The southwestern portion of the Municipality of Mirandola area (Province of Modena, Emilia-Romagna region, Italy) is interested by a buried structural high known as “Mirandola Anticline” (Bruno et al. 2003). In correspondence of this structure the continental and marine superficial deposits of Po Plain are particularly thin.

104 passive seismic measurements (single station microtremor) were performed over the entire municipal area for the seismic microzonation study of Mirandola (September 2011 – February 2012). The comparison of HVSR (horizontal to vertical spectral ratio) curves (Castellaro et al. 2005) with the detailed geological sections made by GeologiS, Seismic and Soil Survey of Regione Emilia-Romagna for the recent researches relating to potential geothermal reservoirs in the Mirandola subsoil (Mantelli & Molinari 2006), shows an excellent correlation between the stratigraphic architecture of superficial units and the results of the passive seismic measurements (peak frequency and amplitude).

In the area of the structural high culmination, where Quaternary Continental deposits are thinned (20-80 m) only and laid directly over Pliocene units, a very high impedance contrast, connected by an abrupt velocity increase, is detected. HVSR peaks are steep with frequencies >1 Hz and very high amplitudes (>3) (i.e. IR06, IR05 and IR06). Where a very thin layer of Quaternary Marine deposits (only 20-30 m) is interposed between thinned Quaternary Continental deposits and Pliocene units, a high impedance contrast connected by a very slow velocity increase is detected. HVSR peaks are wide with frequencies >1 Hz and high amplitudes (>3) (i.e. IR06, IR05 and IR06).

The fundamental frequency (f0) map, required by the CCRG 1051/2011 of Regione Emilia-Romagna for the first level seismic microzonation, was then enhanced to highlight the results of HVSR measurements related with the structural high: in addition to the required 60 values for each single measuring point, a colour-coded grid, related to HVSR peaks amplitude, has been added in background. This thematicization, created with Inverse Distance Weighting (IDW) interpolation provided by the desktop GIS MapInfo Professional, allows us to highlight how the HVSR measurements show a great precision the architecture of the more superficial stratigraphic units, in particular when they are thinned, due to the presence of the Mirandola Anticline.

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REFERENCES


