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Seismic noise measurements in the city of Trieste in order to plan an urban seismic network

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The seismic motion can be modified by local geological conditions, which can cause changes in the amplitude, frequency, and duration of earthquake's seismic waves. For this reason, alongside an assessment of a large scale basic seismic hazard, it is of primary importance to evaluate a local seismic hazard, which takes into account the geological and geomorphological features that characterize the studied area.

Sediments and soft soils, through resonance phenomena, and topography, through focus effects, collaborate to modify seismic waves, usually causing amplification. In Italy, these site effects, since 2008, are commonly investigated by the seismic microzonation, which could be divided into three levels, gradually increasing in details.

The first microzonation level is developed by a work of collection of geological and geophysical data available for the study area, with the addition of some seismic noise measurements. The result is a MOPS chart (Homogeneous Microzone in Seismic Perspective), which divides the land in areas that, theoretically, should behave in a similar way from a seismic point of view. Regarding the city of Trieste, up to now, it is only available a first level microzonation, dated back 2016.

In this work the results of a seismic noise measures campaign carried out in the city of Trieste during the 2022 summer are presented. 32 measurements were carried out in the different homogeneous microzones defined for the city of Trieste, in key positions of the CLE chart (Emergency Boundary Condition), furthermore taking into account the geological, geomorphological, hydrogeological features, and the university building positions.

The goal were multiples. The first one was the estimation of soil amplification in the city of Trieste, analysed according to the horizontal to vertical spectral ratio (H/V) techniques developed by Nakamura. The second goal was to verify the homogenous behaviour of the MOPS, and the results show that the hypothesis of homogenous microzone in the seismic perspective is not always verified. In many examples inside the same homogeneous microzone the seismic behaviour could be highly different. The MOPS seem to be a good instrument as a general first-level evaluation, but they do not appear to be enough accurate for a site-effect detailed evaluation. Lastly, putting all

the collected information together, the noise measurement campaign had the goal to find the best sites to settle a seismic monitoring network inside the University buildings, therefore a map of the proposed sites is presented.