



## **An application of ambient noise techniques to the monitoring of a deep geothermal reservoir in northern Alsace, France.**

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The Upper Rhine Graben (Northern France) hosts one of the most important geothermal anomaly of mainland France. Several deep geothermal sites have been settled over the past few years and future sites are already planned in the area. In this study, we focus on the site of Rittershoffen (North East of France), next to the site of Soultz-sous-Forêts (GEIE-EMC), where a geothermal plant is being installed (ECOGEI project). A large amount of data is now available as several permanent and temporary seismic networks have been deployed for several months to several years within a radius of 15 km around the two sites. This dataset is especially suited to perform temporal analysis of the medium using ambient seismic noise. Considering the depth of the observed structures (up to 3 km depth), the frequency range of interest extends from  $\sim 0.2$  Hz to 5 Hz. The highest part of this range (1 to 5 Hz) is dominated by the anthropogenic activity, which is intense in the area. This noise is characterized by a clustered distribution of the sources and has clear daily and weekly periodicities. The cross-correlation functions (CCFs) have been computed for all possible station pairs of the network. An analysis of the coda stretching has been conducted to highlight potential variations of the medium that could be related to geothermal activities. We observe that the nocturnal noise is more stable over time and, therefore, more suitable for temporal analysis of the correlations coda. Near 5 Hz, a significant stretching of the CCF coda up to 0.4% is observed on several station pairs which coincides with the drilling of the wells at Rittershoffen platform. We discuss our preliminary observations to determine whether they can be safely interpreted as speed variations at depth induced by the drilling or if they can be related to temporal variations of the spectral content of the noise.