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Profiling of late Trias-early Quaternary surface in the Eskisehir basin using microtremors

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Earthquakes in our country and in the world cause damage and collapse of engineering structures due to several reasons. Settlement areas are under the effect of strong and long-duration seismic vibrations due to resonance and focusing effects. In this study, we propose the first approximation for thickness of Quaternary sediment and late Trias topography for the Eskisehir basin in microtremor methods. The 3-D basin structures and site resonance frequencies in the Eskişehir Basin were investigated by geophysical measurements based on the 318 single station and 9 array sites microtremor methods situated on soft soil sediments and rock units within the study area. The microtremor data collection, processing, and interpretation of the H/V curves were carried out following the recommendations and guidelines of the SESAME consortium (Site EffectS assesment using AMbient Excitation) The signals recorded were analysed for horizontal to the vertical (H/V) spectral ratio using GEOPSY software. The H/V ratios were calculated for the frequency range 0.2 to 20 Hz, using 60 s as a time window length and removing time windows contaminated by transients. Almost of the HVSR curves on the alluvium deposits have a low-frequency peak at 0.6-0.8 Hz and a second peak at 4-10 Hz. We used the Spatial Autocorrelation (SPAC) method in Eskisehir Basin using broadband seismometers distributed in triangular arrays. We derive a power-law relationship that correlates the fundamental site resonance frequencies with the sedimentary cover thickness obtained from the seismic reflection data, borehole data and shear wave velocity data in the study area. We use this relationship to estimate bedrock depth and thickness of alluvial deposits in the Eskisehir basin. Our estimation of maximum basin depths is 650 m for the Muttalip. The thickness of quaternary sediment is 25 m for Eskisehir alluvium. The estimated thickness is used to plot digital elevation model and cross profiles correlating with geomorphology and geology of the study area. The inferred sediment-bedrock interface along a cross-section shows an half graben shaped basin with a sedimentary cover thickness reaching about 500 m at the deepest part of the Eskisehir basin.