

Estimation of Kappa, geometrical spreading and quality factor of shear-wave in the Zagros region

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A study focused on estimation of near surface attenuation (kappa), geometrical spreading and quality factor is conducted using 1641 Fourier Amplitude Spectra (FAS) of the shear-wave window obtained from 547 three-component strong motion records from 114 earthquakes in Zagros. The hypocentral distances range from 7 to 190 km. Earthquakes span the period between 1994 and 2012 with moment magnitudes vary between 3.6 and 6.1. The distance dependence of horizontal and vertical kappa are described by $K_H=0.043+0.00025R$ and $K_V=0.033+0.00021R$, respectively. The site effect is eliminated from horizontal components utilizing average horizontal to vertical spectral ratio over whole frequency content and the zero distance kappa factor. No significant differences between the two horizontal components are observed. Geometrical spreading follows trilinear behavior with coefficients of -0.78 for hypocentral distances smaller than 65 km, +0.003 for distances between 65 km and 120 km, and -0.75 for distances beyond 120 km. The observed increase from the first to the second coefficient is the result of post-critical reflections from crust-mantle boundary. The two hinges in the best fitting curve obtained from regression analysis are visually detectable. The relation between shear-wave quality factor, which is inversely related to anelastic attenuation, and frequency is $Q_s=129\pm 9f^{0.87\pm 0.1}$. This relation is estimated by fitting a first order polynomial to logarithm of quality factor values in 15 frequencies between 0.5 and 12.56 Hz. The value of quality factor at 1 Hz is an evidence for strong heterogeneity of the region. This further demonstrates the utmost seismogenesis undergoing in the region.