# Advances in Seismic Risk Assessment of the city of Potenza (Southern Italy)

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The overall objective of this study is to improve the seismic risk assessment of the city of Potenza (southern Italy, selected because it is already the subject of several national and international research projects) based on a multidisciplinary approach that considers the seismic hazard of soils in the urban area, the interaction effect between soils and buildings, and the seismic capacity of buildings. 453 (300 on soils and 153 on buildings) single-station ambient noise measurements analysed through Horizontal-to-Vertical Spectral Ratio technique have been performed to assess the main characteristics of the most representative litho-stratigraphic and mechanical conditions of the urban soil and built environment in the city of Potenza. Thanks to experimental relationship between period, height and building area, derived by experimental results on buildings, made it possible estimating the fundamental frequency for all the Potenza's buildings. By comparing the frequency ranges of buildings with those of foundation soils, it was possible to spatially determine the areas and probabilities of highest occurrence of the soil-building resonance effect in the elastic field throughout the city of Potenza.

Furthermore, capacity curves of buildings were obtained based on the geometric and typological characteristics and on the vibrational frequencies of the measured building. Firstly, the buildings were grouped into homogeneous classes. Based on previous and well-established principles and studies, they were distinguished by construction year (pre-1971, post-1971), presence of soft stories, and number of stories. The capacity curves for each typology were defined in terms of the top displacement – base shear relationship. The values for the yield displacement (δy) and the ultimate displacement (δu) were calculated based on the values obtained from numerical modelling of previous studies. For each of the considered typology, a mean capacity curve was obtained by averaging the values of the buildings belonging to each class. The capacity curves obtained can be used as valuable tools to assess the vulnerability of these buildings and define a seismic risk map for the city of Potenza including the urban soil amplification and the soil-building interaction effect.

**Keywords: HVSR, Resonance effects, Capacity curves.**