Supplementary Materials: The following are available online at www.mdpi.com/xxx/s1

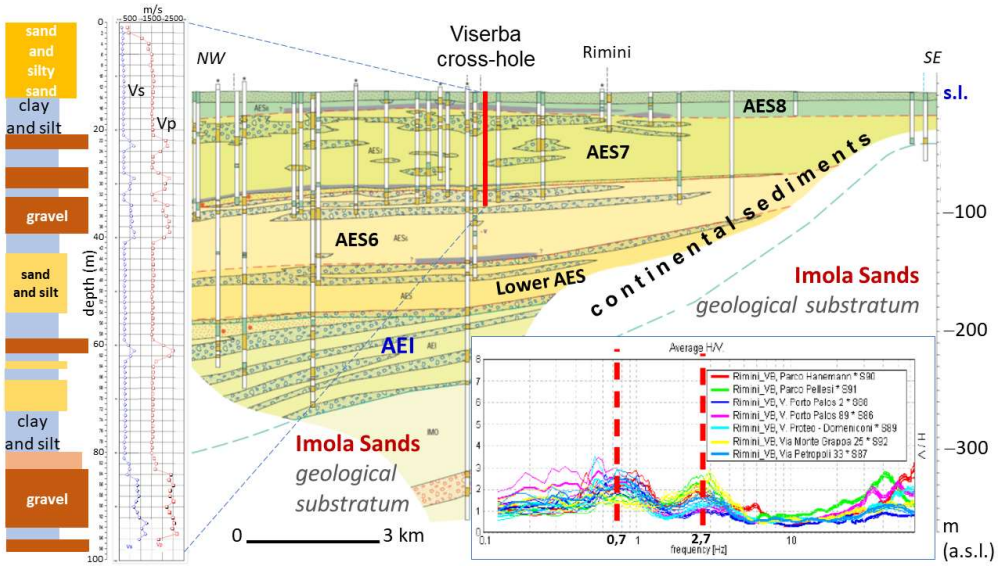

Figure S1. Marginal area: comparison between stratigraphic log, Vs-Vp profiles and ambient noise measurements in Viserba (Rimini Municipality) [32, 33]. Geological cross-section from CARG 1: 50,000, sheet n. 256 "Rimini". Gravelly horizons have Vs greater (approximately double) than that of the sandy-silty and silty-clayey horizons; Vs≥800 m/s in the gravels at a depth of 82÷83 m. The geological substratum is at a depth of about 250 m. Ambient noise measurements show two peaks of the H/V spectral ratio, one at the frequency of 0.7÷0.8 Hz, the other at the frequency of 2.6÷2.8 Hz. The comparison between ambient noise recordings, Vs profile and stratigraphy makes it possible to associate the peak at a frequency of 2.7 Hz to the roof of the first gravelly horizon, at a depth of about 20 m, while the peak at 0.7 Hz can be associated with the roof of gravels with Vs≥800 m/s, at a depth of 82÷83 m, at the discontinuity surface that separates the AES7 and AES6 subsynthems.

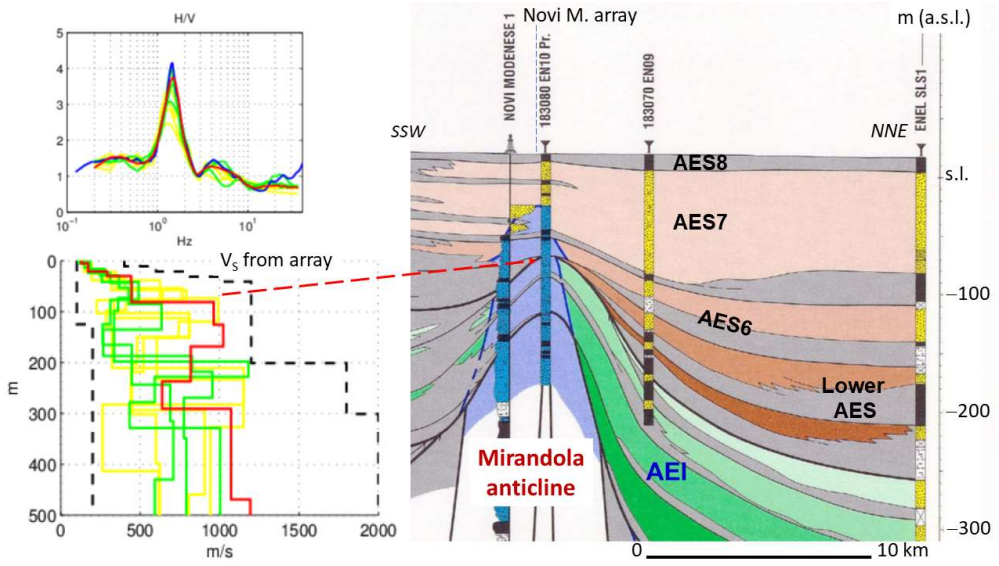

Figure S2. Distal areas, high structural zones: comparison between stratigraphic data [11], H/V spectral ratio and Vs profile from ambient vibration measurement (array) in the Novi di Modena urban area [19], on the westward continuation of the blind Mirandola anticline. The H/V spectral ratio shows a single peak

of high amplitude at the frequency of 1.4 Hz and the Vs contrast was identified at a depth of about 70 m, at the basal discontinuity surface of AES6.

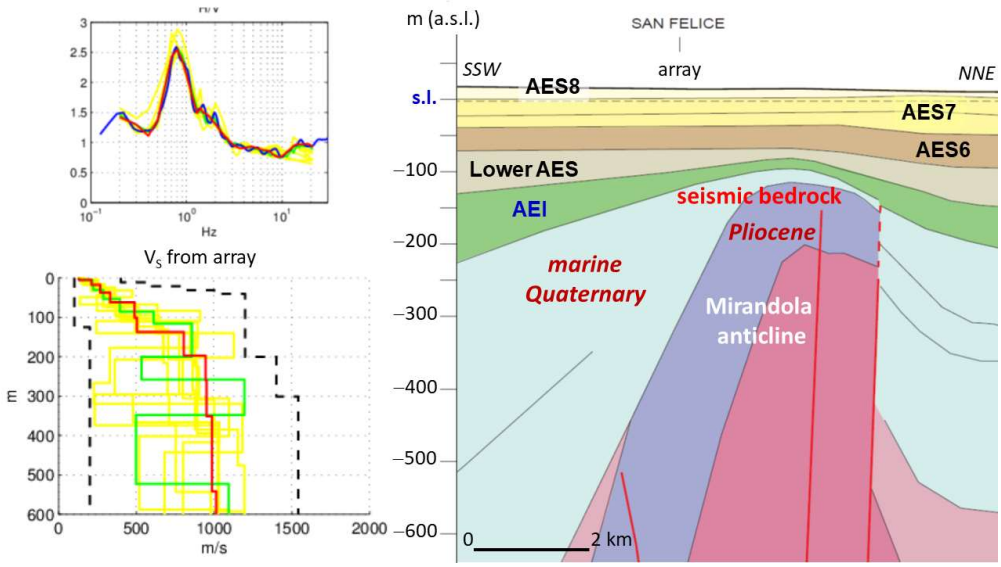

Figure S3. Distal areas, high structural zones: comparison between stratigraphic data, H/V spectral ratio and Vs profile from ambient vibration measurement (array) in the San Felice sul Panaro urban area [19], on the eastward continuation of the Mirandola anticline. The H/V spectral ratio shows a single peak, of smaller amplitude at a frequency of 0.8 Hz and the Vs contrast was identified at a depth of about 120÷140 m, at the basal discontinuity surface of AES.

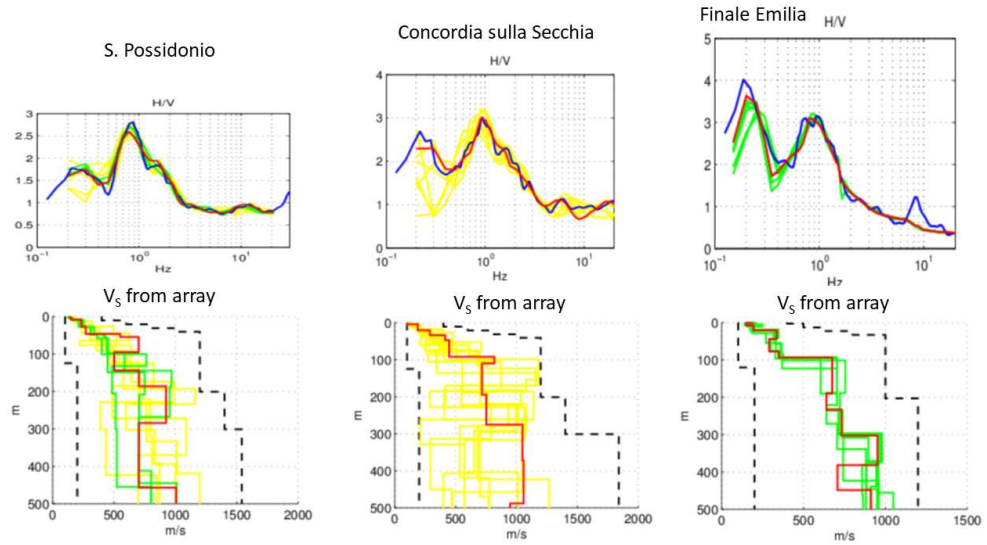

Figure S4. Distal areas, high structural zones: H/V spectral ratios and Vs profiles from ambient vibration measurement (array) around the Mirandola anticline area [19]. The H/V spectral ratios show a peak around the frequencies of 0.8÷0.9 Hz, even if of lower amplitude, with the main Vs contrast deepening from west (San Possidonio and Concordia sulla Secchia arrays) to east (Finale Emilia array). Note that the Concordia sulla Secchia and Finale Emilia measurements, located on the north limb, also show a peak at frequencies between 0.2 and 0.3 Hz and the reconstructed Vs profiles indicate important contrasts even at depths of about 300 m. No detailed stratigraphic data are available for these sites.

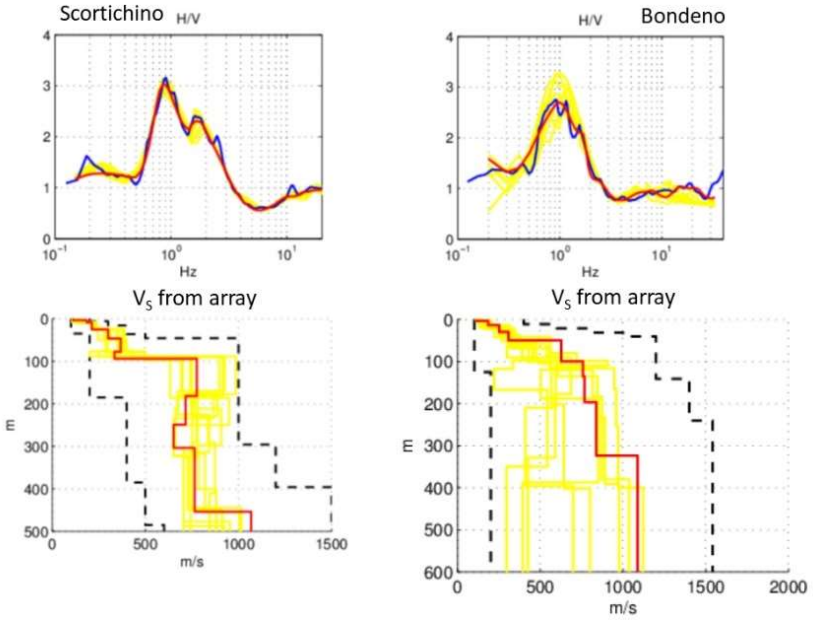

Figure S5. Distal areas, high structural zones: H/V spectral ratios and Vs profiles from ambient vibration measurements (array) in Bondeno and Scortichino, on the intermediate structural high of the Ferrara Folds [19]. The H/V spectral ratio show a single peak of the H/V spectral ratio at a frequency around 0.9 Hz and the reconstructed Vs profiles shows a sharp increase in the first 50÷100 m. No detailed stratigraphic data are available for these sites.

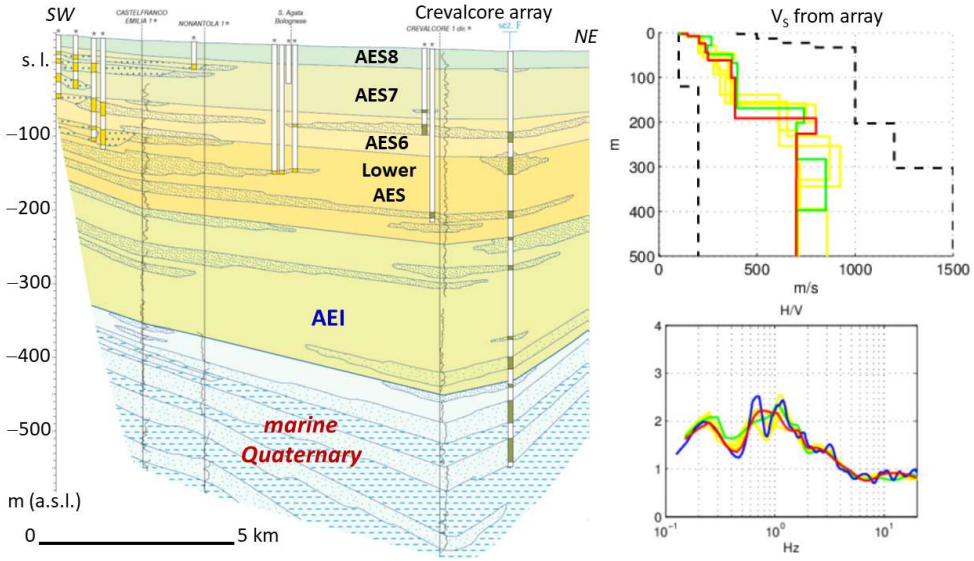

Figure S6. Distal areas, other areas: comparison between stratigraphic data (geological cross-section from Geological Map of Italy, sheet no. 202 "S. Giovanni in Persiceto"), H/V spectral ratio and Vs profile from ambient vibration measurement (array) in the Crevalcore urban area [19]. The H/V spectral ratio shows three peaks, one at the frequency of 0.2÷0.25 Hz and the other two at the frequencies of 0.7 Hz and 1.1 Hz. The main Vs discontinuity is identifiable at depth of about 200 m, at the base of AES; minor Vs discontinuity is present at a depth of about 60 m, at the base of AES7.

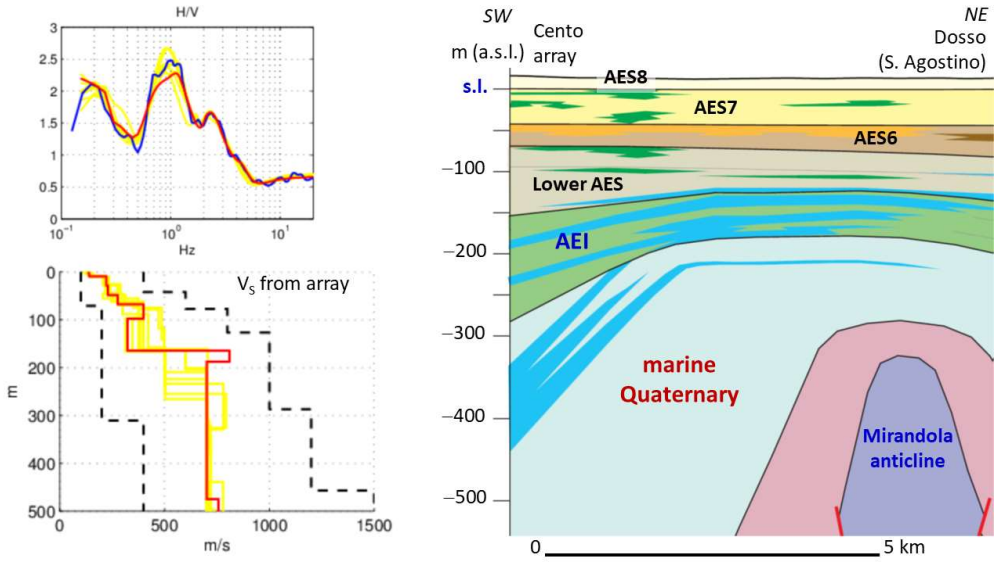

Figure S7. Distal areas, other areas: comparison between stratigraphic data, H/V spectral ratio and Vs profile from ambient vibration measurement (array) in the Cento urban area [19]. Two peaks of the H/V spectral ratio are observed: one at a frequency of 0.2 Hz and the other at the frequency of about 1 Hz. The main Vs discontinuity is identifiable at depth of about 170÷180 m, at the base of AES; minor Vs discontinuity is present at a depth of about 60÷70 m, at the base of AES7.

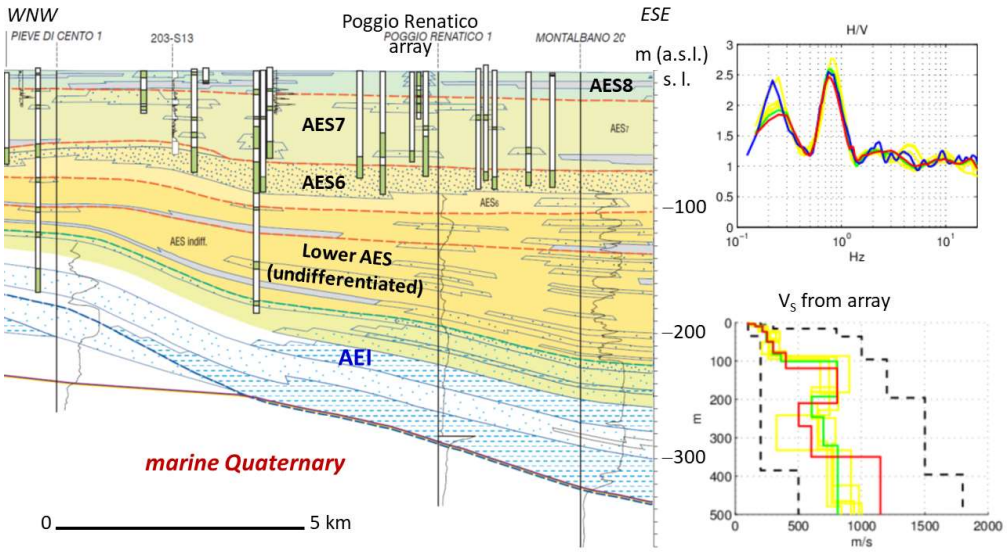

Figure S8. Distal areas, other areas: comparison between stratigraphic data (geological cross-section from Geological Map of Italy, sheet no. 203 "Poggio Renatico"), H/V spectral ratio and Vs profile from ambient vibration measurement (array) in the Poggio Renatico urban area [19]. The H/V spectral ratio shows two peaks, one at the frequency of 0.2÷0.25 Hz and the other at the frequency of 0.7÷0.8 Hz. Important Vs discontinuities are identifiable at depth of about 330÷350 m, at the base of AEI (seismic bedrock), and at a depth of about 100÷110 m, at the base of AES6.

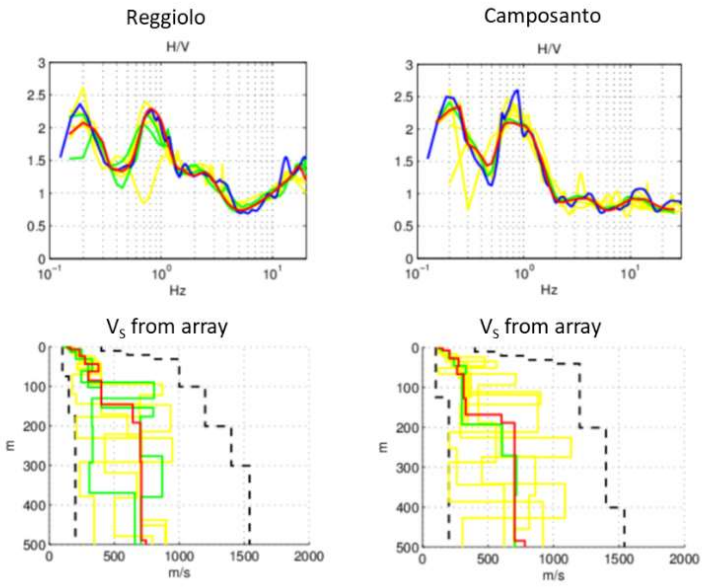

Figure S9. Distal areas, other areas: H/V spectral ratios and Vs profiles from ambient vibration measurements (array) in Reggiolo and Camposanto urban areas [19]. The H/V spectral ratio shows two peaks, one at the frequency of 0.2 Hz and the other at the frequency of 0.7÷0.9 Hz. The main Vs discontinuity is identifiable at depth of about 150÷180 m; the discontinuity responsible for the low frequency peak (0,2 Hz) can be located at depths of about 500 m. No detailed stratigraphic data are available for these sites.

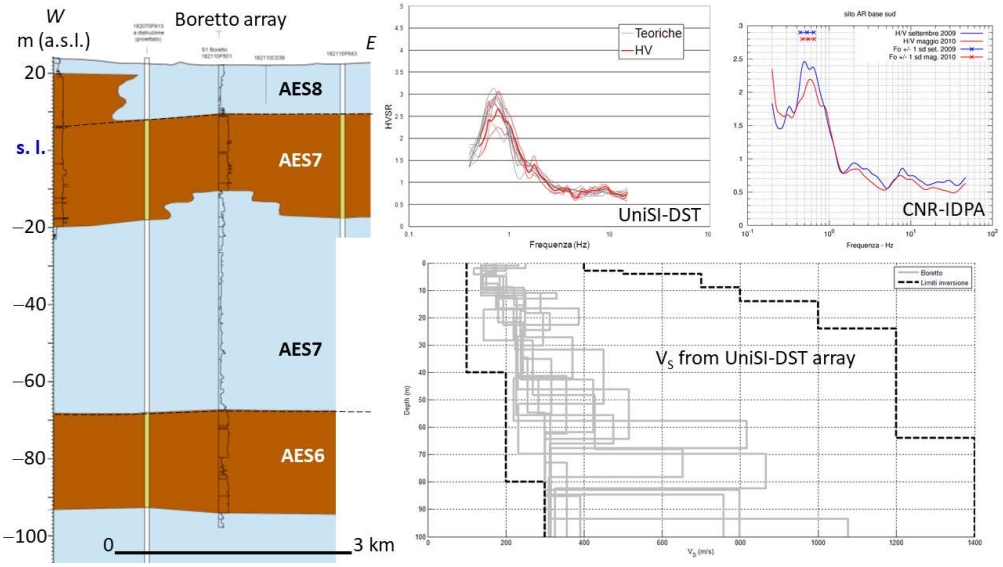

Figure S10. Distal areas, other areas: comparison between stratigraphic data, H/V spectral ratios and Vs profiles from ambient vibration measurements in the Boretto area [28]. Ambient vibration measurements carried out by University of Siena (Earth Sciences Department, UniSI-DST), and National Research Council (Institute for the Dynamics of Environmental Processes, CNR-IDPA). The H/V spectral ratio shows a peak at a frequency around 0.6÷0.8 Hz. The reconstructed Vs profile shows a contrast at a depth of about 70 m, at the basal discontinuity of AES7. Unfortunately, the tests did not allow us to determine the Vs profile at greater depths and therefore to identify the seismic bedrock. According to [11], the geological substratum in this site is at a depth of about 550÷600 m.

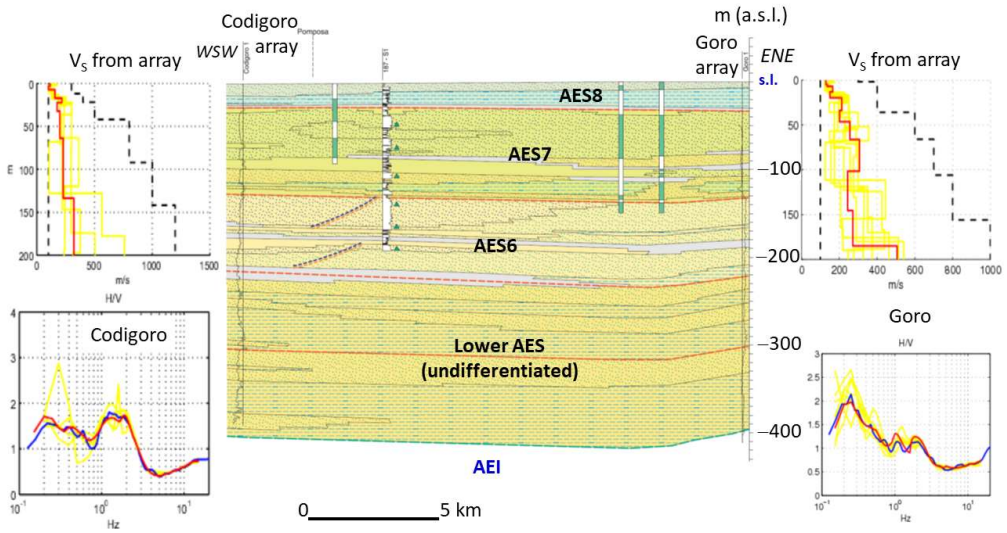

Figure S11. Distal areas, coast and Po delta: comparison between stratigraphic data (geological cross-section from Geological Map of Italy, sheet no. 187 "Codigoro"), H/V spectral ratios and Vs profiles from ambient vibration measurements (array) in the Codigoro and Goro urban areas [38].

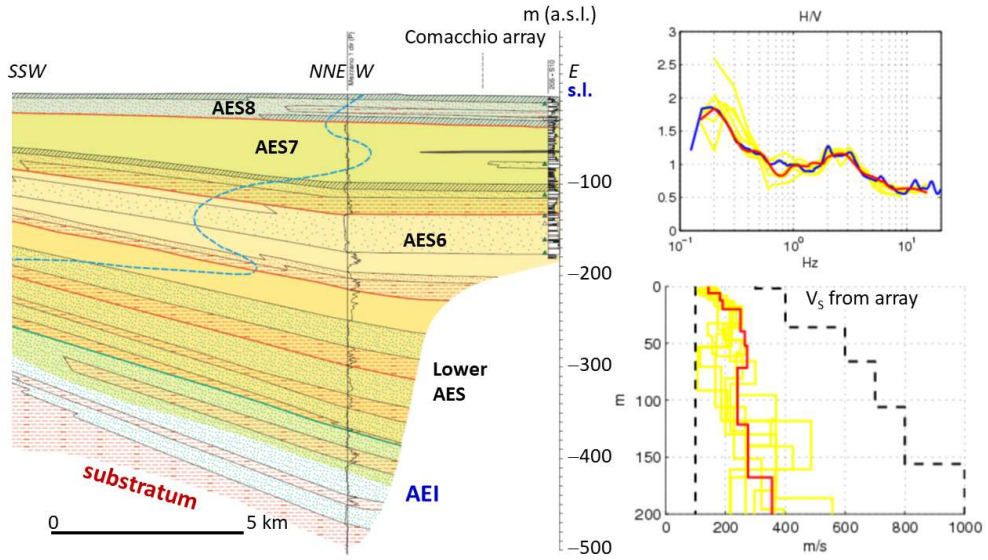

Figure S12. Distal areas, coast and Po delta: comparison between stratigraphic data (geological cross-section from Geological Map of Italy, sheet no. 205 "Comacchio"), H/V spectral ratio and Vs profile from ambient vibration measurement (array) in the Comacchio urban area (unpublished data, measurements by Dr. Domenico Pileggi, EGIS System srl).

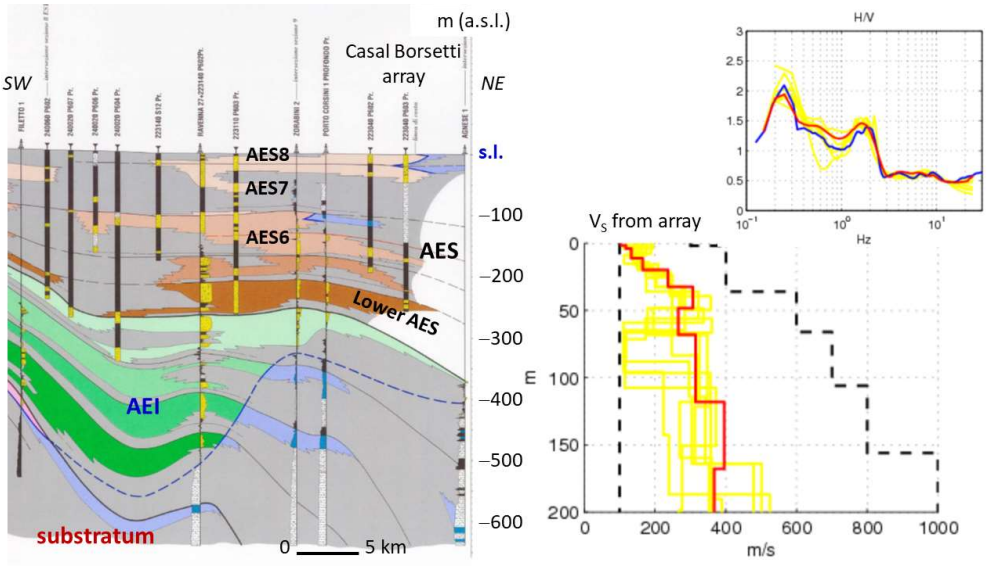

Figure S13. Distal areas, coast and Po delta: comparison between stratigraphic data [11], H/V spectral ratio and Vs profile from ambient vibration measurement (array) in the Casal Borsetti area (unpublished data, measurements by Dr. Domenico Pileggi, EGIS System srl).

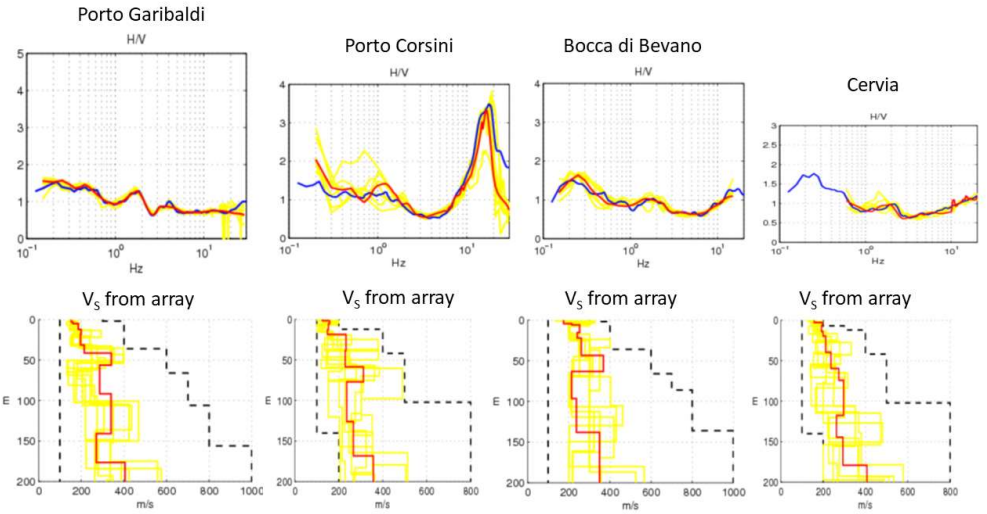

Figure S14. Distal areas, coast and Po delta: H/V spectral ratios and Vs profiles from ambient vibration measurements (array) along the coast from Porto Garibaldi to Cervia (unpublished data, measurements by Dr. Domenico Pileggi, EGIS System srl).