



Ambient-noise tomography of the Geneva basin in a geothermal exploration context

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Switzerland is strongly promoting the development of geothermal energy extraction from low- to high-enthalpy resources. However, there are still several uncertainties regarding feasibility and associated costs given our little knowledge of the subsurface conditions. One of the main issues preventing the broad development of geothermal energy exploitation is the high cost of geothermal exploration compared to the expected economic benefits. Affordable passive seismic methods may provide valuable information about the geological structures targeted for geothermal energy extraction.

In this context, we deployed a temporary seismic network of 20 broadband stations in the Greater Geneva area for about 1.5 years (Aug. 2016 - Feb. 2018). We use the continuous recordings to perform an ambient-seismic-noise tomography of the basin. We present the retrieval of surface Rayleigh waves through cross-correlation of ambient noise, the extraction of the group-velocity dispersion curves, and the inversion of: (1) 2D group-velocity maps at various periods, and (2) a large-scale 3D shear-wave velocity model of the basin. Finally, we discuss the retrieved features of the basin in the light of local geology, previously acquired geophysical datasets, and ongoing geothermal exploration.