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Imaging hydrothermal systems associated with oceanic ridge: ambient noise and travel-time tomographies in the Reykjanes high-temperature area, SW-Iceland.

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Analogue outcrops of hydrothermal fossil systems and simulating pressure/temperature conditions in the laboratory are classical methods for assessing supercritical conditions in magmatic environments. Scientific drilling is used when Earth surface sampled rocks cannot sufficiently explain past geological processes and when geophysical imaging does not sufficiently explain observed phenomena. However, our understanding of structural and dynamic characteristics of geothermal systems can be improved through application of advanced and/or innovative exploration technologies. Unlike resistivity imaging, active and passive seismic techniques have rarely been used in volcanic geothermal areas, because processing techniques were not adapted to geothermal conditions. Recent advances in volcano-seismology have introduced new processing techniques for assessing subsurface structures and controls on fluid flow in geothermal systems. We present here preliminary analyses of seismic records around a geothermal reservoir located both on-land and offshore along the Reykjanes Ridge, SW-Iceland. We deployed 214 on-land stations and 24 Ocean Bottom Seismometers since April 2014. We analyse more than 6 months of part of those records. We present first results of both travel-time tomography and ambient noise tomography and we discuss briefly implications for geothermal exploration in volcanic contexts.