.94	7.11	6.94
65	Tabar Kuh	31	U	6.82	6.64	6.81	6.67	6.70	6.73
66	Kuh-e Cheshmeh Musa	34	U	6.86	6.68	6.86	6.73	6.76	6.78
67	Chah Mess	21	T	6.57	6.50	6.61	6.41	6.41	6.51
68	Ooghami	42	U	6.94	6.76	6.96	6.87	6.92	6.88
69	Shurow	20	T	6.55	6.48	6.59	6.38	6.37	6.49
70	Anjireh	30	T	6.72	6.63	6.80	6.65	6.67	6.69
71	Seh Changan	21	U	6.67	6.50	6.61	6.41	6.41	6.54

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
72	Posht-e Badam	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
73	Tang-e Tabas	38	SS	6.93	6.72	6.93	6.73	6.64	6.80
74	Sangab Sorkh	26	T	6.66	6.58	6.73	6.55	6.56	6.62
75	Behabad	170	SS	7.35	7.16	7.51	7.52	7.40	7.36
76	Banestan	40	SS	6.95	6.74	6.95	6.77	6.67	6.83
77	Kamkoieyeh	58	T	7.00	6.88	7.15	7.08	7.16	7.03
78	Baniz	32	U	6.83	6.65	6.83	6.69	6.72	6.75
79	Gitary	26	T	6.66	6.58	6.73	6.55	6.56	6.62
80	Bajgun	22	U	6.69	6.51	6.64	6.44	6.44	6.56
81	Ciriz	34	U	6.86	6.68	6.86	6.73	6.76	6.78
82	Davaran	130	SS	7.35	7.16	7.51	7.52	7.40	7.36
83	Kuh-e Niu	77	U	7.16	6.98	7.27	7.27	7.37	7.18
84	Javadieh-Elahieh	32	U	6.83	6.65	6.83	6.69	6.72	6.75
85	Jorjafk	130	U	7.20	7.02	7.32	7.33	7.45	7.23
86	Kuhbanan	213	SS	7.35	7.16	7.51	7.52	7.40	7.36
87	Khamrud	35	R	6.79	6.69	6.88	6.75	6.90	6.79
88	Gachal	15	U	6.55	6.37	6.44	6.19	6.15	6.37
89	Dahuiyeh	16	R	6.46	6.40	6.47	6.23	6.35	6.39
90	Deh Zanan	18	T	6.51	6.44	6.53	6.31	6.29	6.43
91	Horjand	25	N	6.74	6.56	6.71	6.52	6.43	6.61
92	Dehu	30	T	6.72	6.63	6.80	6.65	6.67	6.69
93	Chatrud	37	T	6.81	6.71	6.91	6.78	6.83	6.80
94	Tavakol Abad	11	T	6.30	6.26	6.27	5.98	5.92	6.18
95	Baghin	78	U	7.17	6.99	7.27	7.28	7.38	7.19
96	Bardsir	69	U	7.12	6.94	7.21	7.20	7.29	7.13
97	Rafsanjan	160	SS	7.35	7.16	7.51	7.52	7.40	7.36
98	Mahan	79	T	7.13	6.99	7.32	7.28	7.39	7.18
99	Rayen	76	T	7.11	6.98	7.29	7.26	7.36	7.16
100	Baft	96	U	7.20	7.02	7.32	7.33	7.45	7.23
101	Balvard	70	SS	7.15	6.95	7.23	7.13	7.03	7.09
102	Cheshmeh Anjir	60	U	7.07	6.89	7.14	7.10	7.19	7.06
103	Chahzar	43	T	6.87	6.76	6.99	6.88	6.94	6.87
104	Khabr	108	T	7.16	7.02	7.35	7.33	7.45	7.22
105	Kat	40	T	6.84	6.74	6.95	6.84	6.89	6.84
106	Dehsard	25	T	6.64	6.56	6.71	6.52	6.54	6.60
107	Vazireh	66	U	7.11	6.92	7.19	7.17	7.26	7.10

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
108	Layzangan	49	T	6.93	6.81	7.06	6.97	7.04	6.94
109	Kahtekan	32.5	T	6.75	6.66	6.84	6.70	6.73	6.73
110	Sabzevaran	170	SS	7.35	7.16	7.51	7.52	7.40	7.36
111	Jebal-e Barez	60	U	7.07	6.89	7.14	7.10	7.19	7.06
112	Delfa	113	SS	7.31	7.12	7.46	7.45	7.34	7.31
113	Halil Rud	23	U	6.71	6.53	6.66	6.47	6.47	6.59
114	Chah Mazraeh	48	U	6.99	6.81	7.03	6.96	7.02	6.95
115	Khardum	40	T	6.84	6.74	6.95	6.84	6.89	6.84
116	Bam	110	SS	7.30	7.11	7.45	7.43	7.32	7.30
117	Gowk	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
118	Sarduiyeh	100	SS	7.27	7.08	7.40	7.37	7.26	7.25
119	Shahdad	120	T	7.16	7.02	7.35	7.33	7.45	7.22
120	Sirch	42	SS	6.97	6.76	6.98	6.80	6.71	6.85
121	Nayband	400	SS	7.35	7.16	7.51	7.52	7.40	7.36
122	Lakar Kuh	100	SS	7.27	7.08	7.40	7.37	7.26	7.25
123	Dehuj	18	T	6.51	6.44	6.53	6.31	6.29	6.43
124	Gacharak	28	T	6.69	6.60	6.77	6.60	6.62	6.66
125	Markesh	30	U	6.81	6.63	6.79	6.65	6.67	6.72
126	Rud-e Shur	33	U	6.84	6.67	6.84	6.71	6.74	6.76
127	Ravar	144	SS	7.35	7.16	7.51	7.52	7.40	7.36
128	East of Nayband	52	U	7.02	6.84	7.07	7.01	7.08	6.99
129	Chehel Payeh	25	U	6.74	6.56	6.70	6.52	6.54	6.63
130	South of Howz-e Khan	18	U	6.62	6.44	6.54	6.31	6.29	6.46
131	Chah Amina	31	U	6.82	6.64	6.81	6.67	6.70	6.73
132	Kuh-e Zar	37	T	6.81	6.71	6.91	6.78	6.83	6.80
133	Barak	43	U	6.94	6.76	6.97	6.88	6.94	6.89
134	Chah-e Karim Abad	17	U	6.59	6.42	6.51	6.27	6.25	6.44
135	Gazidari	28	U	6.78	6.60	6.76	6.60	6.62	6.68
136	Kuharud	16	U	6.57	6.40	6.48	6.23	6.20	6.41
137	Dough	45	U	6.96	6.78	7.00	6.91	6.97	6.92
138	Torshab	30	U	6.81	6.63	6.79	6.65	6.67	6.72
139	Narges	80	R	7.13	7.00	7.32	7.29	7.49	7.20
140	Tigh-e Noab	32	U	6.83	6.65	6.83	6.69	6.72	6.75
141	Hassan Abad (Zabol)	31	U	6.82	6.64	6.81	6.67	6.70	6.73
142	Tamam deh	25	U	6.74	6.56	6.70	6.52	6.54	6.63
143	Deh Garm	18	SS	6.67	6.44	6.57	6.24	6.16	6.46

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
144	Lah Kuh Sefid	51	SS	7.03	6.83	7.07	6.93	6.83	6.94
145	Zahu	60	SS	7.09	6.89	7.15	7.03	6.93	7.02
146	Esmaeil Abad	75	SS	7.17	6.97	7.26	7.18	7.07	7.12
147	Bandan	80	SS	7.19	7.00	7.29	7.22	7.12	7.15
148	Nasfandeh	17	U	6.59	6.42	6.51	6.27	6.25	6.44
149	Nehbandan	200	SS	7.35	7.16	7.51	7.52	7.40	7.36
150	East of Hosein Abad	15	N	6.55	6.37	6.41	6.19	5.98	6.34
151	Estin	18	SS	6.67	6.44	6.57	6.24	6.16	6.46
152	Heidar Abad	22	SS	6.74	6.51	6.66	6.37	6.29	6.55
153	Mamar	30	SS	6.85	6.63	6.81	6.58	6.49	6.69
154	Sefidabeh	45	T	6.89	6.78	7.02	6.91	6.97	6.90
155	Rapar Kuh	21	U	6.67	6.50	6.61	6.41	6.41	6.54
156	Asagi	100	SS	7.27	7.08	7.40	7.37	7.26	7.25
157	Doparkuh	35	T	6.79	6.69	6.88	6.75	6.79	6.77
158	Zahedan	220	SS	7.35	7.16	7.51	7.52	7.40	7.36
159	Saheb Dad Khan	64	U	7.09	6.91	7.18	7.15	7.24	7.09
160	Kuh-e Sahebdad	47	U	6.98	6.80	7.02	6.94	7.01	6.94
161	Padaguk	53	U	7.02	6.84	7.08	7.02	7.09	7.00
162	Chehel Kureh	57	U	7.05	6.87	7.12	7.07	7.15	7.03
163	Dahaneh Baghi	40	SS	6.95	6.74	6.95	6.77	6.67	6.83
164	Kahurak	148	SS	7.35	7.16	7.51	7.52	7.40	7.36
165	Mazarab	48	SS	7.01	6.81	7.04	6.89	6.79	6.91
166	Nosrat Abad	250	U	7.20	7.02	7.32	7.33	7.45	7.23
167	Darshir	40	T	6.84	6.74	6.95	6.84	6.89	6.84
168	Mirjaveh	86	R	7.16	7.02	7.35	7.33	7.53	7.23
169	Bog	35	R	6.79	6.69	6.88	6.75	6.90	6.79
170	Qarib Abad	27	U	6.77	6.59	6.74	6.58	6.59	6.66
171	Narreh Now	54	U	7.03	6.85	7.09	7.03	7.11	7.01
172	Kuh-e Rud	109	U	7.20	7.02	7.32	7.33	7.45	7.23
173	Gazu	56	U	7.04	6.86	7.11	7.06	7.14	7.02
174	Saravan	240	R	7.16	7.02	7.35	7.33	7.53	7.23

Table A6. The maximum magnitude values estimated by different magnitude-scaling relationships for the identified major faults presented by Javadi et al (2013) for South-East Iran. Moreover, the fault's name, length and faulting mechanism (R: Reverse; T: Thrust; N: Normal, SS: Strike Slip and U: Unknown) are presented.

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
0	Mountain front	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
1	Zagros Foredeep	200	R	7.16	7.02	7.35	7.33	7.53	7.23
2	Lar	107	T	7.16	7.02	7.35	7.33	7.45	7.22
3	Beriz	40	T	6.84	6.74	6.95	6.84	6.89	6.84
4	Sharafuyeh	47	T	6.91	6.80	7.04	6.94	7.01	6.92
5	Banaruyeh	35	T	6.79	6.69	6.88	6.75	6.79	6.77
6	Chah Reza	59	T	7.00	6.88	7.16	7.09	7.17	7.04
7	Bazin	23	U	6.71	6.53	6.66	6.47	6.47	6.59
8	Gowd Beyad	47	T	6.91	6.80	7.04	6.94	7.01	6.92
9	Shahr-e Pir	48	T	6.92	6.81	7.05	6.96	7.02	6.93
10	Zarin Dasht I	32	R	6.75	6.65	6.84	6.69	6.84	6.74
11	Zarin Dasht II	44	U	6.95	6.77	6.99	6.90	6.96	6.91
12	High Zagros	1375	T	7.16	7.02	7.35	7.33	7.45	7.22
13	Furg	26	T	6.66	6.58	6.73	6.55	6.56	6.62
14	Gahkom	130	R	7.16	7.02	7.35	7.33	7.53	7.23
15	Main Zagros Revers	1350	T	7.16	7.02	7.35	7.33	7.45	7.22
16	Ab-e Garm	77	T	7.12	6.98	7.30	7.27	7.37	7.17
17	Dar Bagh	44	T	6.88	6.77	7.01	6.90	6.96	6.89
18	Emamzadeh Pirgheib	25	T	6.64	6.56	6.71	6.52	6.54	6.60
19	Faraghoun	92	R	7.16	7.02	7.35	7.33	7.53	7.23
20	Palami	22	R	6.59	6.51	6.64	6.44	6.57	6.55
21	Sabzevaran	170	SS	7.35	7.16	7.51	7.52	7.40	7.36
22	East of Sabzevaran	36	U	6.88	6.70	6.89	6.77	6.81	6.81
23	Kuh-e Suzgazi	27	U	6.77	6.59	6.74	6.58	6.59	6.66
24	Jiroft	170	SS	7.35	7.16	7.51	7.52	7.40	7.36
25	Now Dez	52	SS	7.04	6.84	7.08	6.94	6.84	6.95
26	Rudan	48	R	6.92	6.81	7.05	6.96	7.12	6.95
27	Bashagard	300	R	7.16	7.02	7.35	7.33	7.53	7.23
28	Minab	300	SS	7.35	7.16	7.51	7.52	7.40	7.36
29	Deraz	40	U	6.92	6.74	6.94	6.84	6.89	6.86
30	Darpahn	58	R	7.00	6.88	7.15	7.08	7.26	7.04
31	Beshnow	25	U	6.74	6.56	6.70	6.52	6.54	6.63
32	Ashkan	22	R	6.59	6.51	6.64	6.44	6.57	6.55
33	Dargan	44	R	6.88	6.77	7.01	6.90	7.06	6.90
34	Sagar	126	R	7.16	7.02	7.35	7.33	7.53	7.23
35	Gazan Bazin	55	SS	7.06	6.86	7.11	6.98	6.88	6.98

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
36	Gedu	40	SS	6.95	6.74	6.95	6.77	6.67	6.83
37	Malkamu	95	R	7.16	7.02	7.35	7.33	7.53	7.23
38	Hangestan	15	R	6.43	6.37	6.43	6.19	6.30	6.36
39	Makran	1000	T	7.16	7.02	7.35	7.33	7.45	7.22
40	Lirehie	20	N	6.65	6.48	6.58	6.38	6.23	6.49
41	Sirmach	15	SS	6.61	6.37	6.48	6.12	6.05	6.37
42	Kuh-e Sorkh-Parkuh	15	T	6.43	6.37	6.43	6.19	6.15	6.34
43	Jagin	25	N	6.74	6.56	6.71	6.52	6.43	6.61
44	Gava	10	N	6.39	6.22	6.18	5.92	5.61	6.13
45	Cheshmeh Rashki	22	N	6.69	6.51	6.63	6.44	6.32	6.54
46	Nazik	26	N	6.75	6.58	6.73	6.55	6.47	6.63
47	Hun	18	N	6.62	6.44	6.52	6.31	6.14	6.44
48	Dazi	39	T	6.83	6.73	6.94	6.82	6.87	6.83
49	Saghdar	39	R	6.83	6.73	6.94	6.82	6.98	6.84
50	Gurkani	20	R	6.55	6.48	6.59	6.38	6.50	6.51
51	Gishkan	50	SS	7.03	6.82	7.06	6.91	6.82	6.93
52	Sabz	18	R	6.51	6.44	6.53	6.31	6.43	6.45
53	Kashi	14	SS	6.58	6.35	6.44	6.07	6.00	6.34
54	Darhaman	20	SS	6.71	6.48	6.62	6.31	6.23	6.51
55	Johldarak	22	U	6.69	6.51	6.64	6.44	6.44	6.56
56	Lirdaf	15	U	6.55	6.37	6.44	6.19	6.15	6.37
57	Sedich	10	R	6.26	6.22	6.22	5.92	6.01	6.16
58	Gabrik	77	R	7.12	6.98	7.30	7.27	7.46	7.18
59	Gakosh	109	R	7.16	7.02	7.35	7.33	7.53	7.23
60	Pashgiram	153	R	7.16	7.02	7.35	7.33	7.53	7.23
61	Kuh-e Doma	50	R	6.94	6.82	7.07	6.98	7.15	6.97
62	Dar Anar	120	R	7.16	7.02	7.35	7.33	7.53	7.23
63	Abnama	52	R	6.95	6.84	7.09	7.01	7.18	6.99
64	Karang	64	R	7.04	6.91	7.20	7.15	7.33	7.09
65	Veranj	45	R	6.89	6.78	7.02	6.91	7.08	6.91
66	Mashgahem	22	R	6.59	6.51	6.64	6.44	6.57	6.55
67	Sarab	76	R	7.11	6.98	7.29	7.26	7.45	7.18
68	Jazmurian	43	T	6.87	6.76	6.99	6.88	6.94	6.87
69	Maskutan	27	U	6.77	6.59	6.74	6.58	6.59	6.66
70	Pip	117	T	7.16	7.02	7.35	7.33	7.45	7.22
71	Lashar	72	T	7.09	6.96	7.27	7.22	7.32	7.14

Num.	Fault's name	Length (km)	Faulting mech.	Maximum magnitude					
				Gh16	No10	WC94	Le10	Tea17	Weighted avg.
72	Bonza	34	U	6.86	6.68	6.86	6.73	6.76	6.78
73	Deh Morad	38	U	6.90	6.72	6.91	6.80	6.85	6.83
74	Kajeh	55	T	6.98	6.86	7.12	7.05	7.12	7.00
75	Kahorkan	80	T	7.13	7.00	7.32	7.29	7.40	7.19
76	Dinar Kelk	98	U	7.20	7.02	7.32	7.33	7.45	7.23
77	Qasr-e Qand	170	T	7.16	7.02	7.35	7.33	7.45	7.22
78	Kend Koroj	10	U	6.39	6.22	6.24	5.92	5.85	6.17
79	Puzak	41	N	6.93	6.75	6.99	6.85	6.88	6.87
80	Zirdan	67	N	7.11	6.93	7.27	7.18	7.32	7.13
81	Muman	33	N	6.84	6.67	6.86	6.71	6.68	6.76
82	Kahir	30	N	6.81	6.63	6.81	6.65	6.60	6.71
83	Gozar	52	N	7.02	6.84	7.13	7.01	7.09	7.00
84	Bir	40	N	6.92	6.74	6.97	6.84	6.85	6.86
85	Gonz	50	N	7.00	6.82	7.10	6.98	7.05	6.98
86	Tolganeh	60	U	7.07	6.89	7.14	7.10	7.19	7.06
87	Khodar	36	R	6.80	6.70	6.90	6.77	6.92	6.80
88	Firuz Abad	105	R	7.16	7.02	7.35	7.33	7.53	7.23
89	Pishmag	183	R	7.16	7.02	7.35	7.33	7.53	7.23
90	Padegan	72	R	7.09	6.96	7.27	7.22	7.41	7.15
91	Mitkan	123	U	7.20	7.02	7.32	7.33	7.45	7.23
92	Bam Posht	267	R	7.16	7.02	7.35	7.33	7.53	7.23
93	Zaboli	110	R	7.16	7.02	7.35	7.33	7.53	7.23
94	Kenar	272	R	7.16	7.02	7.35	7.33	7.53	7.23
95	Sartang	75	R	7.11	6.97	7.29	7.25	7.44	7.17
96	Dehak	53	U	7.02	6.84	7.08	7.02	7.09	7.00
97	Saravan	240	R	7.16	7.02	7.35	7.33	7.53	7.23
98	Kuh-e Noh	26	T	6.66	6.58	6.73	6.55	6.56	6.62
99	Narreh Now	54	U	7.03	6.85	7.09	7.03	7.11	7.01
100	Mahdaneh	110	U	7.20	7.02	7.32	7.33	7.45	7.23
101	Birk	108	T	7.16	7.02	7.35	7.33	7.45	7.22
102	Karvandar	80	U	7.18	7.00	7.29	7.29	7.40	7.20
103	Daman	122	R	7.16	7.02	7.35	7.33	7.53	7.23
104	Kaskin	113	T	7.16	7.02	7.35	7.33	7.45	7.22
105	Kahnow	44	U	6.95	6.77	6.99	6.90	6.96	6.91
106	Sayegan	50	U	7.00	6.82	7.05	6.98	7.05	6.97
107	Chahan	16	U	6.57	6.40	6.48	6.23	6.20	6.41
108	Ahmad Abad (Iranshahr)	27	U	6.77	6.59	6.74	6.58	6.59	6.66
109	Dasht Kuh	35	R	6.79	6.69	6.88	6.75	6.90	6.79