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ESTIMATION OF Vs30 SOIL PROFILE STRUCTURE OF SINGAPORE FROM MICROTREMOR RECORDS

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Singapore lies at the southern tip of the Malay Peninsula, covering a land area of 600 km^2 and with a population exceeding 5 million. Array microtremor recording were carried out in Singapore for 40 sites that encompasses the sites of all the major geological formations. The Spatial Autocorrelation (SPAC) method is employed to determine the phase velocity dispersion curves and subsequently inverted to determine the shallow shear-wave velocity (V_s) and soil stratigraphy. The depth of penetration is generally about 30 m – 40 m for most of the sites. For the present study, the V_s estimation is restricted to the upper 30 m of the soil (V_s^{30}), confirming with the IBC (2006). The Reclaimed Land and the young Quaternary soft soil deposit of Kallang Formation show low V_s^{30} values ranging from 207 m/s – 247 m/s, belonging to site E and at the boundary of site E and D. The Old Alluvium formation shows higher V_s^{30} values ranging from 362 m/s – 563 m/s and can be classified under site C. The estimated V_s^{30} for the sedimentary sequence of Jurong Formation reveal site C classification, with the V_s^{30} range from 317 m/s – 712 m/s. On the other hand, the Bukit Timah Granite body shows low V_s^{30} ranging from 225 m/s – 387 m/s, with most of the sites concentrated under site D classification and few sites at the boundary of sites D and C, for the upper 30 m. This low V_s^{30} value of the granitic body can be explained in the light of intense weathering that the granite body has undergone for the upper layer, which is also supported from borehole records. The SPAC results are compared with nearby borehole data and they show a good correlation for sites that have soft soil formation and for the weathered granite body. The correlation confirms the reliability of SPAC method that can be applied for highly populated urbanized places like Singapore. The present research finding will be useful for further studies of site response analysis, site characterization and ground motion simulation.