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Frequency-dependent Seismic Scattering and Absorption Parameters Along the Central Part of the NAFZ Inferred from Acoustic Radiative Transfer Theory

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Present work deals with frequency-dependent seismic scattering and intrinsic attenuation parameters beneath the crustal structure of central part of North Anatolia Fault Zone (NAFZ). This fault is regarded as one of the largest plate-bounding transform faults that separates the Anatolian Plate to the south from the Eurasian Plate to the north. Thus robust estimates of crustal properties in the area will significantly help in understanding the present and past tectonic processes in relation to the plate boundary. Frequency-dependent scattering and absorption parameters computed at 5 different frequency bands (with central frequencies ranging from 0.75 to 12 Hz) were determined by fitting synthetic envelopes to the observed seismogram envelopes from local seismic earthquake detected by the Kandilli Observatory and Earthquake Research Institute (KOERI) between 2005 and 2008. Waveform data recorded at 39 seismic stations during the North Anatolian Fault (NAF) passive seismic experiment was analyzed. We use acoustic radiative transfer theory when calculating synthetic envelopes. Our preliminary results indicate that the lateral variation pattern of scattering and intrinsic attenuation parameters clearly marks the boundary between the southern and northern blocks. The northern part of the NAFZ in general is represented by smaller values of the mean free path in comparison to the southern block as this indicates stronger scattering of seismic waves north of the NAF. Results for the intrinsic attenuation show lower values of the absorption path length in the northern part of the fault zone when compared to the southern part. This suggests stronger attenuation of seismic waves in the northern part of the NAF. Final magnitude estimates as a bi-product of this study, in general, show a good accordance with original catalogue magnitudes that are based either ML or Md scales.