

A Comprehensive Comparative Study on Seasonal Variation of Parameters Involved in Site Characterization and Site Response Analysis by Using Microtremor Data

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Abstract : The site characterization and site response analysis are the crucial steps for reliable seismic microzonation of an area. So, the basic parameters involved in these fundamental steps are required to be chosen properly in order to efficiently characterize the vulnerable sites of the study region. In this study, efforts are made to delineate the variations in the physical parameter of the soil for the summer and monsoon seasons of the year (2021) by using Horizontal-to-Vertical Spectral Ratios (HVSRs) recorded at five sites of the Indian Institute of Technology (Indian School of Mines), Dhanbad, Jharkhand, India. The data recording at each site was done in such a way that less amount of anthropogenic noise was recorded at each site. The analysis has been done for five seismic parameters like predominant frequency, H/V ratio, the phase velocity of Rayleigh waves, shear wave velocity (V_s), compressional wave velocity (V_p), and Poisson's ratio for both the seasons of the year. From the results, it is observed that these parameters majorly vary drastically for the upper layers of soil, which in turn may affect the amplification ratios and probability of exceedance obtained from seismic hazard studies. The HVSR peak comes out to be higher in monsoon, with a shift in predominant frequency as compared to the summer season of the year 2021. Also, the drastic reduction in shear wave velocity (up to ~10 m) of approximately 7%-15% is also perceived during the monsoon period with a slight decrease in compressional wave velocity. Generally, the increase in the Poisson ratios is found to have higher values during monsoon in comparison to the summer period. Our study may be very beneficial to various agricultural and geotechnical engineering projects.

Keywords : HVSR, shear wave velocity profile, Poisson ratio, microtremor data

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