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Seismic array analysis in the Italian candidate site for ET

We present the results of three temporary deployments of seismic arrays, installed in two vertices of a possible configuration of ET in the area of the Italian candidate site (Sardinia). The experiments, aimed at investigating the local noise sources and the seismic velocity structure, were carried out in 2021 and 2024 with different geometrical layouts, number of sensors and total recording time. In this study, we show the results primarily focusing on the noise spectral characteristics and its azimuthal distribution obtained by beamforming analysis. Moreover, we extract Rayleigh wave dispersion curves from FK-analysis, which are finally inverted to obtain a one-dimensional, shear-wave velocity profile of the subsurface.
Seismic data confirm the exceptionally low level of seismic noise for frequencies above 1 Hz, as their spectra approach the Peterson's NLNM. Regarding the noise source distribution, we are able to adequately reconstruct the seismic wavefield only in the 10-20 Hz range, showing an almost azimuthally homogenous noise source distribution for all arrays, with slowness between 0.4 and 0.5 s/km. The inversion of dispersion curves in the same frequency range highlights the presence of a rather homogeneous, high-velocity terrain (Vs = 2-3 km/s) in the first 100 m, as suggested by the local geological evidences. These characteristics of the shallow subsurface are also confirmed by the flat HVSR spectra across all arrays, thus excluding the presence of resonant, low-velocity layer at shallow depth.

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