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1 Estimation of Coda Wave Attenuation for NW Himalayan Region using Local Earthquakes

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The attenuation of seismic wave energy in NW Himalayas has been estimated using local earthquakes. Most of the analyzed events are from the vicinity of the Main Boundary Thrust (MBT) and the Main Central Thrust (MCT), which are well-defined tectonic discontinuities in the Himalayas. The time-domain coda-decay method of a single backscattering model is employed to calculate frequency dependent values of Coda Q (Qc). A total of 36 local earthquakes of magnitude range 2.1 to 4.8 have been used for Qc estimation at central frequencies 1.5, 3.0, 6.0, 9.0, 12.0 and 18.0 Hz through eight lapse time windows from 25 sec to 60 sec starting at double the time of the primary S-wave from the origin time. The estimated average frequency dependence quality factor gives the relation, $Qc=158f^{1.05}$, while the average Qc values vary from 210 at 1.5 Hz to 2861 at 18 Hz central frequencies. The observed coda quality factor is strongly dependent on frequency, which indicates that the region is seismic and tectonically active with high heterogeneities.

The variation of the quality factor Qc has been estimated at different lapse times to observe its effect with depth. The estimated average frequency dependent relations of Qc vary from $85f^{1.16}$ to $216f^{0.91}$at 25 sec to 60 sec lapse window length respectively. For 25 sec lapse time window, the average Qc value of the region varies from 131 ± 36 at 1.5 Hz to 2298 ± 397 at 18 Hz, while for 60 sec lapse time window its variation is from 285 ± 95 at 1.5 Hz to 2868 ± 336 at 18 Hz of central frequency. The variation of

Qc with frequency and lapse time shows that the upper crustal layers are seismically more active compared to the lower lithosphere. The decreasing value of the frequency parameter with increasing lapse time shows that the lithosphere acquires homogeneity with depth.