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Ambient Noise Tomography applied to a large-N nodal network in Aargau, Switzerland.

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Affordable geophysical survey methods to image in detail the upper crust are critically needed to encourage the growth of the geothermal sector and ensure safe operation conditions. Recent ambient noise imaging studies using surface or body waves retrieved from dense nodal networks have shown that it is a promising technique for reliable, low-cost geothermal prospection and monitoring. The northern canton of Aargau is one of a few regions in Switzerland being investigated for its high geothermal potential. The local positive heat flow anomaly is thought to be linked to hydrothermal circulation along faults bounding the Permo-Carboniferous trough crossing the area. In the Winter of 2020-2021, we deployed a temporary dense network of 210 nodal stations that recorded for about 30 days. The goal was to assess the performance of ambient noise tomography by comparing the derived images against existing 2D seismic reflection profiles and geological data. In this study, we invert for the 3D S-wave velocity structure using surface wave dispersion. We discuss the challenges and solutions we encountered in processing the large-N data such as the automatic picking of the large number (~43k) of dispersion curves and a few solutions we applied, including machine-learning-derived techniques.