This study investigates the seismic activity occurring at the Larderello-Travale geothermal field (LTGF), central Italy, from June 2017 to January 2018. We deployed a network composed of 9 broadband stations around the Venelle 2 well drilling for supercritical fluids. During the experiment, we recognize a group of events that usually occur in swarms and that show a periodic pattern, a narrow frequency band, and almost identical waveforms. Their source is estimated to be located near the well, and their occurrence ceases after about 3 weeks from the conclusion of the drilling. We propose a causal link with the drilling operations where pressure fronts inside the well may promote phase changes and fluid flow across the drilled formations.

Our study sheds light on the anthropogenic seismic activity at the LTGF. More generally, we show that microseismic activity occurring during drilling in high-pressure and high-temperature conditions can remain at low magnitudes and that geothermal wells targeting geothermal fluids in such systems may be handled safely despite the critical conditions encountered at depth. The drilling of the Venelle 2 well is an encouraging example for the development of geothermal energy in critical conditions.