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Characterization of the engineering geological units with the shear wave velocity parameter: statistical analysis of data from the Italian seismic microzonation studies

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The availability of a unique database, where all data of the seismic microzonation studies carried out in about 1900 municipalities of Italy (<https://www.webms.it/>) are achieved with a standardized format, allowed statistical elaborations in terms of subsoil parameters. In particular, we analysed borehole logs and geophysical data in order to characterize them with the shear wave velocity (V_s) vertical profile, and the code of standardized engineering geological units, according to the Italian Guidelines for Seismic Microzonation (Seismic Microzonation Working Group, 2015; 2018). The V_s parameter, extracted from about 3700 geophysical surveys, was correlated to the engineering geological units from the borehole logs, with 1meter step. The correlation was performed for about 1700 available Down-Hole (DH) surveys and for about 2000 Multichannel Analyses of Surface Waves (MASW). For these latter, we selected only MASW surveys located near boreholes, no more than 100 m away. The statistical analysis on the distribution and dispersion of V_s parameter allowed to calculate the V_s values related to the mode, mean, median, standard deviation, first quartile, third quartile, minimum and maximum, and the trend with depth of V_s for each engineering geological unit. Validation with external datasets (e.g. Italian V_{s30} map, Mori et al., 2020) demonstrates that the characterization of engineering geological units in term of V_s , based on velocity profiles extracted by the Italian seismic microzonation dataset, allow to reliably characterize the engineering geological model, where no geophysical data are available. Statistics of subsoil parameters will represent a fundamental tool for computing local seismic ground motion parameters (e.g. PGA, H_{SM}) in the areas not covered by seismic microzonation studies.

References

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