Geophysical Research Abstracts
Vol. 17, EGU2015-4966-1, 2015
EGU General Assembly 2015

Q Estimates using the Coda of Local Earthquakes in Western Turkey

Nihal AKYOL
Dokuz Eylul University, Department of Geophysics, Izmir, Turkey (nihal.akyol@deu.edu.tr)

The regional extension in the central west Turkey has been associated to different deformation processes, such as: spreading and thinning of over-thickened crust following the latest collision across the Neotethys, Arabia-Eurasia convergence resulting in westward extrusion of the Anatolian Plate and Africa-Eurasia convergence forming regional tectonics in the back-arc extensional area. Utilizing single isotropic scattering model, the Coda quality factor (Q_c) at five frequency bands (1.5, 3, 5, 7, 10 Hz) and for eight window lengths (25-60 s, in steps of 5 s) were estimated in the region. The data comes from 228 earthquakes with local magnitudes and depths range from 2.9 – 4.9 and 2.2 – 27.0 km, respectively. The source to receiver distance of the records changes between 11 and 72 km. Spatial differences of attenuation characteristics were examined by dividing the region into four subregions. The frequency dependence of Q_c values between 1.5 and 10 Hz has been inferred utilizing $Q_c = Q_0 f^n$ relationship. Q_0 values change between 32.7 and 82.1, while n values changes between 0.91 and 0.79 for the main- and four sub-regions, respectively. Obtained frequency dependence of Q_c values for a lapse time of 40 s in the main region is $Q_c(f)$ = 49.6$\pm$1.0$f^{0.85\pm0.02}$. The obtained low Q_0 values show that the central west Turkey region is characterized by a high seismic attenuation, in general. Strong frequency and lapse time dependencies of Q_c values for the main- and four sub-region imply tectonic complexity in the region. The attenuation and its frequency dependency values versus the lapse time for the easternmost subregion, confirm the slab tear inferred from previous studies. The highest frequency dependency values, at all lapse times, in the westernmost subregion imply high degree of heterogeneity supported by severe anti-clockwise rotation in this area. Lapse time dependencies of attenuation and its frequency dependencies were examined for two different ranges of event depth (h $<$ 10 km and h $\geq$ 10 km) and distance (r $<$ 40 km and r $\geq$ 40 km). Higher attenuation and its higher frequency dependence for larger distances could be associated to slab retreat in the back-arc extensional area, which results in crustal/lithospheric thinning, elevation of isotherms and increasing heterogeneity with depth.