Testing Ambient-Noise Tomography as a Geothermal Exploration Method in Switzerland

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Switzerland is strongly promoting the development of geothermal energy extraction from low- to high-enthalpy resources. However, the broad development of geothermal energy exploitation is hindered by the lack of subsurface knowledge and the high cost of traditional subsurface exploration methods. Affordable passive seismic methods may provide valuable information about the geological structures targeted for geothermal energy extraction. In this context, we are investigating the potential of the Ambient-Noise Tomography (ANT) technique. We present past results obtained from surface-wave ANT in the Geneva basin with a sparse seismic network, and we share preliminary insights from the starting PSIGE project aiming to try refracted P-wave ANT on dense nodal networks (~500 nodes) at several Swiss geothermal exploration sites. From synthetic examples based on prior subsurface models, we discuss the expected depth of investigation and potential resolution of the method with various network configurations.