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A Pseudo-3D Vs Velocity Model of Ischia Island (Italy) by HVSR spectral ratio inversion

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Following the M_D4.0 (Mw3.9) earthquake of August 21 2017 which occurred on the Ischia island (Naples, southern Italy), the local monitoring seismic network was significantly improved in terms of both number of stations and instrumentation performance. Due to the considerable amount of collected data, in particular of seismic noise recorded at broadband stations, some efforts have been addressed in particular to the definition of a 1D average velocity model effective for the whole island. This is an important scientific step because, in complex volcanic areas, the use of reliable velocity models is essential for an accurate localization of local earthquakes. In this work, the main target is to retrieve a pseudo-3D velocity model of the Ischia island. Specifically, we inverted H/V curves and frequency peaks evaluated at about twenty sites to obtain a velocity profile for each of the investigated measurement points. Taking into account that the H/V frequency peak depends on both velocity and thickness of layers, for each site we applied an inversion process fixing the velocities and modifying the thicknesses in order to obtain the corresponding 1D velocity models. We are quite enough confident about the robustness of models, since during the inversion process, we achieved a good convergence towards the best-fit solutions. Then, a pseudo-3D velocity model was obtained by contouring the 1D models of each station site to highlight possible lateral variations of the layer thicknesses and to reconstruct the morphology of the deeper interface characterized by a high impedance contrast. A good correspondence between the pseudo-3D model and the geological features of the island was observed, especially in the northern sector where most of the stations is installed. In particular, the top of the high-impedance contrast interface appears deeper in the northern coastal areas and shallower in the central sector. This is in agreement with the structural setting of the island likely due to the resurgence of Mount Epomeo.