8th International Conference on Seismology & Earthquake Engineering
11-13 Nov. 2019, Tehran, Iran

ON THE SHALLOW DEPTH QUALITY FACTORS (QP, QS, QC) IN FARIMAN AREA USING AFTERSHOCKS OF MW6.0 EARTHQUAKE ON APRIL 05, 2017

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Keywords: Body wave, Coda wave, Quality factor, Fariman, Iran

High frequency quality factors Q_c, Q_p and Q_s have significant role to study the simulation of the strong ground motion, seismic hazard analysis and seismic zoning. The 2017 April 5 *M*w 6 Do Qaleh Fariman earthquake occurred southeast of the megacity of Mashhad, the center of Khorasan –e Razavi province, at the southern boundary of Kopeh-Dagh. Immediately after Do Ghaleh earthquake, International Institute of Earthquake Engineering and Seismology (IIEES) have decided to deploy an intensive local seismic network in the affected area of the Fariman to record all aftershocks (as shown in Figure 1). The IIEES temporary seismic network was deployed from 6th of April to 12th of May 2017 with 16 three-component seismometer of type LE-3D/20s Lenartz Company and 3 CMG-5TD Guralp accelerometers, which have recorded all events continuously with a sampling rate of 0.005 sec.

First, all events were located after windowing and reading the arrival time phases. Then, the initial speed model was optimized based on a number of events with azimuthal gap less than 120 degrees. An optimized velocity structural model was used to determine the relocation of all seismic events. In the next step, 50 earthquakes, whose waveforms had a signal to noise ratio of more than three, were selected. The Q_C, Q_P, and Q_S quality parameters of the selected earthquakes were calculated. In this study, single back scattering method was used to calculate Q_C which results is presented in Figure 1. The spectral ratio of the source Broun's model was used to calculate the body wave quality factors (i.e. Qp & Qs). Obtained Relations for the Fariman region are calculated as follows:

$$Q_c = 66 \pm 3f^{0.84\pm0.02};\ Q_p = 53.73f^{0.7}\ ;\ Q_s = 69.1f^{0.71}$$

The calculated values for the quality parameters are similar to those obtained for seismic active regions. The values obtained indicate that the quality factor is dependent on the frequency and increases for its high frequencies. Parameters α, and Q are known as tectonic parameters of the study area. Previous studies have shown that areas with high values for α and low Q levels are active tectonically and vice versa (e.g. Nowrouzi et al., 2007; Mahood et al., 2009; Havsqov et al., 2016; Ahmadzadeh et al., 2017; Safari et al., 2018; Amiri Fard et al., 2019 among others). Therefore, our results showed that the Fariman area is a very active region. Our results suggest a comprehensive evaluation of quality factors across Iran plateau by means of local temporary seismic networks.

REFERENCES

Ahmadzadeh, S., Parolai, S., Javan-Doloei, G., and Oth, A. (2017). Attenuation characteristics, source parameters and site effects from inversion of S waves of the March 31, 2006 Silakhor aftershocks. *Annals of Geophysics*, *60*(6 Sup), DOI: 10.4401/ag-7520.

Amiri Fard, R., Javan Doloei, G., Rahimi, H., and Farrokhi, H., (2019). Attenuation of *P* and *S* waves in Western part of Iran. *Geophysical Journal International*, *218*(2), 1143–1156.

Havskov, J., Sørensen, M.B., Vales, D., Özyazıcıoğlu, M., Sánchez, G., and Li, B. (2016). Coda Q in different tectonic areas, influence of processing parameters. *Bulletin of the Seismological Society of America*, *106*(3), 956-970.

Mahood, M., Hamzehloo, H., and Javan-Doloei, G., (2009). Attenuation of high frequency P and S waves in the crust of the East-Central Iran. *Geophysical Journal International*, *179*(3), 1669-1678.

Nowrouzi, G.R., Ashtiani, M., Javan-Doloei, G., and Mokhtari, M. (2007). *Iranian Journal of Geophysics*, *01*(1), 21-35.

Safari, M., Mahood, M., Javan-Doloei, G., and Tatar, M. (2018). Temporal Variation of Q Factor after Earthquakes. *Proceedings of 18th Iranian Conference on Geophysics*, 328-330, Tehran, Iran.

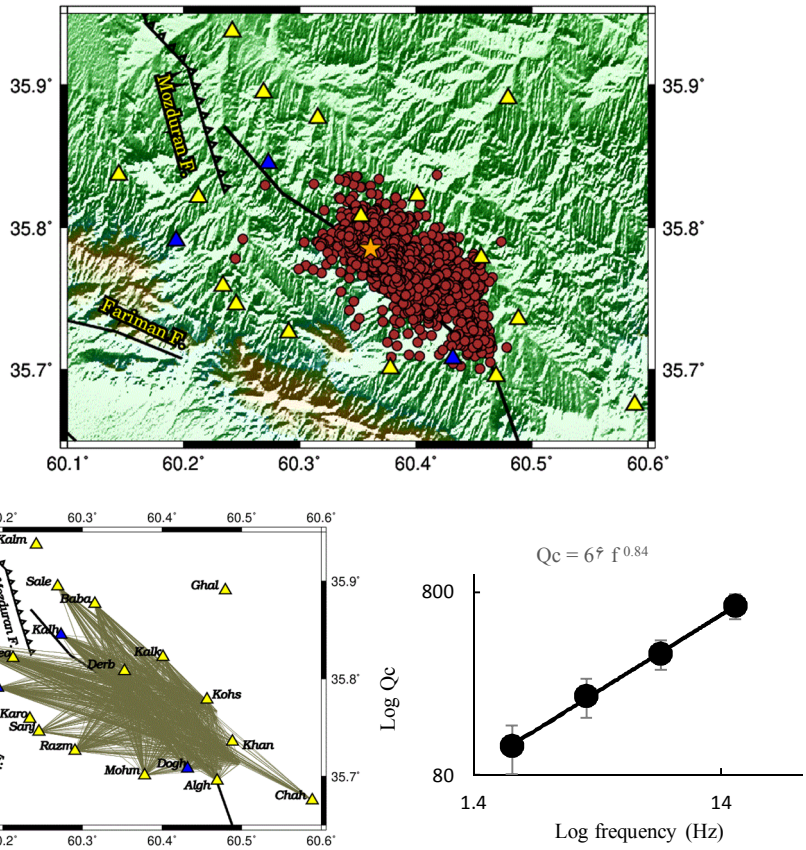

Figure 1. The location map of aftershocks (brown circles) and stations (yellow triangles for seismometers & blue triangles for accelerometers). The orange star show location of the mainshock which recalculated in this study. Raypaths distribution (Top Right) and diagram of the variation of Qc versus frequency for studied area (Bottom Right).